ABORIGINAL HABITAT AND ECONOMY

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PREFACE

The spelling Aborigines has been adopted in this thesis in accordance with the usage prescribed by the Commonwealth Style Manual and that adopted by the Aborigines Welfare Departments of the various States. The word applies to the Aboriginal inhabitants of Australia.

The tribal spellings adopted in the text are not necessarily those used by the authors cited. They have been standardised in accordance with the spellings used in the Preliminary Tribal Index of the Australian Institute of Aboriginal Studies. Variant spellings encountered in the literature are given in the lists comprising Appendix 2.

The plant names used in the tables are those used by the author cited. The difficulty of establishing the species referred to makes it impossible to accurately standardise the nomenclature. It should be realised that this could lead to the one species being recorded under more than one specific, or even generic name. Some plant names quoted have been erroneously applied to Australian flora, or have been mis-spelled. These have been retained on the grounds that they give future research workers an indication of the botanical knowledge and scientific ability of the author quoted.

CHAPTER 1

INTRODUCTION

> Wee may first deduce Varietie of fashions and customes. But secondly, differences of places and times cause differences of fashions and customes, and this of necessitie. For it is not possible...that men that live under different clymates should all live after one fashion.
>
> [(Méric) Casaubon], A Treatise of Vse and Cvstome, London 1638.

The aim of this thesis is to explore the theme of man-environment relationships in a continent which was populated by people who appear to have possessed a common cultural background. The conceptual framework of the problem is bound up with the settling of the Australian continent by the Aborigines, and more particularly, how the descendants of these migrants adapted their way of life to the wide range of habitats they encountered in spreading through Australia, and whether such adaptations are visible in the landuse patterns and economic life of the Aborigines.

The question of the relationship between man and his environment has been an enduring one in the history of geographical literature. Writers from Hippocrates and Strabo to Semple and Huntington have all sought to explain the observable variations in the physical, mental and

social characteristics of mankind by references to the differences in the geographic environment. Many of the earlier writings consist of broad generalisations about the unpleasant characteristics of people living in certain latitudes, in comparison with the favourable characteristics of the people living in the writer's own latitude.

Just as many early environmentalists were satisfied to make such generalisations, so too were many writers content to speak of the Aborigines throughout Australia as if they were a completely uniform people. This view is most clearly illustrated in the following quotation from East (1889, p.1):

> They are the same colour, have no defined religious belief, disregard wearing apparel, have no permanent dwellings nor real property, live entirely by the chase or the uncultivated productions of the soil, and have so many savage customs in common that the impression has naturally been received that a description of the natives in any one locality, with very little modification, is applicable to the whole of the race throughout the island.

While it would be unfair to level this criticism at many of the more modern writings, recent anthropologists have done little to challenge this view. Current work is characterised by specialised and detailed studies of social organisation and similar aspects of culture. So far little synthesis of this material or comparative work has been carried out, particularly in the field of the economic life of the Aborigines. Meggitt is one of the few anthropologists to touch on this topic and, after what is probably a very superficial consideration of the technologies and economies of groups in several

ecologically differentiated regions, comes to the conclusion that there was a 'basic way of life which we can refer to simply as Australian Aboriginal culture' (Meggitt 1964, p.6). The intention of this study is to question this conclusion by studying the differences in the Aboriginal economies of several areas and to attempt to assess the role played by the environment in promoting them.

Opinion is divided over the relationship between the Australian Aborigine and his environment. Some writings show the influence of determinist thought and portray the environment as a causative factor in culture, while others claim that diffusion of culture from outside areas was a far more important factor in Australian culture than invention or adaptation. Favenc, an early example of the former, considered that since the coastal natives occupied a more favourable environment than the inland tribes, given sufficient time they would have advanced to a rude form of civilisation (Favenc 1893, p.320). Strehlow (1965, p.121) makes a far more moderate appeal to environmental influence when he says that the institutions of communities which have not learnt how to effect deliberate changes in their environment will be influenced at many points by adaptations made to what is to them an unchangeable environment. He qualifies this by pointing out that although the geographical environment in two areas may be similar, the cultures present may show considerable variation.

The second school of thought has its most precise statement in the following quotation from McCarthy (1957, p.95):

> ...it is apparent that the Aborigines have imposed their way of life on the Australian habitat, varying widely as it does, and no single force or group of pressures, either biological geographical, historical or psychological in nature has succeeded in changing their food-gathering economy.

One feels that McCarthy might be placing too much emphasis on the assumed lack of invention in Australian culture to the exclusion of other aspects of culture in which adaptation may take place. This is particularly evident in the light of other statements made in the discussion of local variation in the same article. McCarthy (1957, p.90) says:

> Local variation is an important principle in Aboriginal culture. This claim is borne out by a study of the economic life, which, although conforming to a common pattern, is nevertheless not a uniform one followed throughout the continent, nor is the equipment used in all areas dictated solely by the varying habitats.

The apparent contradiction in McCarthy's statements stems from his somewhat unrealistic distinction between economic life and material culture. This reflects his interest in the 'interrelated problems of environment, invention and diffusion...' (McCarthy 1957, p.92). However, the present study is not concerned only with the relationship between habitat and technology, but rather with questions of the relationship between economic life, including material culture and landuse patterns, and the different environments in which the Aborigines lived. The present state of knowledge does not permit the study of the adaptations made to changing environmental conditions in the one area through time.

This approach brings the study very close to that rather nebulous field of human or social ecology, the concepts of which are borrowed from biology. In its modified form human ecology is concerned with 'the interaction of physical, biological and cultural features within a locale or unit of territory' (Steward 1955, p.13). When stated in this way the principal meaning of human ecology is 'adaptation to environment', but there is little agreement or precision as to the use of the concept. Bews (1935, p.13) considers its value to lie in its synthesising effect, and that it provides a means of answering the 'question of how and why man is as he is and behaves as he does' (Bews 1935, p.14). This type of approach has led to the production of much essentially descriptive work with the sole aim of portraying the local web of life. Steward (1955, p.31) criticises this limited, descriptive approach and claims that the concept should be used as an operational tool rather than an end in itself. To this end he develops the concept of cultural ecology which

> differs from human and social ecology in seeking to explain the origin of particular cultural features and patterns which characterise different areas....The problem is to ascertain whether the adjustments of human societies to their environment require particular modes of behaviour or whether they permit latitude for a range of possible behaviour patterns (Steward 1955, p.36).

While the aim of this study is to go further than the description of the web of life in several areas of Aboriginal Australia, it is not possible to pursue the problem to its origins as prescribed by Steward. The nature of the material available and the impossibility of

intensive empirical study will not permit this. However, the methodological procedures proposed by Steward still have considerable relevance to this study. The three fundamental procedures outlined by Steward (1955, p.40) involve the analysis of the following:

(1) The interrelationships of the exploitative or productive technology and environment.

(2) The behaviour patterns involved in the exploitation of a particular area by means of a particular technology.

(3) The extent to which the behaviour patterns entailed in exploiting the environment affect other aspects of culture.

The first category requires consideration of the food and water supply present in any one area and the ability of the people to exploit this through the application of their technology and hunting and gathering techniques. The second category is to some degree an extension of the first and relates to the choice of the actual methods and equipment employed in getting a livelihood and questions of seasonal variations in this. It also involves consideration of the size and mobility of hunting units, the changes in their composition through the year and the interaction between groups. The final category is the least tangible of the three and could include discussion of such factors as the relationship between social structure and economic activity. For the purpose of this study attention will be restricted mainly to questions of population size and density and how this reflects the habitat and the ability of the people to exploit it.

Through the study of these aspects of Aboriginal life in various parts of Australia at a time as close as possible to that of first contact with the Europeans, the writer hopes to make some assessment of the variation in the economic life of the Aborigines, and from this to gain some insight into the role played by environmental adaptation in promoting these differences.

CHAPTER 2

THE PROBLEMS AND SOURCES

As in most research projects the approach one adopts is a compromise between what is ideal and what is possible within the limits prescribed by the study itself. Obviously a study of this nature would be most valuable if carried out in a thorough, quantitative, scientific manner based on fieldwork among functioning communities; but the material itself is not amenable to this kind of treatment, even if time were available for such a study. The past tense must be used when referring to indigenous Aboriginal culture, for no tribes exist with a culture completely unaffected by European contact. Some have been radically changed, while others have become extinct.

McCarthy and McArthur's (1960) work remains the only attempt to apply such a scientific approach to the economic life of the Aborigines, and the difficulties they encountered underline the impossibility of applying these methods to the study of man-environment relationships in pre-European Australia. The authors recognise that the results gained do not necessarily apply to the pre-contact conditions and are valid only for 'the actual groups studied in their present environment' (McCarthy and McArthur 1960, p.146). These people differed from their forebears in that they had lived for part of their lives in mission or government settlements, and that the equipment they used may have been more efficient than those previously used. In addition to this the reduced

population on the land may have increased the amount of food available in any one area.

The length of study of any one group varied from 14 to 21 days and this is obviously insufficient time to gain any inkling into the seasonal patterns and variations in the economy. Thomson (1939) has shown how the emphasis of the Aboriginal economy can change from one food-source to another with the changing seasons, and how the effect of this can be traced in their movements, hunting methods and material culture used. This would necessitate lengthy periods of observation throughout the year, or ideally, the study of a group's activities over a whole year. The time necessary for this intensity of study would seriously limit the possibility of inter-area comparisons and defeat the purpose of this study.

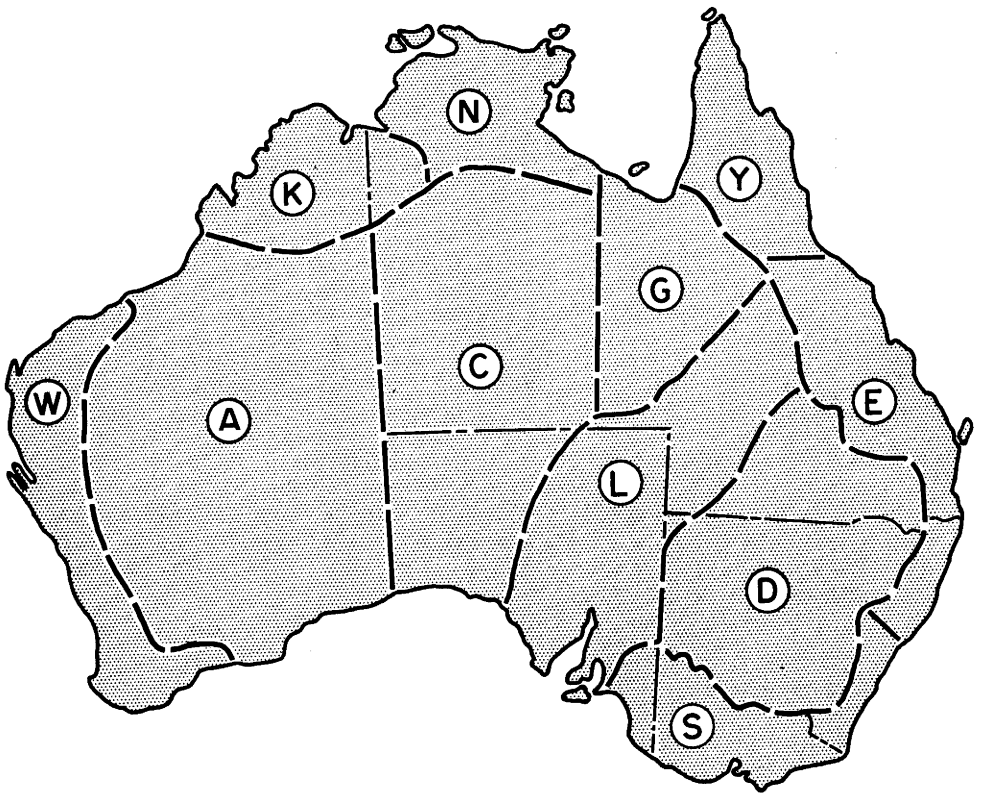
Because of these limitations this study must be limited to a reconstruction of the activities of various Aboriginal groups from existing material. In this sense the present work is not original, but is concerned in marshalling the available literature on various aspects of the subject and arranging it in such a way as to bring diverse observations to focus on a newly conceived problem.

Just as it would not be possible in the time available to study more than one group's activities at first hand, so too is it impossible to process all the literature relating to the 700-odd tribes which inhabited Australia. It is necessary to restrict the study to particular groups and areas. Two factors affect this choice; the amount of material available and the need to encompass as wide a range of habitats as possible.

The choice of the latter is hampered by a lack of detailed mapping of the natural history of most areas of Australia, and because of this, an inability to systematise or classify the many types of environment present. From an anthropological point of view Meggitt (1964, p.3) distinguishes five major environment-economy categories in Aboriginal Australia. They were: littoral, riverine, tropical forest, plains/savannah and desert. Stanner (1965, p.24) combines tribal distributions and vegetation divisions to distinguish the following tentative habitat categories: deserts, spinifex-steppes, grasslands, scrubs and heaths, savannah-woodlands and forest. To some extent the two authors' categories overlap, but since Stanner's takes no account of physiographic variations, Meggitt's classification provides the most useful framework for this study.

Because differences in social organisation might affect the economic activities of the groups, consideration was also given to the major divisions in social organisation among the Australian Aborigines. With this in mind, the division of tribes devised by Capell (see Map 1) and adopted by the Australian Institute of Aboriginal Studies was used as a guide in choosing areas. The criterion of this classification is language groups, but Capell (unpub. MS) claims that these divisions also coincide with the major divisions in social organisation. Cultural influence from New Guinea and other areas to the north should also not be ignored.

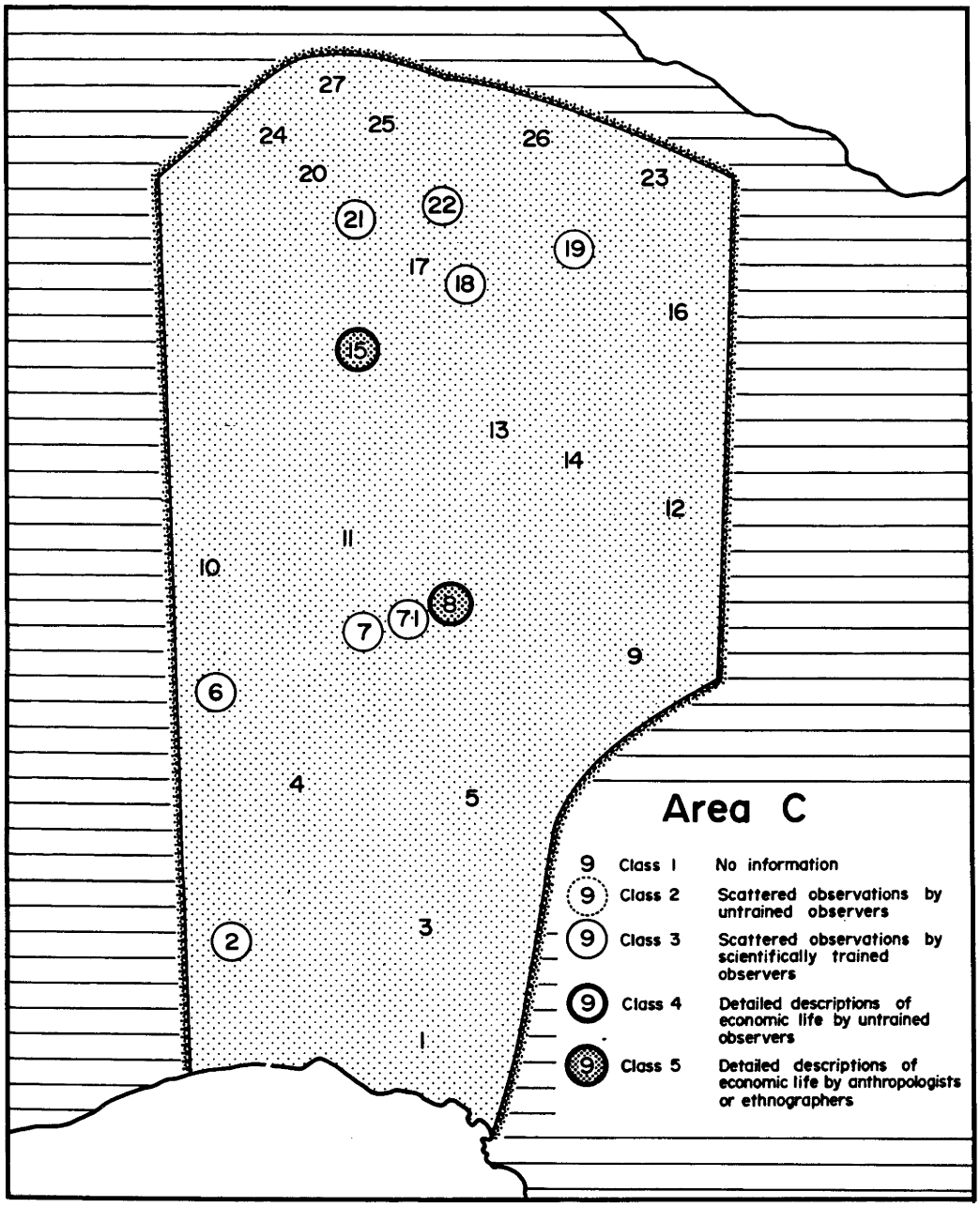
The final factor influencing the choice of study areas is the material itself. Very few tribes or local groups are documented in sufficient detail to permit



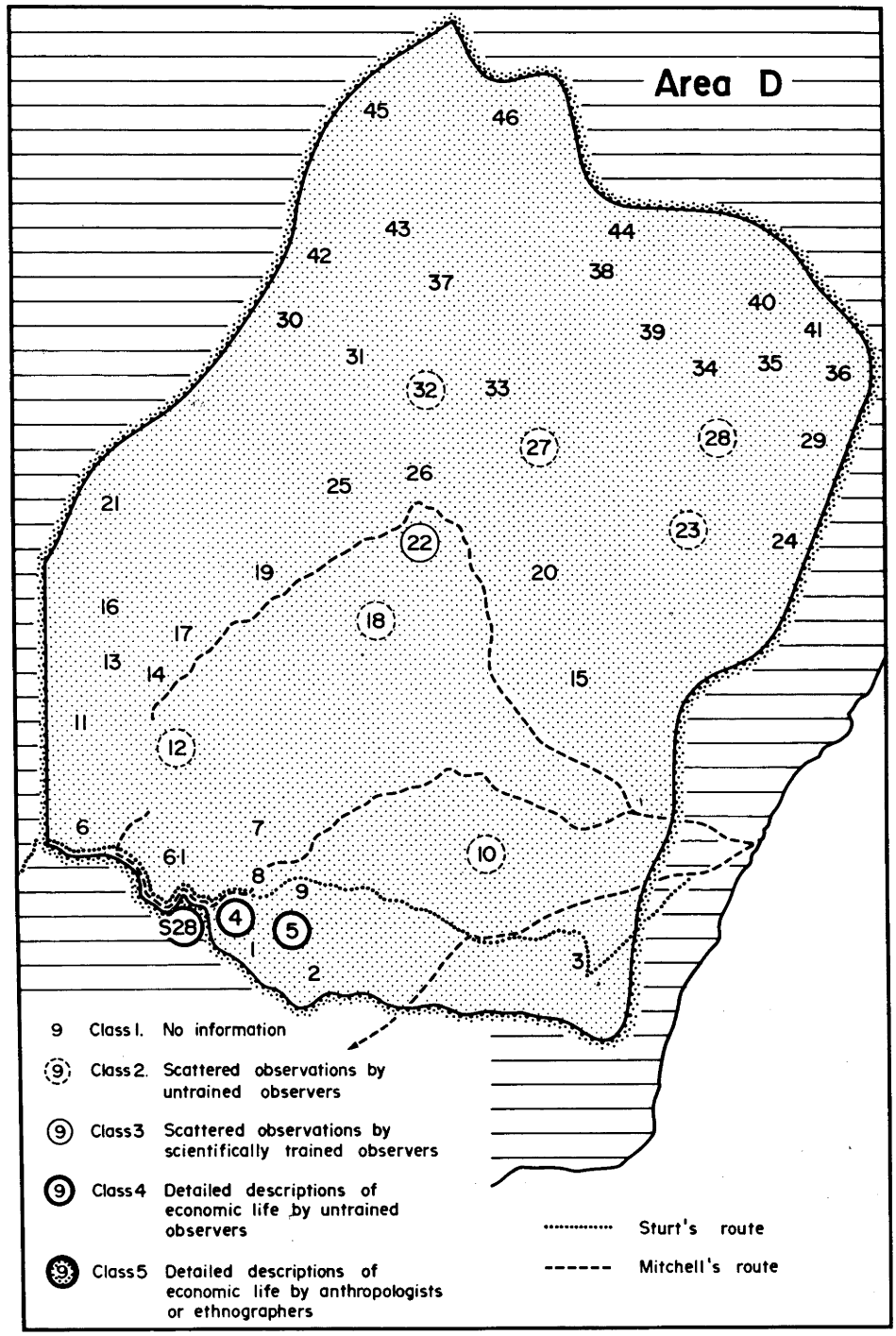
Map 1. The tribal subdivisions adopted by the Australian Institute of Aboriginal Studies.

intensive study of a particular community. Sufficiently large areas must be chosen to ensure a reasonable amount of material, but only a generalised picture of the range and variation of activities in the area can be gained from this information. Very little information is available on the Aborigines in the plains/savannah regions and also on those living in the tropical forests. The choice of groups must thus be restricted to tribes living in the desert, riverine and littoral environments of Australia, and within these habitats the tribes studied should come wholely from any one of the tribal divisions of Map One. With this as a guiding principle Areas C, D, S and Y were chosen for study. Maps 2, 3, 4 and 5 show the distribution of material dealing with the Aborigines in each area.

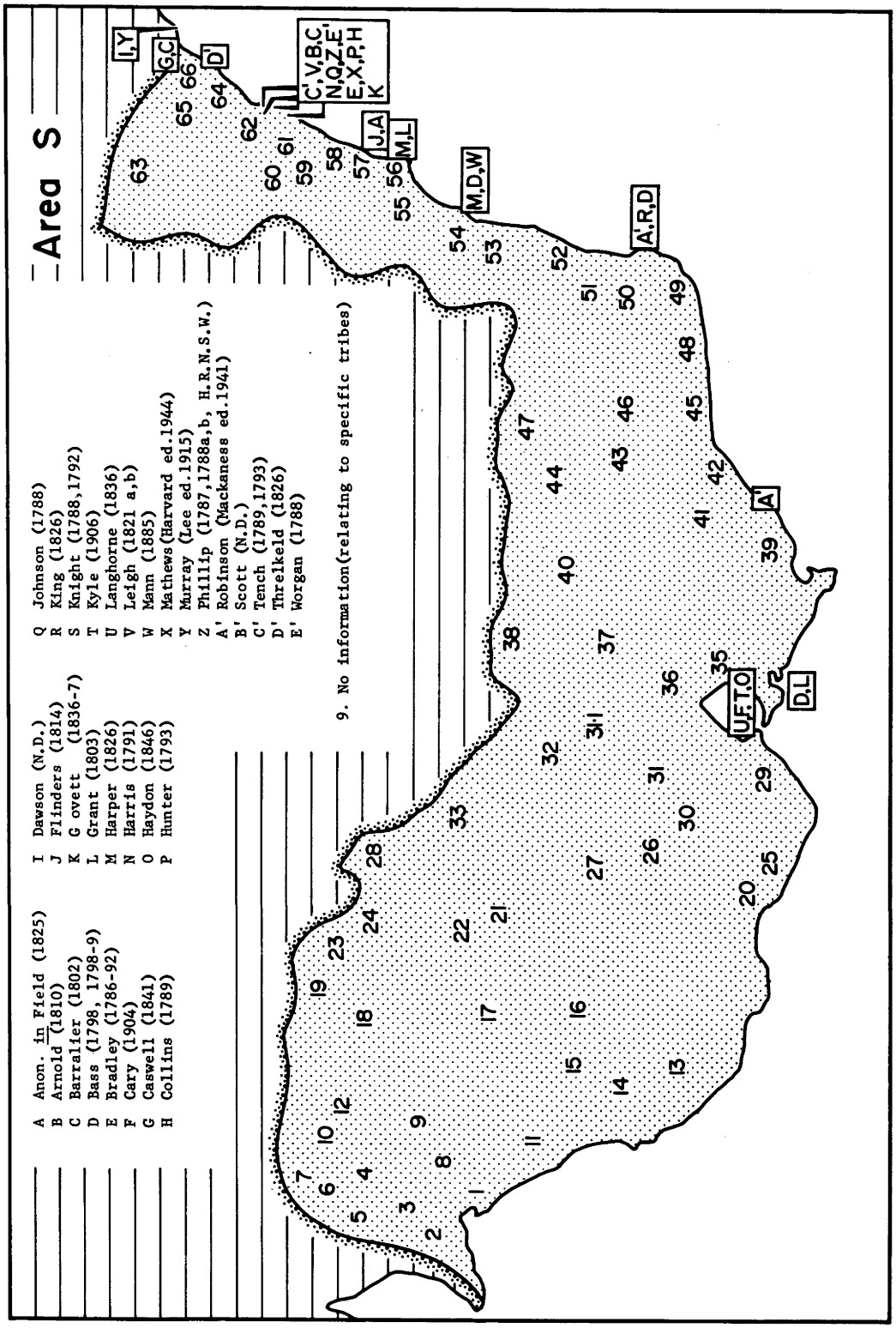
A large part of Area C is classified as arid to semi-arid and provides an area in which the adaptations of the Aborigines to an arid environment can be studied. Map 3 shows that a large part of the information on the Aborigines in Area D is concentrated in the western and more arid parts of the region, but the prime interest here is the riverine environment along the courses of the Murray, Darling and Murrumbidgee Rivers which provide a wealth of aquatic food not available to the natives in adjacent areas. The coastal people in areas S and Y had the choice of exploiting both the marine and terrestrial food sources of their habitat. The people in Area Y showed the influence of cultural infiltration from the north and a comparison of the economic life there with that in Area S might provide insights into the importance of cultural importation as apposed to local invention, and its importance in changing the economic of the Aborigines.



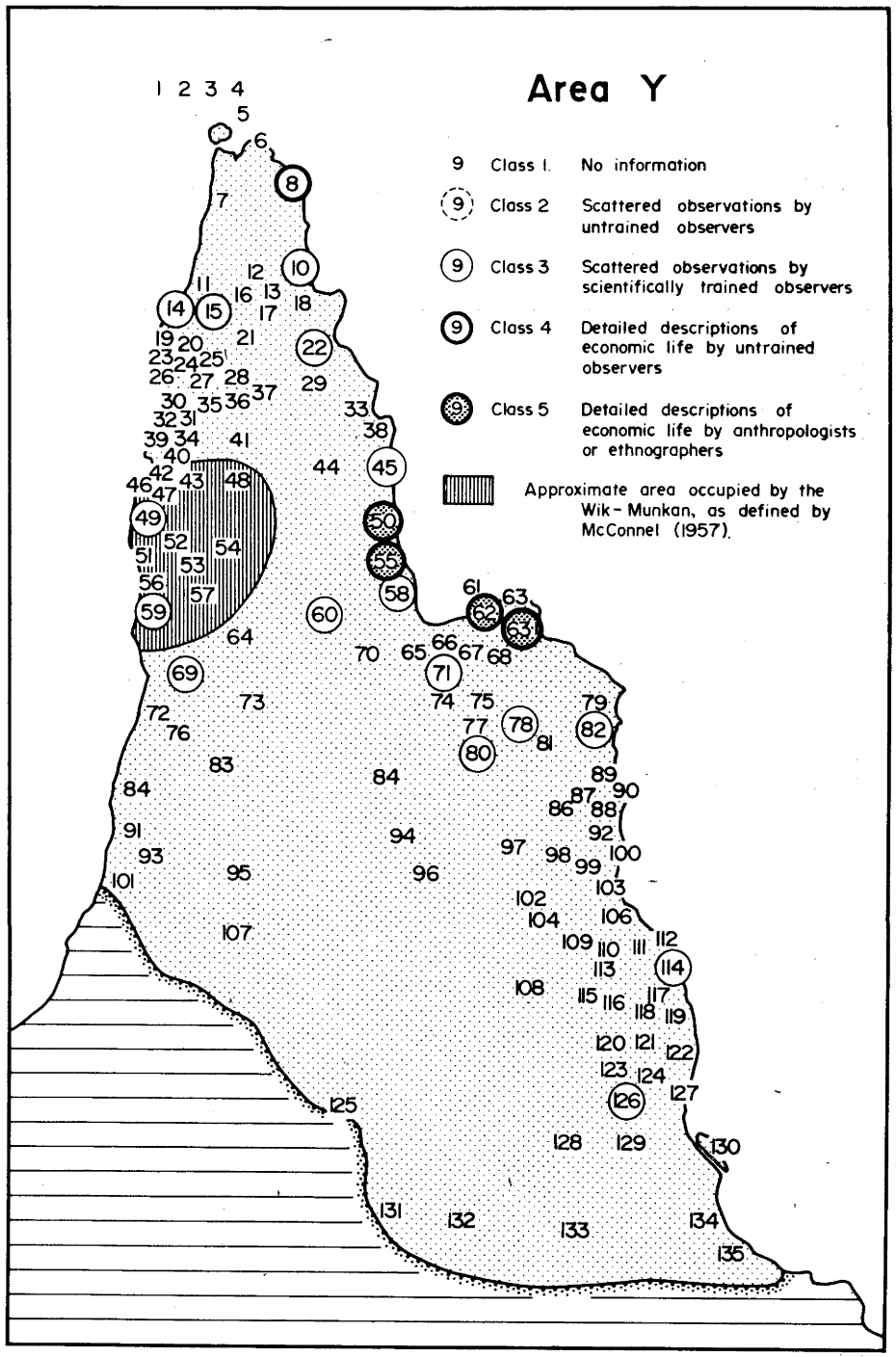
Map 2. The distribution and types of information by tribes in Area C. The numbers relate to the tribe names in Appendix 2 and are placed in the centre of the approximate tribal area. Tribe names and locations are those adopted tentatively by the Australian Institute of Aboriginal Studies.



Map 3. The distribution and types of information by tribes in Area D.



Map 4. The distribution of information by areas and authors in Area S. No detailed information relating specifically to tribes is available.



Map 5. The distribution and types of information by tribes in Area Y.

Within the two coastal areas some environmental differences are evident. The eastern coast of Cape York is fringed by a coral reef. This is absent from both the western coast of Cape York and from the coast of southeastern Australia.

Between them, these three areas contrast some of the broad environmental types which confronted the Aborigine in Australia. The study of their economic life and the adaptations they made to the differing habitats might reveal the importance of the environment in shaping their economic life and influencing their culture.

The Sources

Several possible avenues of source material are open to the research worker in this field. By far the richest source is the great quantity of literature making direct or indirect observations on the Aboriginal way of life. Another source is the information gathered at first hand from Aboriginal and European informants. Other possible but rather dubious sources include the use of Aboriginal place names and the interpretation of native myths.

While the study of place names might lead to an understanding of the character of an area and its importance to the Aborigines, their interpretation poses some problems. The Aboriginal names adopted by the Europeans were not necessarily those used by the Aborigines. In some examples they may represent what the Europeans thought the Aborigines called the area, or even the Aborigines' replies to questions they did not understand. European preference for euphonious words was

also a factor in the adoption of Aboriginal place names. Mitchell's instructions to surveyors on the use of native names show that little thought was given to authenticity. He was concerned to establish a uniformity of spelling and pronunciation, 'as well as to avoid the printing of long names, which are by no means desirable on maps' (Havard 1934, p.121). Thus place names are at least once removed from Aboriginal usage, and even if it can be established that Wagga Wagga was the local natives' name for a 'place of many crows', this gives no indication of the economic importance of crows to the Aborigines.

The myths, legends and song cycles of the Aborigines could provide a valuable source of information because these are, according to McConnel (1957, p.xxi):

> ...intimate word-pictures of the way of life of these people: their comings and goings, the daily walkabout, the camping, the hunting, the cooking, the arts of making, the skills and achievements, the intimacies of family life, its fears and conflicts, romances, quarrels, and fights, the punishments for disobedience to tribal law, the ritual behaviour, the intimate knowledge of nature's ways, the humorous mimicry of human idiosyncrasies and the peculiar habits of the creature world are all deftly interwoven.

However, extreme caution must be used in interpreting these myths, for without independent supporting evidence they can be more misleading than useful. The Berndts (1947, p.133) found evidence in a song cycle from north-eastern Arnhem Land to suggest that the ancestors of these people had seen, used, and even helped the visiting Macassans make pottery from the clay of termite mounds. To use this alone as decisive evidence would be highly questionable, and until analyses of the technological

aspects and the characteristics of the clays from Arnhem Land and Indonesia are carried out (the Berndts suggest this should be done on p.134) it would be precipitate to say that the pottery was made in Arnhem Land. On this question McCarthy and Setzler (1960, p.294) say that

> ...since no structures were found by us which could be identified as pottery kilns, such as those reported from China or southeast Asia, we must conclude that pottery fragments collected on the various trepang sites were not made in Australia but were brought by the Macassans to these northern shores of Arnhem Land.

In a similar situation in Cape York where certain elements in the culture were obviously borrowed from the north, the Aborigines met every question relating to the origin of these traits with the statement that their culture heroes found them (Thomson 1933, p.468). One can feel no more justified in reconstructing the everyday life of the Aborigines from these myths than one could feel so in writing an early British history from the legends of King Arthur. They may provide insights, but never indisputable proof.

The use of informants' replies is also beset with difficulties. As well as the dangers inherent in the method itself, the number of informants in most areas is likely to be so limited that there is little chance of effectively cross-checking their responses, or providing an adequate coverage of each of the areas chosen for study. The writer's experience in using informants has not been highly successful. Few of them had knowledge of the Aborigines at an early period of contact and so had little chance of observing their activities in a little modified state. Where useful replies were received, these

consisted of descriptions of the main foods eaten, with little reference to quantities eaten, seasonal variations and critical elements in the food supply, even though they were asked to discuss this if possible. The sections of their replies which were of most interest were the incidental observations on the Aborigines' attitude to a particular source of food, and other less tangible things which often escape the attention of many fieldworkers. The informants contacted by the writer in Northern Queensland had little or no direct contact with the Aborigines, but quoted freely from various books on the Aborigines in the area. Aboriginal informants might be able to give more complete descriptions of Aboriginal life, but since many members of the present generation have had continued contact with mission life, it is questionable how accurate a picture they can give of traditional life. Where contact with informants must be made through interpreters, the possibility of misinterpretation is always present.

The Literature

The literature of relevance to this study falls into four broad groups. The first of these entails the more or less incidental observations on the Aborigines contained in the journals of the explorers and in the reminiscences of travellers. The contact these writers had with the Aborigines was rather fleeting. The second group includes the memoirs, reports and reminiscences of settlers, squatters, missionaries, government officials and the occasional escaped convict or shipwrecked sailor who had contact with the Aborigines over a longer period of time.

The collations which comprise the third group draw upon the observations of the writers in the first two groups in an attempt to synthesise the material and construct more generalised pictures of the life of the Aborigines over large areas. The best examples of this type of work are Curr's The Australian Race and R. Brough Smyth's The Aborigines of Victoria. In both these works the authors drew upon published accounts, their own experiences and the answers to questionnaires sent to settlers and public officials, notably policemen and magistrates. This latter method was also used extensively by earlier workers whose works comprise part of the final group. This group is mainly distinguished in that it publishes the results of organised research into the life of the Aborigines. The authors were no longer concerned with giving anecdotal or general accounts of the Aborigines they observed; their attention became focussed on particular problems, the origin of which can often be traced to the theoretical problems confronting the anthropological thought of the day. Many of the works in this later group were carried out by people with training in the fields of anthropology or ethnology.

Each of the groups poses its own problems in regard to the capabilities and interests of the writers, the contacts they had with the Aborigines and the aims with which their works were written, as well as the tempering effect of current social attitudes towards the Aborigines. All these factors affect the value of such works to this study and these problems will be discussed at greater length in the following. However, it would be fair to say that, with the possible exception of several papers by

Thomson, none of the writers was concerned with the problem now being studied.

Explorers' and Travellers' Journals

These journals were the product of many different expeditions with similarly differing purposes. The earliest include the journals of the maritime explorations of discovery along the Australian coast, and the follow-up survey expeditions of Flinders, King, Blackwood and others. The expeditions of the 'Beagle' and the 'Challenger' were primarily research and collecting expeditions. Practically all of these voyages were accompanied by personnel with some scientific training, particularly in the field of the Natural Sciences. The list would include such names as Banks, Solander, MacGillivray, Wilcox, Jukes, Huxley, Darwin, Mosely and others. On land these works have their counterparts in the journals of such explorers as Oxley, Sturt, Mitchell, Eyre, Grey and so on, as well as in the writings of such travellers as Bennett, Strzelecki, Lumholtz and Henderson. Even though these works may be spread over a considerable time span, the methods of observation and the details recorded are remarkably uniform. The passages relating to the Aborigines consist mainly of descriptions, often superficial, of the visible aspects of Aboriginal life; the material culture, the weapons, implements and utensils used, the foods eaten and the methods used in collecting them and, all too rarely, references to the size of the groups seen. At worst, some journals merely record the skirmishes they had with the Aborigines. Generally speaking, this source of information provides a

considerable quantity of purely descriptive material in which no attempt is made to draw the material together into a more general survey. This deficiency stems from the nature of a journal as a day to day record of observations on many topics. Eyre and Grey are exceptions to this, and the reasons probably lie in the greater contact they had with the Aborigines of one area. Eyre's observations on the Aborigines comprise half of the second volume of his journal and relate to the Aborigines of Moorunde, where he was Resident Magistrate from 1841 to 1844, and hence this part of his work might be more properly placed in the second group. However, his incidental observations also provide a valuable source of information.

While this source of information has obvious shortcomings as to the picture it can give of Aboriginal life as a whole, it does have certain advantages. Firstly, the explorers came in advance of even the earliest settlement, and in some cases at least, remain the only reports of the Aborigines in their pre-contact state. Here it is important to add the caution that while the Aborigines may not have had contact with the Europeans, evidence from both Mitchell and Sturt suggests that exotic diseases, including small-pox, preceded the land explorers, and even if the material culture remained unaffected, the numbers may not be a true reflection of the pre-European numbers.

As observers, many of these people were interested mainly in the visible elements of Aboriginal culture and economic life, rather than the social structure and similar aspects of culture which have become the prime

interest of the present day social anthropologists. During his journey down the Macquarie River in 1828-9 Sturt was instructed to

> ...note the description of the several people whom you may meet, the extent of the population, their means of subsistence, their genius and disposition, the nature of their amusements, their diseases and remedies, their objects of worship, religious ceremonies, and a vocabulary of their language (Sturt 1833, 1, p.187).

It is also relevant to note that most of these observations were made before any stereotyped generalisations about the Aborigines of the continent generally had developed, and so observers were content to describe what they saw rather than analyse it in relation to any preconceived notions they held about Aboriginal culture. It is surprising how many later workers dismiss Aboriginal culture as being completely uniform throughout the continent and therefore not worthy of detailed discussion.

The very nature of a journal as a day to day account means that the observations made can be fixed in time and set in an approximate seasonal framework. Because of the tendency for the early coastal surveyors to call at the places visited by Cook it is possible in some instances to make comparisons between their observations of the same places at different times of the year and thus gain some insight into the seasonal variations of activities, as well as providing some check of the accuracy of the various reports. The fact that several people on the one ship kept journals means that there is some possibility of checking observations. However, the recording of the same observation in several journals should not be taken as

indisputable confirmation of the observation because of the possibility of copying or discussion between the members of the ship's company. This is particularly obvious in comparing Wilcox and MacGillivray's accounts of the voyage of the 'Rattlesnake'. MacGillivray's account, published in 1852, contains many passages obviously borrowed from Wilcox's unpublished manuscript journal, now in the possession of the Mitchell Library, Sydney.

The scientific training of these observers encouraged them to be more accurate and less imaginative than some of the earlier explorers like Dampier. It is interesting to contrast Dampier's description of the Aborigines with that of Cook and later observers. Dampier (Masefield ed. 1906, 1, p.453) describes the Australian Aborigines in the following terms:

> The Inhabitants of this Country are the miserablest People in the world....setting aside their Humane Shape, they differ but little from Brutes. They are tall, straight-bodied, and thin, with small long Limbs. They have great Heads, round Foreheads, and great Brows. Their Eye-lids are always half closed, to keep the Flies out of their Eyes,...They have great Bottle Noses, pretty full Lips, and wide mouths. The two Fore-teeth of their Upper jaw are wanting in all of them, Men and Women, Old and Young; whether they draw them out I know not: Neither have they any Beards. They are long visaged, and of a very unpleasing Aspect, having no one graceful Feature in their Faces.

This contrasts with Cook's (Beaglehole ed. 1955, p.508) less impassioned, if somewhat idealistic, description of the Aborigines:

> The Natives of this Country are not numerous. They are of a very dark brown...colour with lank black hair, they are under the common size

> and seem to be a timerous inoffensive race ...Men, women and children go wholy naked, ...they live chiefly on Fish and wild Fowl ...for they do not cultivate....These people may truly be said to be in the pure state of Nature, and may appear to some to be the most wretched upon Earth: but in reality they are far happier than...we Europeans...

In fact the difference between the people Banks observed and the accepted picture of the New Hollanders based on Dampier's description led him to state (Beaglehole ed. 1963, 11, p.112) that the Australians he saw were neither negroid nor the natives described by Dampier. Where bias of this nature occurs it is reasonably easy to detect, but the more subtle exaggerations are far less obvious and therefore more dangerous.

The observers' knowledge of botanical and zoological nomenclature meant that they could give the names of many of the plants and animals eaten, where other workers were able only to give the common or Aboriginal names, making it difficult to establish the true identity of the object being referred to. This problem also crops up in the nomenclature of the material culture. The terms used to refer to the implements were often purely descriptive and not standardised in any way. Thus one sees spears referred to as sticks, shafts, javelins, gigs and lances.

This source of evidence has obvious draw-backs. The time element involved is necessarily short and contact may have occurred only over a few hours, and at best, not over a fortnight. Because of this the observations cannot hope to give a balanced picture of the activities of the Aborigines. However, they do provide a record of what the Aborigines did or ate in a particular instance.

The Reminiscences of Squatters, Settlers, Government Officials, Missionaries and Others

Because of their longer period of contact with the Aborigines and their correspondingly greater chances of observing the everyday life of the Aborigines, one would expect this source of information to prove most valuable. Unfortunately, it often reveals more about the thought processes of nineteenth century Europeans, than it does about their understanding of Aboriginal culture. Like the above material, its real worth to this study is determined by the interests of the writers. Thus missionary and government reports tend to be mainly concerned with matters of education and contact. The rest of the material is spread through pamphlets, books, published and unpublished collections of family papers and journals ranging from the learned journals like the Transactions of the Royal Societies of the various States through to such everyday magazines as Dicken's Household Words and the Illustrated Sydney News. Many of these accounts are little more than accounts of clashes between the settlers and the Aborigines or anecdotal stories about particularly colourful Aboriginal characters. Eyre and Beveridge do write at considerable length on the life of the Aborigines of particular areas. In the more serious writings it is possible to isolate topics which seem to have been of considerable interest to the observers of the day. These include: the way the Aborigines lived and made their living, their beliefs and particularly whether they believed in a supreme being, their intelligence and the possibility of civilising and Christianising the Aborigines, and other such questions which would interest the nineteenth century European who placed himself, and

the principles of western civilisation, at the very peak of the evolutionary process. Despite the very obvious bias which characterises much of this work, some writers have made worthwhile descriptive contributions on the material culture and economic life of the Aborigines of particular areas, and in some instances, these remain our only records of these Aborigines. A disappointing feature of some of this material is the failure of the writers to give the tribal names of the groups they are describing and even the precise location of the area itself. In general, this literature continues the descriptive approach of the previous group, but the topics touched upon are more numerous and the description, at times, more detailed. Some of the later works in this group show an increasing tendency to generalise from the writer's experience with one group to the Aborigines of Australia generally.

Collated Material

In some respects this grouping is a culmination of the developments referred to above. The motivating force behind the production of these works was not always scientific interest in particular problems relating to the Aborigines, but rather they were driven to record Aboriginal customs before it was too late. Brough Smyth's (1878, I, p.v) aim was to 'collect information respecting the customs of the people who had formerly owned the soil of Australia, and...make accurate drawings of their weapons and ornaments'. Thus the main aim of these works is still descriptive, but the scope has been areally widened, and the authors' prefaces reveal an increasing

interest in the problems of the origin and antiquity of the Aborigines. The material for these works came from three main sources. The first of these is the already published accounts of explorers, settlers and missionaries. The second source is the replies of settlers who corresponded with the collators, or answered the questionnaires sent to them. The latter idea is a valuable one because it collects material from people with first-hand knowledge of the Aborigines and who would probably never have been concerned with publishing it. However, the manner in which Curr's questionnaires were devised tended to limit the respondant's answers to certain channels which reflect the editor's particular interests. This is clearly evident in the questionnaire used by Howitt and reproduced in Appendix 1, with the permission of the Mitchell Library, Sydney. In a sense the material gained from these questionnaires is twice removed from reality. There are problems relating to the bias of both the informant and the collator. Unfortunately, the informants' accounts are not given in full. The editors chose the observations which they considered relevant to the situation as they saw it. The rest was ignored and lost. The third source of information comes from the writers' own experiences with a particular group of Aborigines. Both Curr and Taplin had considerable knowledge of the groups in the areas in which they lived. Despite the obvious difficulties referred to above, such works do provide a wealth of descriptive material which can usually be localised.

The Products of Individual and Organised Research

The writings in this group show a movement away from general description and an increasing interest in certain aspects of Aboriginal life, particularly theoretical problems relating to marriage institutions, social organisation, religion, totemism and comparative linguistics, and the place of these in the developmental schemes propounded by such theorists as Tylor, Morgan and Lang. Mulvaney (1958, p.297) stresses the necessity of recognising the effect of the inspiration and guidance of these writers on the accumulation and interpretation of material on the Aborigines by such early fieldworkers as Fison, Howitt, Spencer and Gillen. The unilinear evolutionists saw the study of the Aborigines as a means of producing evidence to confirm the laws of development they had already postulated. The anthropological literature of the day is full of unfounded pronouncements claiming that group marriage preceded monogamy, and that society develops from maternal to paternal systems. It was this type of a priori reasoning which provided the framework for the first systematic fieldwork in Australian anthropology, and its influence is very evident. Mulvaney (1958, p.306) observes that:

> ...despite the sincere belief of the two teams, Howitt and Fison, Spencer and Gillen, in their objectivity and independence of mind, their facts were frequently collected in response to suggestions from overseas theorists and their selection and classification was as interpretative as the generalisations which they set out to test. All shared a belief in the evolutionary nature of institutional and social processes, and the interaction of question and answer, of Old World theory and Australian practice, resulted in circular and misleading argument more often than has been recognised;...

Mulvaney's (1958, p.312) study of the correspondence between Spencer and Frazer, and between Howitt and Tylor and Morgan shows how influential the theorists were and, in some cases, how closely the 'discoveries' of these workers followed the suggestions or questions of the theorists.

While this material shows a focussing of interest and a narrowing of the field of enquiry, it also shows an increasing interest in social organisation, and perhaps, an increasing awareness of its relevance to the understanding of the Aboriginal way of life as a whole. As a corollary, the literature also shows a marked decrease in the amount of description of material culture and economic activities. This specialisation tends to limit the value of this, and later work, to the present study.

Both Elkin (1963, p.19) and Mulvaney (1958, p.314) recognise the late 1920's as being a period of major change in the development of anthropology in Australia. The setting up of the National Research Council followed the Pan-Pacific Science Congress of 1923, a Department of Anthropology was founded at Sydney University in 1925 for the purpose of training research workers to carry out projects in Aboriginal Australia and in New Guinea and Melanesia, Oceania commenced publication in 1929 and provided, for the first time in Australia, an academic journal devoted to the record of native peoples, and in 1929 the first systematic attempt in Australia to apply statigraphic, rather than conjectural principles in the study of Australian prehistory was initiated by Hale and Tindale at Devon Downs, South Australia (see Hale and Tindale 1930).

Thus it might be assumed that the works in this later grouping should provide the most valuable source of information possible. The advantages of this type of work are obvious. Fieldwork among individual groups over extended periods of time by specially trained research workers would make it possible for the worker to observe the interrelationship of group activities at first hand with an understanding of the problems involved. However, much of this material is only of limited value to a study of this kind. Firstly, it is restricted in time to the period after 1920, a time when many areas had been completely depopulated, or the traditional way of life so modified, that few groups could be studied in anything approaching their pre-contact state. Perhaps a more limiting factor is the specialisation of interests which developed with the increasingly scientific approach. Whereas many of the older works gave general descriptive accounts of the visible aspects of culture, many later works show a split between social anthropology and ethnology. Social anthropology has attracted the greater attention, while enthnology has become almost entirely the province of museum collectors. Social anthropologists have become pre-occupied with questions of social structure and organisation as such, and thus their works fail to raise the questions of the relation of the community to its environment, which is of prime interest to this study. An excellent example of this is the fact that Radcliffe-Brown's (1930-31) description of the Australian tribes has been accepted, explicitly or implicitly, for so long and was only challenged actively by Hiatt in 1962. This challenge has gone some way to

stirring interest in this question and Stanner's paper (1965) can be seen as a response to Hiatt's paper, but it also raises some very important issues and stresses the need to distinguish between the Aboriginal concepts of territory and locality, a factor which has been largely ignored in anthropological writings. Again, few writers pay more than lip-service to the relationship between economic activities and the environment. Indeed some ignore it completely by appealing to unfounded generalisations. Sharp (1934) is a particularly clear example of this. In his paper 'Ritual Life and Economics of the Yir-Yoront of Cape York' he dismisses their economic activities with the following statement (1934, p.36): 'Production among the Yir-Yoront follows typical Australian patterns'.

On the other hand, the ethnologists have specialised in the description and classification of material culture, often without due regard to the activities of the groups who used them, their attitudes towards the implements used, and the manner in which they were used. Thomson (1939) is one of few workers to demonstrate the value of anthropological training for the understanding of the material culture of a group.

As well as these problems relating to the abilities of the observers, their interests and the effect of these on the observations made, the literature presents other problems. None of the areas chosen for study in this thesis is equally well-documented in respect of the groups in the literature discussed above. The tribes which occupied areas settled early in the history of European settlement in Australia are described only in explorers'

journals and settlers' accounts and are not represented in the later more scientific writings, while some of the groups in the later and less densely settled areas feature prominently in this latter group. Thus the literature available is unevenly distributed over Australia and uneven in content. This makes inter-area comparison difficult. The need for comparison also raises the question of the time element. Contact occurred far earlier in southeastern Australia than it did in Arnhem Land and because of this it might be questioned as to whether comparisons can be made between Sydney in 1788 and the Kimberleys in the 1920's. Similarly, the question might be asked as to what changes had occurred among the Aborigines of Flinder's Island between the time Flinders called there, and the time that Hale and Tindale studied the Aborigines there in 1933. In most cases these questions cannot be fully answered. It is sufficient to note, as McCarthy and McArthur do (1960, p.145), that there have been changes in the economic field, mainly in the form of modern substitutes for the materials used for objects in daily use, and that the traditional methods of food-getting are still followed.

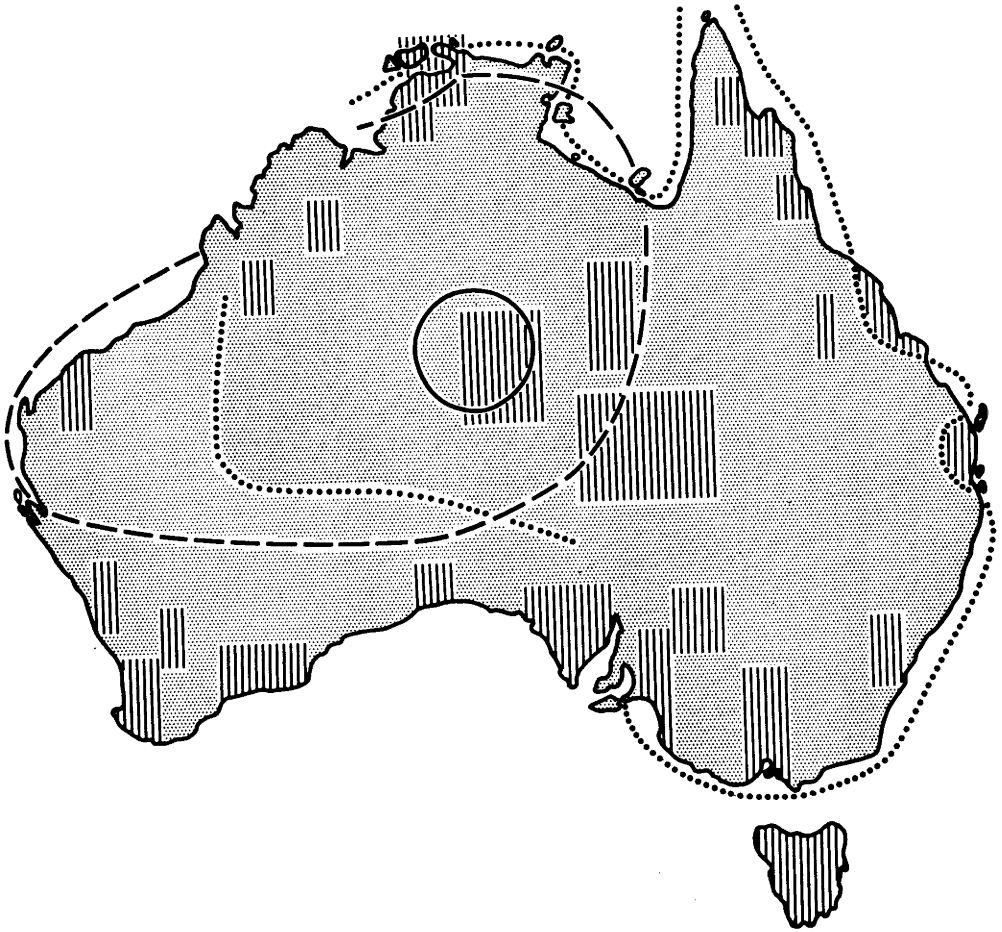
The preceding discussion deals with the possible sources of material available for a study of this nature and scope, and in consideration of the time available for the study, the written and published accounts provide what is probably the most rewarding source of information under the present circumstances. However, it should be stressed that in a situation where the Aborigines could be studied in their traditional way of life, an approach such as this could hardly be justified. In view of the evidence

available, a library study such as that embarked upon in the present work, is appropriate.

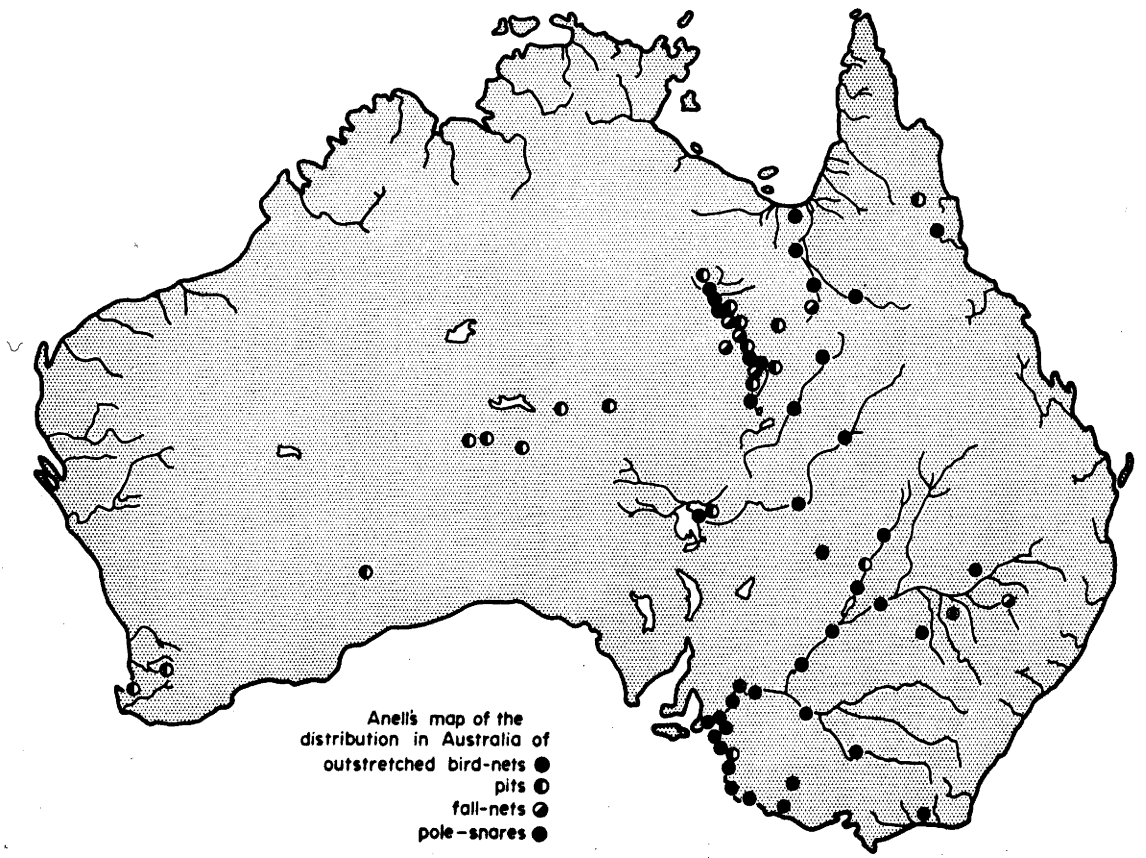
Several writers have used this source of material in studying other problems, but none has been concerned with the relationship between the community and its habitat. Krzywicki and Birdsell have utilised the available population estimates for the Aborigines in several ways. In his Primitive Society and its Vital Statistics Krzywicki is concerned with the collation of the available material on population numbers, fertility periods and birth rates throughout the primitive societies of the world in an attempt to come to some assessment of the relationship between population characteristics and the type of primitive economy. On the other hand, Birdsell's paper 'Some Environmental and Cultural Factors Influencing the Structuring of Australian Aboriginal Populations' restricts the scope to Australia alone and attempts to relate the population density and the rainfall. While his conclusion that the density of Aboriginal population in Australia was determined to a large measure by rainfall operating indirectly through the biota, might be valid (there is insufficient evidence to really assess this), the assumptions Birdsell makes are highly questionable. His assumption that the average size of the tribe was five hundred can scarcely be accepted. Even accepting all the problems related to the definition of a tribe as a unit, the available evidence suggests that there was a considerable variation in the size of the tribes, and to work from averages would cloak such differences. The definitions of tribal territories he uses in his calculations are those collected by Tindale and Birdsell

in 1938-9, and in many cases the boundaries are demarcated on the basis of statements of informants, some of whom were completely detribalised.

Davidson (1933, 1934, 1935, 1936, etc.) and Massola (1956) studied the distribution of various elements of the material culture of the Aborigines using information from published sources and the material in museum collections. Davidson was obviously influenced by the diffusionist school of thought and in studying the distribution of such features as netting techniques, spear traits and watercraft, attempted to come to a tentative chronology for the origin, arrival and dispersal of the various traits in Australia. He was not concerned with the place of the implements or techniques he studied in the way of life of the Aborigines. Anell (1960) employs similar techniques in studying the distribution of hunting, trapping and fishing methods in the wider context of Oceania. The difficulties encountered by these writers in mapping the distribution of their information is of particular interest to this study. Davidson uses shading and lines to show the approximate distribution of the traits under discussion (Map 6). Anell uses a symbol to indicate the location where a particular hunting method was recorded (Map 7). In this sense Anell's map is a more accurate portrayal of the known distribution of a trait, but its visual effect is misleading. What the map really shows is the distribution of sites where these methods have been recorded by Europeans. The clustering of symbols represents the frequency of observation, rather than the importance of the methods in a particular area. For this reason it has been decided to tabulate



Map 6. Davidson's map showing the distribution of plain spear types in Australia.
Hatching - Appearances of plain one-piece spears.
Broken line - Limit of two-piece wooden spears
Dotted line - Limit of two-piece reed spears
Solid line - Limit of three-piece wooden spears



Map 7. Anell's map allegedly showing the distribution of several hunting techniques in Australia.

observations rather than attempt to map highly inadequate information on distributions. Sufficient material is not available to map the spread of traits within the areas chosen for study. Comparisons between areas are very difficult and frequently meaningless because the lack of observations in an area does not mean that particular implements were not in use.

In using the material from these sources the writer is not concerned with questions of the origin and diffusion of various culture traits, but rather with reconstructing, as far as practicable, the economic life of several Aboriginal groups in different parts of Australia, and how these comparisons might highlight the various environmental and cultural factors involved. This might enable one to come to some understanding of the relationship between the Aborigine, his culture and his environment.

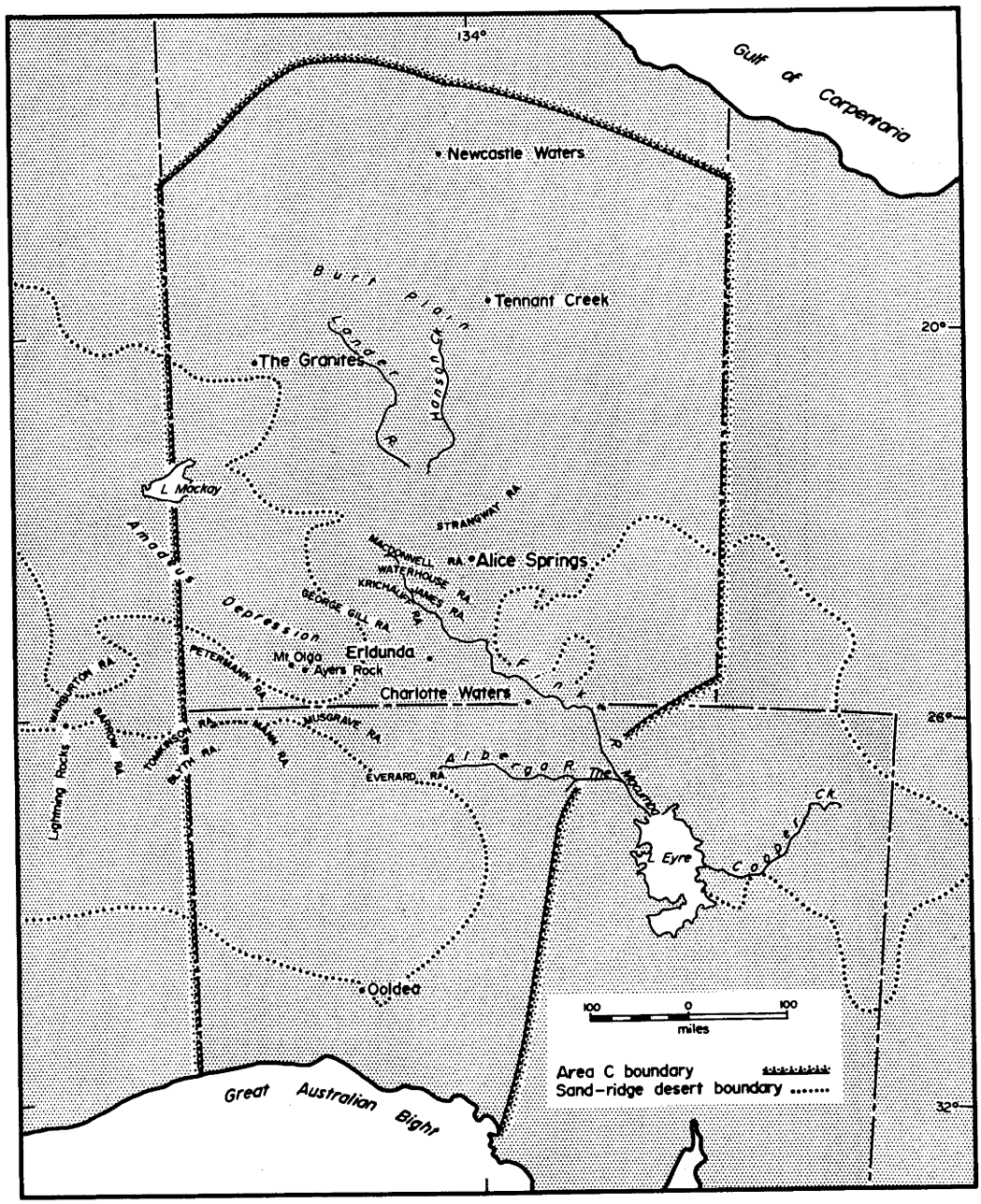
CHAPTER 3

THE ABORIGINES OF CENTRAL AUSTRALIA

(I) THE HABITAT OF THE CENTRAL AUSTRALIAN TRIBES

The area over which the central Australian Aborigines ranged covered a large part of both South Australia and the Northern Territory (Map 8). In the exploration and opening up of the area, the explorers and prospectors tended to concentrate their activities in the central parts where the ranges provided routeways along which they travelled. Normally, the spinifex and sandhill country, through which travel was difficult, was avoided. Consequently most of the literature describes the central ranges, and our knowledge of the remaining areas depends mainly on the writings of later visitors, particularly anthropologists: Thomson among the Bindubi, Meggitt and Sweeney on the Waljbiri and the Berndts among the partially europeanised Aborigines on the Transcontinental Railway at Ooldea.

On a broad scale the area possesses two distinct environments; the ranges and the lowlands. The Aborigines recognised the effect these environmental differences had on various tribes and designated them with appropriate ecologically-oriented names. The Berndts (1942, p.325) record that at Ooldea the tribes who came from the hill country, the Warburton, Petermann, Tomkinson, Mann, Musgrave and Everard Ranges, were termed 'jabu people, or



Map 8. Area C - Locality map. (Sand-ridge areas after Madigan)

people from rocky or hilly country; while those in the desert proper were called 'bila (spinifex) people. The later term was also applied to people in 'jabu country where spinifex was found too. These terms were blanket terms and applied to several tribes. On a smaller scale Spencer and Gillen (1927, I, p.8) record a similar instance where several groups living along the Finke River were referred to as Larapinta men, from the native name for the river. The application of these names implies that the Aborigines recognised the relationship between environmental differences and the distinctive characteristics of the way of life of the people concerned.

Topography

The area is divided into two lowland regions by a central zone of ranges. They trend east-west for 300 to 400 miles in a series of ridges known separately as the Waterhouse, James, MacDonnell, Krichauff, Gill, Levi and Strangway Ranges. The crests of these ridges range between 2,000 and 3,000 feet, while individual peaks reach altitudes of up to 5,000 feet. The main watercourses in the area rise on the northern side of the ranges and flow through deep gorges onto the sandy flats beyond. Under normal conditions the waterholes in the gorges are the only permanent sources of water along the rivers' courses. The lower parts hold water only for a short period after heavy rain. To the south of these ranges, and separated from them by the Amadeus Depression, are the Musgrave, Everard and Mann Ranges. The area is drained by the Alberga River which, in times of exceptional run-off may reach Lake Eyre.

To the north and south of this mountain zone are the lowlands. In the south the land surface rises gradually from an elevation of 70 feet at the Macumba River to an altitude of approximately 2,000 feet at the central ranges. North of the ranges the land surface falls gradually from the level of the Burt Plain (2,000 to 2,300 feet) to 700 feet at Newcastle Waters. The lowlands are characterised by sand plains, dune fields, salt pans, limestone and stony or gibber plains. Map 8 gives the distribution of sand-ridge deserts in the area. Except in the near vicinity of such isolated outcrops as Ayer's Rock and Mount Olga, watercourses are absent. Through most of the year water can be obtained only from soaks and springs and from claypans after rain.

The differences in land type between the lowland and range country is accentuated by differences in the flora and fauna of each area, and it was probably these differences which were recognised in the ecologically-oriented group names used by the Aborigines.

Larger mammals are rarely encountered in the spinifex areas. Thomson (1962, p.149) records that two red kangaroos, seen at clay pans after rain, were the only large native mammals seen in a journey of 300 to 400 miles through Bindubi territory. The smaller mammals, including kangaroo rats, desert rats and hopping mice inhabit the spinifex and possums are encountered where eucalypts occur. Thomson (1962, p.149) considers that the dune areas yield a far greater variety of lizards than the other areas, and that these were a very important part of the flesh diet of the Bindubi. Kangaroos and wallabies are found on the grassy plains adjacent to the ranges, while the euros and

rock wallabies inhabit the hills. The emus span both environments in so far as they live on the grassy plains but nest in the spinifex, thus providing a valuable, but not permanent addition to the diet of the spinifex people.

Vegetation

The sand plains are characterised by a vegetation of sparse shrubs and low trees, of which Acacias and scattered Desert Oaks make up the bulk of the medium-sized and taller growth. Minor stands of Mulga over short grasses and forbs also occur. Spinifex forms the dominant ground cover. The sand-ridges are fixed with spinifex, desert cane grass and sparse shrubs, the Desert Oak being the characteristic tree. The swales carry similar vegetation with the addition of Gidgee, Hakea, Kurrajong, with some Mulga and Mallee. On the alluvial flats stands of Coolibah and Mulga over short grasses and forbs occur. The more important plant foods in these areas include the roots of Ipomoea costata, the fruit of various Solanums, the leaves of Marsdenia australis, the seeds of various Acacias and such grasses as Eragrostis eneopogon. Vigna lanceolata and Cyperus rotundus occur where flood-outs penetrate the area.

The vegetation of the hills is more varied. Coolibah, River Gum and Santalum lanceolatum are prominent trees along the watercourses flowing from the ranges. Gidgee, Bloodwood, Mulga, Coolibah and several grasses dominate the alluvial flats. The hills themselves carry Ficus, Grevilleas, Eremophilas, Acacias and Eucalyptus. Among the important plant foods of the area are the fruits of the Ficus, Santalums, Capparis, and Carrisa, the seeds of

Acacias, Eucalyptus and various grasses, and the roots of such plants as Vigna lanceolata and Cyperus rotundus which grow along the sandy creek beds.

Slatyer (1962, p.120) discusses the effect of rainfall and temperature on the vegetation of the area and stresses the differences between the behaviour of some ephemerals which are winter active and make rapid growth on the winter rains, while most of the permanent components of the natural vegetation are sensitive to the low winter temperatures and remain dormant during this period. Such species make rapid growth soon after the cessation of frosts in the spring and continue until the accumulated soil-water storage is exhausted. They then make intermittent growth following sporadic summer rains. Slatyer's calculations (1962, p.123) show that rainfall sufficient to promote growth in the summer months can only be expected approximately once every two summers at Charlotte Waters, twice every summer at Alice Springs and with increasing frequency further northward. The chances of receiving effective initial rainfall in winter is higher in the central parts of the area. Chances of receiving rainfall sufficient to enable growth to continue for a period of four weeks are significantly less than those of receiving enough rainfall to initiate growth, particularly in the areas of lowest rainfall.

The fact that only two significant growth periods can be expected in each year would have had very obvious effects on the availability of plant foods to the Aborigines. This is particularly true of the plants of which the stems and leaves were eaten, and probably of some of the more fleshy fruits. The fact that some

drought-evading ephemerals begin growing immediately following the winter rains and are not sensitive to low winter temperatures may extend the harvest of vegetable food a little, but probably not to any great extent. It would not have had such a marked effect on the grain foods, and some seeds, roots and fruits which were harvestable after the plant had ceased to grow.

Climate

The average annual rainfall varies from 13.85 inches at Tennant Creek to 5.08 inches at Charlotte Waters. The seasonal regime shows a summer maximum which becomes progressively more marked towards the north. Slatyer (1962, p.110) describes the typical rain as a light, steady fall interspersed with occasional heavy thunderstorms. The rain persists for periods of 24 to 48 hours and total falls of four to eight inches have been recorded. Little information is available on the variability of the rainfall. Sweeney (1947, p.299) records that The Granites has an average annual rainfall of 6.90 inches,[1] but for four consecutive years (1940-43) the rainfall was below five inches.

The general impression of the area is one in which aridity is a prevailing condition. Surface water is not widely available, and is limited to water-holes, rock-holes and soaks. The aridity exercises a considerable effect on the flora and fauna of the area. The major growing and productive season of perennial species occurs

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[1] Average of eight years only and therefore not reliable.

in late winter and early spring. Sporadic growth also occurs following rains. Animal life tends to concentrate around the available water supplies. Throughout the area the flora and faunal assemblages are not uniform, the principal regional differences being between the range country and the sandhill and sand plain country. These differences had a recognisable effect on the lives of the Aborigines, an effect which was recognised and designated by them.

(II) THE ECONOMIC LIFE OF THE CENTRAL AUSTRALIAN TRIBES

The impression gained by observers in the area was that the Aborigines ate most species of the birds, animals and reptiles in their territory, and utilised a significant number of plants. Stirling (1896, p.51) considers that to mention all the animals eaten in an area would be largely to recapitulate the zoology of the district. However, Meggitt (1962, p.4) records that preferences were shown, and in good seasons when food was plentiful, the smaller, less palatable creatures were ignored.

The preceding section gave a brief outline of the major environmental differences in the area. The floral and faunal assemblages in the sand dune and sand plain areas differed considerably from that of the range country and one would expect this to have had an obvious effect on the lives of the people; an interpretation supported by the available evidence.

Thomson (1964, p.402) describes the food supply of the Bindubi, a tribe living in the spinifex, sand dune and sand plain country to the west of Lake Mackay, as

consisting of small mammals, rodents, lizards and vegetable foods, the chance gleanings of daily hunting forays along the dunes, interspersed with periods when they could count on a regular harvest of seeds, usually grasses, which could at times support a group of several families at one well for several weeks. Strehlow (1965, p.125) records that 19 Ngalia people remained at the one camp in the sandhills for many weeks and their protruding stomachs indicated that they had been living largely on the yam of Ipomoea costata for several months. In what is probably a reconstruction of Waljbiri economic patterns, Meggitt (1962, p.49) equates these periods of larger gatherings and more certain food supplies with the autumn and early winter season. The larger mammals were rare in the area and the only evidence of their having provided food for the Bindubi were the bones of a Red Kangaroo in the camp-fire ashes in a rocky area of their territory (Thomson 1962, p.147). Vegetable foods appear to have formed a considerable part of the diet, particularly when the staple crops matured after rain.

In the light of the frequent references to the methods used in hunting emus, kangaroos, wallabies and euros in the ranges and surrounding areas, one has to assume that these animals formed an important part of the flesh diet of these people. Smaller game and reptiles were also hunted. Fish, molluscs and crustacea from the waterholes in the ranges may have supplemented the food supply, particularly after rains, but were probably not of widespread importance. The basic collecting party appears to have been the family, but very large ceremonial gatherings were encountered (Tindale and Hackett 1933, p.102). The food supply of these groups was not

enumerated by the observers. It is highly probable that they were permitted by rain and the bountiful vegetable harvest following. The more important plant foods were outlined in the preceding chapter. It was during these periods when larger groups could persist that the more organised drives for game could be carried out.

The economic activities of the Aborigines show the widely encountered division of labour based on sex. The women were mainly concerned in collecting vegetable foods, reptiles, rodents and smaller mammals, while the men concentrated on hunting the larger animals. There seems to be sufficient evidence to suggest that among the Bindubi the roles overlapped somewhat, despite Thomson's (1962, p.12) statements to the contrary. Since the larger animals were rare in the area the men engaged in hunting reptiles and the smaller animals which the women also collected. The principal difference probably lay in the equipment employed rather than in the game collected, but even here Basedow (1904, p.26) records that digging sticks were much used by men as well as women.

Several opinions suggest that vegetable foods and the takings of women provided the more important and consistent portion of the diet. Mountford (1948, p.122) claims that women were the more reliable food-gatherers because they concentrated on collecting the accessible foods, the grass seeds, fruits, small reptiles and insects as they moved from camp to camp, rather than concentrating on the more elusive and less certain larger game which the men hunted. Meggitt (1964, p.33) is more specific and states that the vegetable foods collected by the women comprised 70 or 80 per cent of the total food

supplies. It is very difficult to come to any assessment of the relative importance of various sectors of the diet because of variations in it over time. Strehlow (1965, p.33) cited the example of the Ngalia people living principally on yams for several months, but one has no means of knowing their diet for the remainder of the year. Similarly Tindale (1966, p.180) records that a family of Ngadajara people at Lightning Rocks had been living on the sugary scales of lerp insects for several days. In the total diet of these people this food source may not have been particularly important, but in the short-term it may have been of considerable importance. The diet of the people in any area appears to have depended on the availability of food at the moment, and had a constantly changing emphasis as different vegetable foods came into production, and as the life cycles of the birds, animals and reptiles in the tribal area progressed.

Hunting Methods

The range of hunting methods recorded in Table 1, shows surprisingly little variation in both methods employed and equipment used. Spears and throwing sticks appear to have been the only weapons used directly in hunting, while the digging stick and wooden dish were widely used in digging out small animals and lizards. Brush fences, pit-falls, groups of beaters, hides, decoys, firing the vegetation and the use of narcotics to stupefy the game complete the list of supplementary methods employed, and surprisingly little variation within each of these was recorded. This may well be a reflection of the sparsity of the literature.

Despite this lack of variety, many of the hunting methods employed were designed to capitalise on the peculiar habits of the animals being hunted. The method of driving the game towards an ambush of hunters was adapted to accommodate the different behaviour of the wallaby and the euro. The latter, when disturbed keeps to the broken country and could thus be driven along a ridge to the end of a spur and into a waiting ambush. The wallaby keeps to definite paths by which the hunters could profitably conceal themselves. The use of a decoy resembling an emu neck when hunting emu capitalised upon the inquisitive nature of the bird.

The hunting methods listed in Table 1 fall into two main groups; the joint activities involving the co-operation of more than one individual, and the individual pursuits. It is immediately obvious that the former could only be employed when food supplies permitted larger groups to live together in any one area. The table also shows that the joint activities were employed mainly in hunting the larger animals and birds, and this suggests an important areal difference between the hunting methods employed in the range country where this game was encountered, and the spinifex where it was largely absent. Thomson (1962, 1964) makes no reference to the use of organised drives or brush fences by the Bindubi, but he does imply (1962, p.267) that the Bindubi burned the spinifex when hunting small game. Thus, if Thomson's observations are correct, the nature of the game can be seen to have had a recognisable effect on the choice of hunting methods, and, up to a point, the hunting methods employed might be a reflection of the type of game within any given area.

Fishing

Owing to the lack of permanent watercourses in the area fish and other aquatic foods were not important in the diet of the Aborigines. However, fishing was practised in some of the more permanent waterholes in such rivers as the Finke. The methods used are not recorded in detail. Spencer and Gillen (1948, p.575) describes a short, light, hand spear supposedly used in fishing, but give no instance of its being used. Organised drives in shallow water were the most frequently recorded method. In the example described by Basedow (1925, p.127) no equipment at all was used; the natives merely formed a line and moved across the pool, driving the fish before them into the shallow water where they floundered in the mud. Spencer and Gillen (1904, p.677) record a similar method, differing only in that the men pushed a moveable weir in front of them. Stuart (Hardman ed. 1864, p.252) gives a vague description of a brush fence built in the Finke, and which was evidently used in catching fish. Stirling (1896, p.53) reports that crayfish and crabs (Thelphusa transversa, Spencer 1928, 1, p.28) were eaten and Cleland (1966, p.143) lists several molluscs from the area.

The paucity of references to fishing and acquatic foods suggests that, in the total diet of these people, such foods did not bulk large. This contrasts markedly with the Cooper's Creek area to the east where Howitt (in Brough Smyth 1878, II, p.305) records that large quantities of fish were caught using seines, gill nets and fish weirs.

Insect Foods

The references to insect foods fall into two broad categories; those which comprise a recognisable part of the diet throughout the year, and those which were available only at certain times of the year or in such small quantities as to add little to the total food supply. Pre-eminent among the insects eaten were the various larvae known collectively to the Europeans as 'witcheties'. These are the larvae belonging to the family Cossidae as well as the larvae of such beetles as the Longicorn Beetle. Tindale (1953, p.59) records that the witjuti grubs were most important at the time of the year when the pupae rose to the surface, making it easier to dig them out. The women and children spent much time digging for them. Over a period of several months the author noted (1953, p.59) that these grubs formed part of nearly every day's diet and that men, as well as women and children, engaged in digging for them. Basedow (1925, p.124) records the use of a small, hooked stick used to extract grubs from their holes in trees. After each rainfall snails provided a considerable, but short-lived, supply of food. Giles (1889, I, p.181) records seeing great quantities of white snail shells in heaps at old encampments all along their route in the Musgrave Range. Basedow (1925, p.121) regards Helix perinflata as being the most commonly eaten species, the snail being thrown on hot ashes and the flesh picked out of the shell with a small, pointed stick. Various caterpillars were eaten when they appeared. Honey ants and bees' honey provided a certain amount of food, but this was evidently not great. Sweeney (1947, p.292) states that these were found only in limited parts of

Waljbiri territory. Cleland's (1966, p.144) observation suggests that it may have been important in these areas. At some times lerp-manna was present in sufficient quantities to support small groups (Tindale 1966, p.180).

Vegetable Foods

Like the animal foods, the vegetable foods available to the Aborigines were not uniform throughout the area. Sweeney (1947, pp.296-7) outlines some of the basic differences between the vegetable foods present in the mulga and grass part of the Waljbiri territory, which included the hill and creek areas, and those in the spinifex desert areas. To the former belong the nutritious seeds of the Mulga (Acacia aneura) and Witchetty Bush (Acacia kempeana), the yam Vigna lanceolata and the bulbs of the Onion Grass Cyperus rotundus. The higher rainfall in these areas also induces many of the native fruits to bear better crops. In the transition zone between the mulga and grass country and the spinifex grow most of the grass and herbage seeds utilised by the Aborigines. The more important foods of the spinifex areas include the yam Ipomoea costata, the seeds of Acacia coriacea, the fruits of the various Solanum species, the leaves and stems of the Desert Banana (Marsdenia australis) and various grass seeds.

The growth patterns of the plants in relation to rainfall was discussed briefly in the preceeding chapter. These are particularly important in determining the availability of plant foods over a period of time. With such drougt-evading ephemerals as the Lepidium species, the plant begins to grow soon after rain and continues to do so until the water supply is exhausted. Thus food from

this source might be available several times during the year, but only for a period of short duration. The growth pattern of such perennials as Carrisa lanceolata produce similar results, the fruits maturing quickly after rain and the harvest lasting only for a few weeks. On the other hand, some seeds, rootstocks and fruits which could be utilised in a dehydrated condition, were utilised long after the plant had ceased to grow.

Not only does the rainfall affect the growth patterns of the plants, but also the Aborigines' ability to exploit their territory. The shortage of water tended to concentrate their activities around the more permanent water sources, while the potential harvest in more remote areas could be realised only in periods following rains when supplies of surface water were available.

Table 2 lists the references to vegetable foods eaten by the Aborigines in the literature surveyed by the writer in this thesis. Numerically, seeds comprise the most important grouping and this is probably a reflection of their true importance. Not all entries are of equal significance. The seeds of the Acacias mentioned above appear to have been favoured and staple foods, but the seeds of Acacia cuthbertsoni were only occasionally eaten, and then only when more attractive food was not available. Thomson (1964, p.402) records that the seeds of such grasses as Eragrostis eriopoda at times supported several families at the one well for several weeks. Cleland and Tindale (1954, p.83) state that, despite the small size of the grains, these foods occur in such abundance as to make them a valuable addition to the diet. Their importance was further enhanced by the fact that the grain could be

harvested long after it had fallen from the seed heads. Both Cleland (1932, p.37) and Cleland and Johnston (1939, p.22) record that ants collected the seeds of several grasses and stored them around the entrance to their burrows; from there they were collected by the women.

No references to the storage of grain were encountered; even though this appears to have been employed on the eastern borders of the area. Horne and Aiston (1924, p.55) imply that the seeds of the munyeroo (Portulaca sp.) not used immediately were stored by the tribes to the north of Lake Eyre. Howitt (in Brough Smyth 1878, II, p.302) describes a mud and grass structure holding about two bushels of munyoura seeds in the Coopers Creek area.

The relatively few references to the collection of root foods is not a true reflection of their importance. Stirling (1896, p.60) states that the bulbs of Cyperus rotundus and the seeds of Claytonia balonnensis were much more freely consumed than any other vegetable food, and in many camps it appeared to be the only food that was being used. The importance of some root foods was greatly enhanced by the fact that they were available throughout the year. Sweeney (1947, p.259) cites the example of the yam Ipomoea costata which was distinguished by its runners in the growing season and by its dead or dormant stalks during dry periods. He considers it one of the most valuable food supplies of the desert native. Strehlow's observations cited earlier support this.

While the number of species listed in Table 2 might suggest that fruits comprised an important part of the native diet, this may not have been so. Cleland and

Tindale (1954, p.83) state that while Capparis mitchellii was distributed over a wide area (and hence frequently recorded) it was not abundant. The same authors point out that the Native Peach (Eucarya acuminata) yielded a considerable quantity of fruit, but its bearing was capricious and short-lived. Similarly, Sweeney (1947, p.290) cites the example of the Konkleberry (Carrisa lanceolata) which matured quickly after rain, but the harvest lasted for a few weeks only. These factors led Cleland and Tindale (1954, p.88) to conclude that 'the fruits in fact do not constitute an important source of food, but are valuable food adjuncts'. References to the use of fruits in dehydrated form, and to the drying and storage of fruits might encourage one to question these conclusions, but considering the small quantities of dried fruit found by Thomson (1962, p.11) and the mobility of the people concerned, it is unlikely that the importance of these fruits was greatly increased.[1]

It is difficult to assess the importance of leaf, stem and flower food because of the different ways in which they were collected. Plants like Pentatropis kempeana and Claytonia sp. were evidently eaten on the move and not brought back to the campl the latter was eaten principally as a thirst-quencher, but the former was an esteemed and important food. Cleland and Tindale (1959, p.136) record that if a bush was passed while hunting the hunters would stop and eat their fill. How important this

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[1] The Berndts (1942, p.164) record the development of food storage at Ooldea, but this was among detribalised, partially sophisticated, less mobile groups.

food was in comparison with that derived from plants belonging to such genera as Lepidium, Stenopetalum and Portulaca, the preparation of which necessitated cooking, cannot be assessed. Individual plants, such as the palm Livistona mariae, may have yielded considerable quantities of leaf food, but because of their extremely limited distribution, their value in the diet may not have been great.

The nectar from flowers, and the sugary exudations of the Mulga probably provided little more than amusement value in the diet of the natives, but the gum of several Acacias and other plants may have been a more important source of food.

To what extent the cooking of plant foods represented an attempt to destroy toxic or unpleasant elements in the plants cannot be properly judged. In many instances it appears to have been little more than an attempt to make the food more palatable since the plants were eaten both in the raw and cooked state. However, the more involved preparation of Lepidium muelleri-fernandi and L. rotundum recorded by Cleland and Tindale (1959, p.133) may have approximated to the more elaborate preparations used in northern and eastern Australia. This is strengthened by the authors' statement that the Bindubi did not use this method or gather the plants. Whether the method of preparation resulted from isolated experiment on the part of the Aranda, or whether it was the application of widely known, traditional techniques cannot be assessed. It is significant, however, that the natives in the MacDonnell Ranges showed no knowledge of the preparation of the nut of the cycad palm Encephalartos macdonnelli (Stirling 1896,

p.59) even though Maiden (1889, p.40) implies that it was eaten after preparation, and the nuts of other members of this family were eaten over wide parts of Australia after precautions had been taken to remove the toxic elements.

Water

In many areas the availability of water was as important as the food itself. Except in the periods immediately following rains when surface water in creek beds and clay pans was available, the water supply was limited to the more permanent waterholes in the rivers in the ranges, to the 'ngama' or rock-holes in rock outcrops and to the soaks in the river beds and sandhill country. The importance of these soaks to the desert Aborigines cannot be overestimated. Thomson (1962, p.271) states that, as a general rule, there is nothing in the lie of the land to explain the location of the water. The Bindubi songs stress the need to find water, and Thomson (1962, p.274) records that an old man could recite the names of more than 50 waters, wells, rock-holes and clay pans. He also describes a highly conventionalised map, deeply incised in the body of a spear-thrower, showing the location of waters in the terrain over which the Bindubi hunted. The importance of the soaks was increased by the excavation of wells. Rowlands and Rowlands (1965, p.233) describe several wells in the Lake Mackay area, the shaft of one being vertical for 10 feet and then inclined at about 30 degrees to vertical. The vertical part of the well was 25 to 30 inches in diameter with foot holds cut into the side. Basedow (1925, p.97) describes an unusual type of rock-hole at Ullbönnalenna, east of the Musgrave

Ranges, which necessitated the use of a broom-shaped piston to pump the fluid to the surface. The piston consisted of a rod, about five feet in length, to one end of which a brushwood bundle, the size of the hole, was bound. The implement was inserted in the hole, slowly pushed down into the water and after a short interval quickly withdrawn, bringing up the water collected behind it. The water was collected in a small clay enclosure built around the hole. No other writers record the use of such an implement or principle, but whether this represents a local invention cannot be assessed.

Smaller quantities of water were obtained from several sources. Hollow trees provided reservoirs for small quantities of water. The lateral roots of several trees (see Table 2) yielded some water. Koch's (1898, p.110) statement that the bush of Hakea leucoptera was burned to drive the water into the roots is not supported by other writers' observations. Whether any tribe's water supply came primarily from this source is unlikely; it is probable that this source was utilised by travelling natives (Cleland 1966, p.142). The leaves of Claytonia and the roots of yams may have been used as a means of quenching thirst. The extent to which aestivating frogs of certain species were utilised as an emergency source of water is not clear. Cleland (1966, p.142) states that in dry periods the position of the buried frogs could be detected by cracks on the surface of the ground. The examples found by Spencer (1928, I, p.46) yielded only one or two teaspoonfuls of water each. Sweeney (1948, p.298) records that in one very severe drought women kept their families supplied with water while hunting by carrying

water from a permanent soak 15 miles away. The women travelled at night.

Material Culture

Spears were the most frequently used hunting weapon. The most common type consisted of a shaft of light wood, usually Tecoma doratoxylon, to which a flattened head of mulga wood was lashed with sinews. The blade varied in length from 10 to 15 inches and was of a long lanceolate shape, varying from an inch to an inch and a quarter in width. In some examples a slightly curved barb of hardwood was bound to the blade. Stirling (1896, p.87) observes that the shaft rarely consisted of a single piece of wood, but rather several pieces scarf-jointed and bound with tendon. He attributes this to the want of shoots of sufficient length. The butt was recessed to take the peg of the spear-thrower. Thomson (1962, p.13) describes the spears of the Bindubi as consisting of a single shaft of mulga sapling, or more rarely the lateral root of an acacia (1964, p.421), with no separate head or countershaft. The spears were about seven feet in length, with the tip coming to a flattened, chisel edge rather than a point. In rare examples they terminated in a broad, flattened blade, on one side of which was set a wooden barb secured with sinews. He (1962, p.14) attributes the scarcity of barbed spears to the scarcity of large game. This could have affected both the need for barbed spears and the availability of sinews for binding on the barbs. Spencer and Gillen (1938, pp.575-8) list six types of spears encountered by them in central Australia. Those with stone-flake heads and the wooden spears with one or

more barbed prongs were considered by the authors to be confined to the north and not reach as far south as the MacDonnell Ranges. The other spears include those also described by other writers and noted above. Two exceptions include one made of a single piece of dark, hardwood, and the other a short, light hand spear used in fishing. Apart from this last example no specific use was equated with a particular spear design by the authors, and it is highly probable that cultural factors, rather than conscious adaptations, were responsible for the variations in design.

The most frequently recorded spear-thrower consisted of an ovate, leaf-shaped body, concave in its upper surface and up to 76 centimetres in length and 12 centimetres wide at its greatest width. The grip consisted of a mass of resin in which a stone flake was embedded. Spencer and Gillen (1938, p.583) consider this the most important cutting weapon of the central Australian native. Thomson (1964, p.416) stresses the multiplicity of uses of this spear-thrower. As well as its major purpose in propelling spears, it was also used as a parrying stick to deflect spears, as a scoop for digging out lizards, rodents and vegetable foods, while the mounted adze-stone was employed as a graving tool in maintaining and repairing tools and as a knife for quartering game or extracting the sinews from kangaroos and emus. It might be argued that this weapon represents an adaptation to the local conditions and the high mobility of life in the area in so far as it represents a combination of several functions in the one implement. However, the Waramanga and Wambaja tribes used spear-

throwers of different design (Spencer and Gillen 1938, pp.579-80). These did not possess the versatility of function evident in the former implement, even though its advantages would still have applied to these tribes. In addition to this, the spear-thrower with the mounted adze-stone was also widely used along the eastern coast where, presumably, the need for the combination of several functions in the one weapon would not have been such a pressing necessity because of the lessened mobility of the people. It would appear that cultural factors, such as the diffusion and acceptance of particular designs were more important in explaining the designs encountered, rather than any appeal to conscious modifications to meet particular needs.

Throwing sticks appear to have been the only other weapon used widely in hunting. Thomson (1964, p.410) records their use in hunting birds and other small game, and describes them as being one to two feet in length and made of heavy wood. Stirling (1896, pp.90-2) describes the characteristics of the 'boomerangs in common use', but in all the admittedly scanty references to the use of hunting weapons, the boomerang is not mentioned. Thomson (1964, p.410) observed that each of the Bindubi men possessed several boomerangs which were regarded almost as ceremonial items and kept hidden in the camps where the men slept, being carried only when moving camp.

A feature which may have been distinctive in some parts of the area, and environmentally conditioned was the use of the digging stick, or a derivative of it by men. Basedow (1904, p.26) records that both men and women used the digging stick to dig out such burrowing game as

lizards, rodents, and burrowing mammals. Helms (1896, p.305) describes the use of a digging stick to chop off the heads of lizards after their attention had been attracted by waving a feather fan above them. It is possible that the lance-like spear with a flattened blade, described by Basedow (1904, p.25) as being used for killing animals in bushes rather than hurling, was used as a digging stick as well as a weapon.

The digging stick appears to have been the principal implement used by women in collecting vegetable foods. Several variations in design were recorded; the points in some being rounded and tapered, while in others they were brought to a broad chisel-edge. Wooden dishes were frequently used as scoops for removing the soil loosened with a digging stick. These dishes were made from bark or carved from several types of wood. Several designs have been described, but no specialised purposes for them were recognised by the observers. The dishes were used to carry food and water, in winnowing grass seeds, as a scoop for digging, as a cradle, and also as a vessel in which to heat Triodia resin. Netted bags were not generally in use in the area although Spencer and Gillen (1938, p.610) record that some vegetable and fur-twine bags were bartered from the southern tribes and traded as far north as the MacDonnell Ranges. Wallets of skin and bark seem to have been the most common means of carying small items. Skin water-bags were used to transport water in some areas.

Small stone flakes and the adze-stone mounted on a spear-thrower were used in cutting and preparing meat. Opinion as to the use of the hafted stone knives is divided. Spencer and Gillen (1938, p.593) state that the

smaller ones were used in general cutting operations, while the larger ones were used in fighting. Stirling (1896, p.97) is of the opinion that very few of these knives showed evidence of use and considers that they were carried more for decoration than use. He quotes Gillen as saying that the smaller ones were used in performing initiatory rites. Grindstones were seen in many camps and consisted of sandstone slabs or similar material. They were evidently not transported from camp to camp when the occupants moved.

The two most frequently recorded implements used in manufacture were the adze, a stone flake mounted on the end of a straight or curved shaft, and the adze-stone mounted on the distal end of a spear-thrower. Opinion differs as to whether these tools were complementary or whether their usage was differentiated. Campbell and Edwards (1966, p.193) state that the mounting and uses of the two were similar. Stirling (1896, p.95) records that the implements were used in the same way and that because of its weight and solidity, the adze-stone mounted on the spear-thrower had an advantage over the adze which was the lighter instrument. Thomson (1964, p.418) observes that the adze-stone mounted on the spear-thrower was the only hafted cutting implement possessed by the Bindubi and while it functioned as a graving tool, a spoke-shave and a hafted cutting tool, it was primarily a maintenance implement used in repairing, rather than making implements. Speaking generally of the adze-stones Mulvaney (1961, p.84) says of both the forms; mounted on a shaft and on a spear-thrower, that they were used for a variety of rough shaping and hollowing tasks and also in delicate shaping,

fluting and engraving. Two types of hafted stone axes were also recorded in the area. The first of these, the ground axe, was evidently not widely in use because Stirling (1896, p.98) states that none were seen by him in the Alice Springs area and cites Gillen as his authority for affirming their presence in the area. Spencer and Gillen (1938, p.588) also claim that ground edge axes were rare in Central Australia. The other axe consisted of a trigonal flake of quartzite hafted with a strap of wood or inserted into a split in the end of a stick and secured in position with resin. According to Spencer and Gillen (1938, p.592) these were used only in fighting at close quarters and were manufactured by the Waramanga and Bin-gongina and traded into other areas. Surprisingly enough, the stone implements most frequently used in chopping and cutting were merely undressed stones. Mountford (1944, p.312) records that the Bidjandjadjara tribe in the Mann Ranges collected stones from the surrounding hills and tried the natural cutting edges to find the most suitable ones. Similar instances were recorded by Thomson (1964, p.411) and Spencer and Gillen (1938, p.594), but in each case the stone was dressed to provide a better cutting edge. The natives described by Mountford attempted to obtain a better cutting edge by breaking the stone, but all these attempts proved ineffective and the stones were discarded.

Resin collected from the spinifex and the sinews of emus and kangaroos were used in manufacturing implements. Among the Bindubi the latter were particularly valued because of the scarcity of this game in the area (Thomson 1962, p.13).

No clothing of any significance was recorded in the area. The men wore fibre or fur-string belts in which weapons and game were carried. Spencer and Gillen (1927, p.24) record that fur-string aprons were worn by the women north of the MacDonnell Ranges. Bark sandals were recorded by Wells (1899, p.169) and Thomson (1962, p.266, 1960). These were made of the bast fibre of Crotalaria cunninghamii and were worn by the natives coming onto the gibber plains and rock areas from the sand dune country. This distinguishes them from the ceremonial blood and emu-feather sandals of the Aranda.

The most commonly encountered shelter type consisted of a circular framework of saplings meeting at an apex. Minor variations in thatching materials were encountered, but these were related to the availability of certain materials and climatic conditions. The major differences appear to have been between some desert groups, such as the Bindubi and the people living closer to the ranges. Thomson (1962, pp.11, 155) describes the huts of the former as consisting of low, sparse, brush walls arranged in a crescent shape and covered with uprooted spinifex clumps. The leeward side was scooped out to form depressions to accommodate the sleepers and fires were often lit on the intervening ridges. Slightly more permanent huts were encountered in some areas, and Thomson (1962, p.11) interprets these as being base camps from which foraging journeys were made into the dunes. Similar shelters to those built by the Bindubi were described by Basedow (1904, p.29) as being temporary shelters built by the range tribes when travelling. As well as the previously described shelters, the Bindubi

built platforms of mulga branches to provide shade and racks for personal possessions.

In contrast to the relative paucity of the hunting weapons and utensils, the Aborigines possessed many artefacts which played no part in their every-day economic life. The men possessed spears, shields, clubs, axes, stone knives and boomerangs which were used only in fighting. The elaborate costumes and ceremonial artefacts all comprised part of their material culture, but played no part in their economic life. Some were manufactured and used only for the duration of the ceremonies, but others were carefully stored for subsequent occasions. While clothing in a utilitarian sense was absent, the men wore head bands ornamented with feathers, nose bones and sticks, hair pins and pubic tassels, and the women wore necklaces of fur-string coated with grease and ochre, strings of beans and forehead ornaments of kangaroo incisors.

The material dealt with in this section permits only tentative conclusions to be drawn. To a certain extent the differences in environment of the range and spinifex areas affected the food supply, activities and material culture of the people. Organised drives for large game were not recorded among the Bindubi, whose main flesh food consisted of small game and lizards. One cannot reasonably conclude from this that the Bindubi had no knowledge of these methods, and that they were invented by the groups who used them. It is highly probable that the knowledge of the use of such methods was general and that the decision to employ them and the precise form the activity took, depended on the nature of the game hunted,

the terrain over which the animal ranged, and on the number of people who could be employed in the operation. Variations in both the design and raw materials used in artefacts were observed in the area. It is very difficult to relate the former to specific purposes because most of the observers describe only their formal characteristics without giving due attention to their uses. It is highly probable that most of the differences in design of one implement type were related to cultural factors and from the diffusion of new designs from outside areas by trade, rather than from any desire to improve the particular facets of a weapon's behaviour in a purely local context. This is particularly clearly seen in the design variations of the spear-thrower. The broad, leaf-shaped spear-thrower was very widely encountered throughout a large part of Australia, but in the northern parts of the study area two other designs were also manufactured, neither of which had the secondary uses of the former. These factors militate against a completely functionalist approach to material culture. While the utilitarian aspects of particular weapons might be cited as indicating adaptations to the harsh conditions and enforced mobility of the people, this cannot be demonstrated for all instances. Large sectors of the material culture play no part in the everyday economic life of the Aborigines, even in the desert areas where one would expect with the highly mobile nature of their activities, that multiple uses of implements would be very important.

(III) POPULATION TOTALS AND DENSITIES IN CENTRAL AUSTRALIA

The references to the Aboriginal population in central Australia fall into three categories. The first includes the descriptions of the economic or food-gathering units. The second contains the references to the larger ceremonial gatherings, and the final category includes the estimates of the population of tribes as a whole. Under normal conditions the most common economic group was the family: the man, his wife or wives, their children, and perhaps an aged parent. In better seasons several of these groups linked up and foraged together. Sweeney (1947, p.297) considers that ten natives would have constituted a large hunting party among the Waljbiri. Forty-two was the largest group of Bindubi seen by Thomson (1962, pp.154, 269). He makes no reference to its being a ceremonial gathering. It could have been due to the novelty and attraction of aliens (Thomson and his party) in the area. At Kimai the horde consisted of 15 or 16 people. Meggitt (1962, p.51) states that the membership of these larger economic groups was recruited on several different bases and depended on kinship and kinship obligations, family quarrels and reconciliations, and personal friendships.

The larger ceremonial gatherings are not well documented. Tindale and Hackett (1933, p.102) record meeting a gathering of 240 Bidjandjadjara at Erldunda who were moving eastward to join in ceremonial activities. Meggitt (1962, pp.49, 244) states that in a good season

when water and food were plentiful the whole community[1] might be able to gather at the billabongs (presumably on the Lander River or Hanson Creek) and perform ceremonies and engage in large scale organised hunting and foraging. During this season the membership of the group may have remained relatively static, moving en masse from billabong to billabong as different crops came into bearing and as the game moved away from the more densely populated areas. As food became more scarce the community broke up into progressively smaller groups, and with the onset of the bad season the basic food gathering unit was once more the family. It is highly probable that, in most areas, the community might come together only in exceptionally good seasons, and then only for short periods.

Estimates of total tribal populations are almost non-existant. Meggitt (1962, p.32) estimates that the pre-Euorpean total of the Waljbiri might have been 1,000 people and not more than 1,200. This figure gives an average density of one person per 35 square miles. He also estimates the Aranda population as being around 2,000 people and occupying approximately 25,000 square miles. This gives an average density of one person per 12.5 square miles. This latter figure is perhaps too high if one is willing to accept Radcliffe Brown's (1930, p.696) estimate of 300,000 for the total aboriginal population of Australia before European contact. This estimate gives the density of population for the whole continent as being one person to 12 square miles (Radcliffe Brown 1930, p.696).

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[1] Meggitt uses the term community to designate the four major divisions of the Waljbiri tribe into the Ngalia, Wulmala, Waneiga and Yalpari groups.

On the other hand Radcliffe Brown (1930, p.696) states that 'even in fairly arid regions there was a density of one person to ten square miles'.

In some respects such density figures are not revealing. The localised nature of water in many areas tended to concentrate game, some plant foods, and hence economic activities around the more permanent water supplies. The remainder of the tribal area might be hunted over only for short periods when the availability of surface water permitted greater mobility. Thus, effectively, the population might depend on an area far smaller than its recognised tribal area. The Berndts (1942, p.327) state that tribal boundaries meant little to the people in the spinifex country around Ooldea, and while certain groups were associated with particular areas, after heavy rains the people went hunting and travelled down the long water-hole routes, engaging in ceremonial activities, trade and social intercourse with other groups. Meggitt (1962, p.48) records that while many of the older Waljbiri had no difficulty in defining their countries (the area occupied by each of the four communities) fairly precisely and less precisely the boundaries of the other countries, the Waljbiri would in times of extreme hardship move from their own tribal territories into that of tribes to whom they were friendly disposed. Thus, as Stanner (1965, p.11) says, the tribal areas were not, as a general rule exactly demarcated and adhered to with 'a "keep out" or "trespassers will be prosecuted" mentality', and for a decade or more a group might be forced to range over a far wider area than its traditionally recognised country (Stanner, 1965, p.2). These factors make it difficult to assess the meaning of population densities.

TABLE 1 REFERENCES TO THE HUNTING METHODS EMPLOYED BY THE ABORIGINES IN CENTRAL AUSTRALIA 3:i

Method	Game Hunted	Equipment Used	Technique Employed	Nature of Activity	Source	Area	Tribe
Spearing	Kangaroo, wallaby euro, dingo and emu.	Most frequently described spear-types consisted of (1) tecoma wood shaft with mulga head lashed to shaft with kangaroo sinew. May also have wooden barb. Used with spearthrower. (2) Single shaft of heavy hardwood. Thrown by hand. Additional spear-types described by Basedow (1925 pp.190-5). (1) Plain shaft of acacia with cutting blade. Thrown by hand. (2) As above with two barbs attached. (3) Single piece of acacia with flattened blade. Used as lance, not thrown (Basedow 1904 p.2).	Game stalked and speared	Individual	Basedow (1904 p.14) Helms (1896 p.256) Spencer, Gillen (1927 p.16)	Musgrave Tomkinson, Western Mann Blyth, Barrow Ranges *	Several - *
	Emu		Decoy resembling neck of emu used to attract bird within spearing range.	Individual	Spencer, Gillen (1927 p.16)	*	*
	Wallaby		Bundle of feathers on rod swung round head to imitate eagle. Made wallaby crouch and freeze. More easily approached and speared.	Individual	Basedow (1925 p.141)	North of Great Australian Bight	-
	Emu		Pituri placed in waterhole to stupefy emu. If waterhole large, portion dammed off and game directed to water by brush fence.	Individual	Spencer, Gillen (1927 p.16) Stirling (1896 p.52)	* Central Australia	* -
	Kangaroo, wallaby and emu.		Hides constructed at waterhole. Animals speared as came to drink	Individual	Spencer, Gillen (1927 p.16) Finlayson (1936 p.81)	* Central Australia	* -
	Kangaroo, wallaby and emu		Brush fences constructed at waterholes - spear game as came to drink	Individual	Basedow (1904 p.14) Finlayson (1936 p.81)	Musgrave Tomkinson, Western Mann Ranges Central Australia	Several -
	Kangaroo, wallaby and euro		Hunters concealed themselves beside frequently used animal pad. Beaters usually women and children, drove game onto pads and into ambush. Euro will not leave range and was driven into ambush at end of spur.	Joint activity, probably small groups.	Spencer, Gillen (1927 p.16) Finlayson (1936 p.81)	* Central Australia	* -
	Kangaroo and wallaby		Animals driven into V-shaped brush fence and speared by hunter concealed at apex	Joint	Basedow (1904 p.14)	Musgrave Tomkinson, Western Mann Ranges	Several
	Lizards	Digging stick used as a lance	Fan of feathers waved overhead. Attracted lizard's attention and head then cut off with digging stick.	Individual	Helms (1896 p.305)	Hampton Plains	-
Pitfalls	Emu		Pit dug near feeding ground and covered with branches. Short sharp spear fixed upright in bottom of pit.	-	Spencer, Gillen (1927 p.16)	*	*

TABLE 1 (CONTINUATION) REFERENCES TO THE HUNTING METHODS EMPLOYED BY THE ABORIGINES IN CENTRAL AUSTRALIA

Method	Game Hunted	Equipment Used	Technique Employed	Nature of Activity	Source	Area	Tribe
Pitfalls	Kangaroo		V-shaped and zig-zag brush fences constructed parallal to ridges. Fences up to ½ mile long. Self-acting pit trap at each apex. Pit 2'6" x 15" x 60" deep. Stone or bough placed across opening in fence to hide pit and make animal jump.	Construction. probably by joint effort	Helms (1896 pp.256, 293) Basedow (1925 p.143)	Northern margin of Victoria Desert, Everard Range, Mann, Musgrave Tomkinson	- -
Throwing Sticks	Budgerigar, pigeon, small mammals	Short, straight or slightly curved stick. Fore-runner of the boomerang.	Thrown into flocks of birds when landing at waterholes. Thrown at small game in spinifex which was burned to flush the animals.	Individual	Helms (1896 pp.256, 269) Thompson (1962 p.13)	Blyth, Barrow, Everard Ranges Lake Mackay	- Bindubi
Misc.	Possums		Cut out of trees by river beds.	Individual	Basedow (1904 p.15)	Musgrave Tomkinson, Western Mann Ranges.	Several
	Echidna, banded ant-eater, dingo and lizards		Dug out of holes with digging sticks. Bulk of tribes food	Individual	Helms (1896 p.293) Thomson (1964 p.402)	Everard Range Lake Mackay	- Bindubi
	Animals and birds recorded as being eaten, but for which no hunting method was recorded - wombat, flying fox, native cat, bandicoot, marsupial mole, wild turkey, parrot, cockatoo, owl, eaglehawk, magpie, duck, crow and snakes.						

* These references are repeated in the authors' other books covering other tribes as well as the Aranda. The references probably apply mainly to Aranda people in the MacDonnell Ranges near Alice Springs where Gillen was a Special Magistrate and Sub-Protector of Aborigines.

Rootstocks

Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Boerhavia diffusa	'waibi	-	Considered good food.	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
	wai-ipi	-	Root and plant placed in fire - root eaten.	Cleland, Johnston 1939 p.23	The Granites	Waljbiri
	kurri	-	Eaten after cooking	Johnston, Cleland 1943 p.154	North eastern corner of S.A.	Several
	Several	-	-	Cleland, Tindale 1959 p.132	Haast Bluff	Several
	wi-tuka	-	-	Cleland, Johnston 1938 p.209	Musgrave Ranges	Bindubi
	waijibi	-	-	Meggitt 1962 p.6	-	Waljbiri
Brachychiton gregorii	-	Kurrajong	-	Basedow 1904 p.19	Musgrave, Tomkinson and Western Mann Ranges	Several
	-	-	-	Stirling 1896 p.56	Central Australia	Aranda
Clerodendron floribundum	Several	-	-	Cleland, Tindale 1959 p.137	Haast Bluff	Ngalia, Aranda
	dodubidji	-	-	Meggitt 1962 p.6	-	Waljbiri
Cleroderdron ovalifolium	datti-pitji, dadibiji	-	Perhaps eaten	Cleland, Tindale 1939 p.25	The Granites	Waljbiri
Cyperus bulbosus	'jalka	-	-	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
Cyperus rotundus	irriakura	-	Eaten raw or cooked	Spencer, Gillen 1927 p.17	-	Aranda
	irriiákŭra	-	More freely consumed than	Stirling 1896 p.60		
	dünmordta	-	any other vegetable food except Munyeru, roasted in ashes, rolled to remove skin	Basedow 1904 p.18	Musgrave, Tomkinson and Western Mann Ranges	Several
	djanmara	-	Eaten raw or cooked	Sweeney 1947 p.291	-	Waljbiri
	djanmara	-	-	Meggitt 1962 p.57	-	Waljbiri
Erodium cygnorum	ngumilba	-	Cooked in ashes	Johnston, Cleland 1942 p.98	Ooldea	
Eucalyptus sp.	-	Mallee	Roots roasted and pounded	Helms 1896 p.304	Murchison district	-
	-	Mallee	Roots roasted and pounded	Stirling 1896 p.58		Arunta
Ipomea costata	jala	yam	Harvested at any time of year - distinguished by runners when growing and by dead or dormant stems. One of the most valuable desert foods. Available all seasons.	Sweeney 1947 p.259	-	Waljbiri
	jala		-	Meggitt 1962 p.8	-	Waljbiri
Ipomea heterophylla	dintani	-	Roasted and eaten	Johnston, Cleland 1943 p.155	North eastern corner of S.A.	Several
Ipomoea sp.	yala	-	Large edible yam	Cleland, Johnston 1939 p.25	The Granites	Waljbiri
Ipomoea sp.	'jala	-	-	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
Ipomoea sp?	'wapiti	-	-	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
Portulaca intraterranea	several	-	Roots only eaten when cooked - leaves stems eaten raw	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	Several
Portulaca oleracea	several	-	-	Cleland, Tindale 1959 p.132	Haast Bluff	Bindubi
	-	-	-	Cleland, Johnston 1937-8 p.209	Musgrave Range	Bidjandjadjara
P. oleracea var. grandiflora	several	-	Eaten after cooking	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several
Thysanotus exiliflorus	tjipari	-	-	Johnston, Cleland 1942 p.95	Ooldea	-
Thysanotus patersoni	nurgu-nurgu	-	Eaten raw or cooked	Helms 1896 p.259	Everard Range	-
Typha augustifolia	-	-	Young roots eaten raw or roasted	Stirling 1896 p.60	Central Australia	-
Vigna lanceolata	-	-	Roots eaten raw or roasted	Stirling 1896 p.57	-	-

TABLE 2 (CONTINUATION) REFERENCES TO PLANTS EATEN BY THE ABORIGINES OF CENTRAL AUSTRALIA

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Rootstocks	Vigna lanceolata	alaitya	yam	Women recognize withered remains of plants	Cleland 1932 p.37	MacDonald Downs	-
		wabidi	-	Eaten raw or cooked	Sweeney 1947 p.291	-	Waljbiri
		wabidi	-	-	Meggitt 1962 p.9	-	Waljbiri
		several	-	-	Cleland, Tindale 1959 p.135	Haast Bluff	several
Fruits	Canthium latifolium	jauwagi		-	Sweeney 1947 p.291	-	Waljbiri
		jauwagi	Plum-bush	-	Meggitt 1962 p.6.	-	Waljbiri
	Capparis lasiantha	ung'durika		2 types of fruit identified under this name	Cleland 1932 p.37	MacDonald Downs	-
		aldura		One buried until ripe to prevent birds eating it			
	Capparis mitchellii	trogea	-	-	Cleland 1932 p.37	MacDonald Downs	-
		-	Native pomegranate	Widespread but not abundant	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
		wadagi		Limited to mulga and grass country	Sweeney 1947 p.290	-	Waljbiri
		wadagi	wild-orange	-	Meggitt 1962 p.6	-	Waljbiri
		several	wild-orange	-	Cleland, Tindale 1959 p.132	Haast Bluff	several
		-	Native orange or pomegranate		Stirling 1896 p.55	Central Australia	-
	Capparis spinosa	-	-	-	Stirling 1896 p.55	Central Australia	-
		several	-	-	Cleland, Tindale 1959 p.132	Haast Bluff	several
	Capparis sp?	djuguru	Wild-orange	-	Meggitt 1962 p.6	-	Waljbiri
		-	-	Available February-March	Finlayson 1936 p.84	Central Australia	-
	Carrisa brownii	mangari	-	-	Cleland, Tindale 1954 p.185	Yuendumu	Ngalia
		several	-	Considered good food	Cleland, Tindale 1959 p.136	Haast Bluff	several
	Carrisa lanceolata	managidji	Konkleberry	Matures quickly after rain. Harvest lasts for only a few weeks	Sweeney 1947 p.290	-	Waljbiri
		managidji	Conkerberry	-	Meggitt 1962 p.6	-	Waljbiri
		nganango	-	-	Thompson 1962 p.266	Lake Mackay	Bindubi
	Casuarina decaisneana	several	Desert oak	Kernels chewed when green	Cleland, Tindale 1959 p.131	Haast Bluff	several
		-	Desert oak	Young subacid cones eaten	Stirling 1896 p.57	Central Australia	-
	Clerodendron floribundum	several	-		Cleland, Tindale 1959 p.137	Haast Bluff	several
	Cucumis chate	-	-	-	Stirling 1896 p.58	Central Australia	-
	Cucumis melo, var. agrestis	-	Cucumber	-	Cleland, Tindale 1954 p.82	Yuendumu	Ngalia
	Enchylaena tormentosa	several	-	-	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several
		several	-	Fruit soaked in water and liquid drunk	Cleland, Tindale 1959 p.132	Haast Bluff	several
	Eucarya acuminata	toordoo	Quondong	Fruits roasted when green. Kernels of ripe fruit eaten	Johnston, Cleland 1942 p.96	Ooldea	-
		several	Native Peach	-	Cleland, Tindale 1959 p.131	Haast Bluff	several
		-	Native Peach	-	Cleland, Tindale 1954 p.82	Yuendumu	Ngalia
	Ficus platypoda	-	Native Fig	Grows among rocky hills	Cleland, Tindale 1954 p.82	Yuendumu	Ngalia
		several	Fig	-	Cleland, Tindale 1959 p.131	Haast Bluff	Several
		-	Fig	-	Øleland, Johnston 1937-8 p.209	Musgrave Range	Bidjandjadjara
		widjirgi	Wild-fig	-	Meggitt 1962 p.8	-	Waljbiri
		widjirgi		-	Sweeney 1947 p.290	-	Waljbiri
		-	-	Dry fruits eaten	Basedow 1904 p.18	Musgrave, Tomkinson, Western Mann Ranges	Several
			Native fig	-	Stirling 1896 p.57	Central Australia	-

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Fruits	Loranthus exocarpi	ngantja			Cleland, Tindale 1959 p.132	Haast Bluff	Bindubi
		jamilbiri	-	Eaten with fruit red or black	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
		amara	-	-	Cleland 1932 p.37	MacDonald Downs	-
		-	-	Berries collected and eaten while on the move	Stirling 1896 p.58	Central Australia	-
	Loranthus linophyllus	-	-	as above	Stirling 1896 p.58	Central Australia	-
	Loranthus maidenii	'tjan'ga	-	Eaten by children in play	Cleland, Tindale 1959 p.132	Haast Bluff	several
		ngarankiri	Mistletoe	-	Cleland, Tindale 1954 p.86	Yuendumu	Ngalia
	Loranthus mitchellianthus	koontarda	-	-	Johnston, Cleland 1943 p.15	North eastern corner of S.A.	-
	Loranthus murrayi	several	-	-	Cleland, Tindale 1959 p.131	Haast Bluff	several
	Loranthus pendulus	-	-	Collected and eaten while on the move	Stirling 1896 p.58	Central Australia	-
	Melrothia maderaspatana	-	-	-	Stirling 1896 p.58	Central Australia	-
	Melrothia sp?	ilgodda	-	-	Basedow 1904 p.18	Musgrave, Tomkinson, Western Mann Ranges	-
	Myoporum dampieri	-	-	Red drupes eaten	Stirling 1896 p.58	Central Australia	-
	Plectronia latifolia	several	Wild currant	Plentiful on sandhills and ranges	Cleland, Tindale 1959 p.138	Haast Bluff	several
		-	Native currant	Juice squeezed and drunk	Cleland, Johnston 1939 p.26	The Granites	Waljbiri
		tawaljuru	-	-	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
	Santalum acuminatum	-	Quondong, Native Peach	Ripe fruit eaten, stones cracked to extract kernel.	Stirling 1896 p.58	Central Australia	-
		-	Quondong	Dehydrated fruit gathered and pounded into paste.	Thomson 1964 p.402	Lake Mackay	Bindubi
			Native peach	-	Basedow 1904 p.18	Musgrave, Tomkinson, Western Mann Ranges	-
	Santalum lanceolatum	'marukiri	Native plum	Considered good food	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
		-	-	Dried and made into cakes	Finlayson 1936, p.84	Central Australia	-
		several	Native plum	-	Cleland, Tindale 1959 p.131	Haast Bluff	several
		kolpata	Native plum	-	Cleland, Johnston 1937-8 p.209	Musgrave Ranges	Bidjandjadjara
		mugagi	-	Useful food	Sweeney 1947 p.290	-	Waljbiri
		mugagi	Plum-bush	-	Meggitt 1962 p.9	-	Waljbiri
		algullia	Native plum	-	Basedow 1904 p.18	Musgrave, Tomkinson, Western Mann Ranges	-
		several	-	-	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several
		-	Native plum	-	Stirling 1896 p.58	Central Australia	-
	Santalum sp?	-	Quondong	Fruits stoned, pounded, partially dried and made into cakes.	Finlayson 1936 p.84	Central Australia	-
	Santalum sp?	moiju	Plum-bush	-	Meggitt 1962 p.9	-	Waljbiri
	Sida inclusa	alputadi	-	-	Cleland, Tindale 1959 p.136	Haast Bluff	Bindubi
	Solanum centrale	several	-	Good fruit	Cleland, Tindale 1959 p.137	Haast Bluff	several
	Solanum coactiliferum	several	-	-	Cleland, Tindale 1959 p.137	Haast Bluff	several
	Solanum ellipticum	several	-	Staple food, eaten at all times	Cleland, Tindale 1959 p.138	Haast Bluff	several
		garaba	Desert raisin	Important desert food	Sweeney 1947 p.290	-	Waljbiri
		garaba	Desert raisin	-	Meggitt 1962 p.9	-	Waljbiri
		e-toonba	-	-	Johnston, Cleland 1942 p.101	Ooldea	-

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Fruits	Solanum ellipticum	ngaliljiriki	-	Cooked ripe or green	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
		albaranji	-	-	Cleland 1932 p.37	MacDonald Downs	
		-	-	Plucked and eaten raw	Stirling 1896 p.59	Central Australia	-
	Solanum ellipticum var.	a'leljaka	-	Small green fruits good food	Cleland, Tindale 1959 p.137	Haast Bluff	Aranda
		-	-	-	Cleland, Johnston 1937-8 p.211	Musgrave Ranges	Bidjandjadjara
	Solanum eremophilum	several	-	Fruit very nice to eat	Cleland, Tindale 1959 p.139	Haast Bluff	several
	Solanum esuriale	-	-	Plucked and eaten raw	Stirling 1896 p.59	Central Australia	-
	Solanum melanospermum	several	-	Black seeds removed, flesh and skin eaten	Cleland, Tindale 1959 p.138	Haast Bluff	several
	Solanum nemophilum	yakkadiddi	-	-	Cleland, Johnston 1939 p.25	The Granites	Waljbiri
	Solanum orbiculatum	several	-	Good fruit	Cleland, Tindale 1959 p.137	Haast Bluff	several
	Solanum petrophilum	-	-	Plucked and eaten raw	Stirling 1896 p.59	Central Australia	-
	Solanum phlomoides	ngaru	-	Readily eaten when green, provided seeds are black.	Cleland, Johnston 1939 p.26	The Granites	Waljbiri
		wanakitji, ngandawali	-	wanakitji has reflexed fruit, ngandawali is upright variety	Cleland, Tindale, 1954, p.85	Yuendumu	Ngalia
	S. sp. aff. with S. phlomoides and S. melanospermum	several	-	Skin and flesh only eaten, black seeds discarded	Cleland, Tindale 1959 p.138	Haast Bluff	several
	Solanum sp?	wanggi	-	-	Meggitt 1962 p.9	-	Waljbiri
	Solanum sp?	-	-	Skin only eaten. Dried after removing pulp and seeds. Strung on stick and dried in sun. Soaked before use. Important desert food.	Sweeney 1947 p.290	-	Waljbiri
	Solanum sp.	-	-	2 types desicated and stored	Thomson 1962 p.11	Lake Mackay	Bindubi
	Solanum sp? nova	jakadjeri	-	Good food	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
	Solanum sp. ident.) S. ellipticum)	japindiri	-	Sweet edible fruit	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Seeds	Acacia aneura	mandja	Mulga	-	Meggitt 1962 p.5	-	Waljbiri
		mandja	Mulga	Seeds roasted and ground.	Sweeney 1947 p.291	-	Waljbiri
		'mandja	Mulga	-	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
	Acacia aneura var. latifolia	several	Blue mulga	Seeds parched and milled	Cleland, Tindale 1959 p.134	Haast Bluff	several
		koraka	-	Seeds covered with embers. Ground and made into damper	Cleland, Johnston 1937-8 p.210	Musgrave Range	Bidjandjadjara
	Acacia coriacea	bangguna	Wattle	-	Meggitt 1962 p.5	-	Waljbiri
		bangguna	-	Seeds roasted and ground to mash. A staple food.	Sweeney 1947, p.291	-	Waljbiri
	Acacia cuthbertsoni	pi:li	-	Sometimes eaten	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
	Acacia dictyophleba	baddutu	-	Seeds pounded and eaten	Cleland, Johnston 1939 p.24	The Granites	Waljbiri
	Acacia estrophiolata	wabidi	Ironwood	-	Meggitt 1957 p.143	-	Waljbiri
	Acacia farnesiana	several	-	Seed parched and milled	Cleland, Tindale 1959 p.134	Haast Bluff	several
	Acacia frumentacea	-	-	-	Stirling 1896 p.57	Central Australia	-
	Acacia kempeana	ngalgiri	Witchetty-bush	-	Meggitt 1962 p.5	-	Waljbiri
		ngalgiri	-	Seeds roasted and ground	Sweeney 1947 p.291	-	Waljbiri
		érepili	Witchetty-bush	Grubs in roots also eaten	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
	Acacia ligulata	several	Broad leaf wattle	Available Spring	Cleland, Tindale 1959 p.133	Haast Bluff	several
	Acacia murrayana	-	-	Roasted and eaten	Johnston, Cleland 1943 p.154	North eastern corner of S.A.	-
	Acacia notabilis	mandala	Wattle	-	Meggitt 1962 p.5.	-	Waljbiri
	Acacia patens	several	-	Ground. Makes bean soup with water	Johnston, Cleland 1959 p.133	Haast Bluff	several
	Acacia pyrifolia	-	-	-	Stirling 1896 p.57	Central Australia	-
	Acacia saliciana	-	-	-	Stirling 1896 p.57	Central Australia	-
	Acacia sentis	-	-	-	Stirling 1896 p.57	Central Australia	-
	Acacia stipuligera	jilborimba	-	Seed pounded and eaten	Cleland, Johnston 1939 p.24	The Granites	Waljbiri
	Acacia tetragonophylla	guarara	Wattle	-	Meggitt 1962 p.5	-	Waljbiri
	Acacia sp?	budjubanda	Wattle	-	Meggitt 1962 p.5	-	Waljbiri
	Acacia sp?	minjana	Wattle	-	Meggitt 1962 p.5	-	Waljbiri
	Acacia sp?	ganalarambi	-	-	Meggitt 1957 p.143	-	Waljbiri
	Acacia sp?	-	-	Pods placed in ashes - shelled and eaten like peas	Spencer, Gillen 1927 p.17		Aranda
	Amaranthus grandiflorus	tjika-la	-	Made into damper	Cleland, Johnston 1939 p.23	The Granites	Waljbiri
	Amaranthus mitchellii	several	-	Used for damper	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several
	Andropogon exaltus	ƙalbal'bi	-	Husked and ground to make damper	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
	Aristida sp?	ƙalbal'bi	-	as above	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
	Aristida sp?	jibiri	Mulga grass	-	Meggitt 1962 p.6	-	Waljbiri
	Brachiaria piligera	several	-	Milled with water and baked	Cleland, Tindale 1959 p.130	Haast Bluff	several

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Seeds	Brachychiton gregorii	several	Desert kurrajong	Milled and eaten. Considered fattening	Cleland, Tindale 1959 p.136	Haast Bluff	several
		-	Kurrajong	-	Basedow 1904 p.19	Musgrave, Tomkinson, Western Mann Ranges	several
		-	-	-	Stirling 1896 p.56	Central Australia	-
		-	Desert kurrajong	Fruit eaten by crows. Seed deposited in excreta of birds at waterholes. Collected by Aborigines from there.	Cleland 1939 p.6	-	-
	Chenopodium rhadinostrachyum	several	-	Seed soaked in water, rubbed between stones to make damper.	Cleland, Tindale 1959 p.132	Haast Bluff	several
		pri(e)ntiga	-	Ground	Cleland, Johnston 1939 p.22	The Granites	Waljbiri
	Chenopodium sp?	-	'Mouse-tail' Chenopodium	-	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
	Claytonia balonnensis	ing-witchika	Munyeru	Ground with water, paste eaten raw or cooked	Stirling 1896 p.56	Alice Springs	Aranda
	Claytonia sp?	-	Munyeroo	Ground and made into paste eaten raw or cooked	Basedow 1925 p.149	Central Australia	-
	Claytonia sp?	ing-witchika	Munyeru	Ground with water, paste eaten raw or cooked. Very important food	Spencer, Gillen 1927 p.17		Aranda
	Claytonia sp?	-	Munyeroo	Bushes torn up, heap on clay pans. Beaten when dry to knock seed out, swept up, ground with water. Paste cooked in ashes.	Horne, Aiston 1924 p.55	North of Lake Eyre	-
	Dactyloctenium radulans	several	-	Milled with water. Considered good food.	Cleland, Tindale 1959 p.130	Haast Bluff	several
		otetta	-	Seed collected by ants after fallen from ears - Women collect seeds, husked by working with feet, winnowed and presumably ground. Recorded in August.	Cleland 1932 pp.36-7	MacDonald Downs	
	Eragrostis clelandii	wagu	-	Ground and made into damper	Johnston, Clelend 1942 p.95	Ooldea	
	Eragrostis dielsii	several	-	Milled	Cleland, Tindale 1959 p.130	Haast Bluff	several
	Eragrostis eriopoda	several	-	Milled with water	Cleland, Tindale 1959 p.130	Haast Bluff	several
		-	-	Sometimes supported a family at one well for several weeks.	Thomson 1964 p.402	Lake Mackay	Bindubi
	Eriachne sp?	mga-land-ngong	-	Seed collected by ants. Gathered, winnowed and ground by women.	Cleland, Johnston 1939 p.29	The Granites	Waljbiri
	Eucalyptus gamophylla	'waralju	-	-	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
	Eucalyptus microtheca	-	Coolabah	-	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
		pattera	Coolabah	Branches broken off, laid on claypan. Seed capsules open after 5 days. Debris collected and winnowed. Seeds soaked, cleaned, dried and ground. Resulting paste eaten raw or roasted.	Johnston, Cleland 1943 p.155	North eastern corner of S.A.	
	Grevillea striata	jildilba	Beefwood	-	Meggitt, 1957 p.143	-	Waljbiri
	Hakea sp.	wadia wanu	-	-	Meggitt, 1957 p.143	-	Waljbiri

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Seeds	Ipomoea heterophylla	dintani	-	Seeds eaten when fresh, not ripe and dry.	Johnston, Cleland 1943 p.155	North eastern corner of S.A.	
	Ipomea muelleri	judadjidi	-	-	Meggitt 1962 p.6	-	Waljbiri
	Marsilea quadrifolia	-	Nardoo	Not eaten much	Basedow 1904 p.18	Musgrave, Tomkinson and Western Mann Ranges	-
		-	Nardoo	Grows where water lodges for some time.	Cleland 1932 p.36	MacDonald Downs	
		parapara	-	-	Basedow 1925 p.150	-	Aranda
	Owenia reticulata	marrangi		Nut eaten raw or roasted	Cleland, Johnston 1939 p.24	The Granites	Waljbiri
	Panicum decompositum	several	-	Good grass-seed food.	Cleland, Tindale 1959 p.130	Haast Bluff	several
		'kalbal'bi	-	Milled with water and baked Husked and ground to make damper bread.	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
		-	-	Most largely used grass seed.	Stirling 1896 p.61	Central Australia	-
	Panicum distachyum	ngilyara	-	Seeds first collected by ants after falling from ears. Seeds husked winnowed and ground by women. Recorded in August.	Cleland 1932 p.37	MacDonald Downs	
	Panicum pauciflorum	bunnaitju		as above	Cleland, Johnston 1939 p.22	The Granites	Waljbiri
		jugaridja	-	-	Meggitt 1957 p.143	-	Waljbiri
	Pappophorum avenaceum	ibirri	-	Seed collected by ants. Collected, husked winnowed and ground by women.	Cleland, Johnston 1939 p.22	The Granites	Waljbiri
	Polygonum plebejum	paua-tinna	-	Seeds crushed and cooked as damper. Not used by other tribe in area	Johnston, Cleland 1943 p.150	North eastern corner of S.A.	Ngamini
	Portulaca oleracea	*	-	Seeds ground	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several
		-wakadi	Common purslane	Fine seed ground	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
		wakadi	-	-	Cleland, Johnston 1939 p.23	The Granites	Waljbiri
		waka-ti	-	-	Cleland, Johnston 1937-8 p.209	Musgrave Range	Bidjandjadjara
		several	-	-	Cleland, Tindale 1959 p.132	Haast Bluff	several
	Portulaca sp?	wagadi	Pig weed	-	Meggitt 1962 p.8	-	Waljbiri
	Portulaca sp?	wagadi	-	-	Sweeney 1947 p.292	-	Waljbiri
	Rumex crystallinus	murkera	-	Ground and made into damper	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several
	Stipa sp?	wang-u	-	-	Johnston, Cleland 1942 p.95	Ooldea	-
	Tragus australianus	several	Prickle grass	Milled and baked	Cleland, Tindale 1959 p.130	Haast Bluff	several
Leaves, stems and flowers	Blennodia eremigera	several	-	Eaten after cooking	Johnston, Cleland 1943 p.154	North eastern corner of S.A.	several
	Calandrinia volubilis	uratja	-	Cooked in hole scraped in ashes	Cleland, Johnston 1937-8 p.209	Musgrave Ranges	Bidjandjadjara
	Claytonia spp?	-	Muneryoo	Leaves eaten raw as thirst quencher. Tops eaten cooked	Basedow 1925 p.149	Central Australia	-
		-	Parakylia	Plant eaten raw or baked	Stirling 1896 p.57	Central Australia	-
	Claytonia		Parakylia	Leaves eaten	Basedow 1904 p.18	Musgrave, Tomkinson, Western Mann Ranges	-
	Convolvulus erubescens	several	-	Steamed and eaten	Cleland, Tindale 1959 p.137	Haast Bluff	-
	Eremophila freelingii	mianba	-	Leaves and flowers eaten	Meggitt 1962 p.7	-	Waljbiri
	Eremophila latrobei	janjilingi	-	Leaves and flowers eaten	Meggitt 1962 p.7	-	Waljbiri
	Eremophila sp?	wadianu	-	Flowers eaten	Meggitt 1962 p.7	-	Waljbiri

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Leaves, stems and flowers	Eremophila	wagabadari	-	Flowers eaten	Meggitt 1962 p.7	-	Waljbiri
	Erythrina australis	jinindi	Bean tree	Young shoots steamed and eaten	Cleland, Tindale 1954 p.84	Yuendumu	Ngalia
	Erythrina verspertilio	-	Coral tree	Seedling shoots eaten	Cleland, Tindale 1954 p.83	Yuendumu	Ngalia
	Eucalyptus camaldulensis	ngabiri	-	Flowers eaten [nectar?]	Meggitt 1962 p.7	-	Waljbiri
	Ipomoea sp?	mootcherie	-	Leaves eaten like spinach	Johnston, Cleland 1943 p.155	North eastern corner of S.A.	-
	Ipomoea sp?	-	-	Steamed, leaves stripped off and eaten. 'Long time ago live on this'.	Cleland, Tindale 1959 p.137	Haast Bluff	-
	Lepidium muelleri-fernandi	several	-	Stems cooked and eaten	Johnston, Cleland 1943 p.154	North eastern corner of S.A.	several
		several	-	Aranda steam plants in hole with hot stone. Plant enclosed in covering of Zygophyllum plant. Steamed grass stripped and eaten. Stems pounded and eaten. Where no stones, plants laid on wet grass on heated sand-leaves eaten, stems discarded.	Cleland, Tindale 1959 p.133	Haast Bluff	Aranda
	Lepidium oxytrichium	several	-	Steamed and eaten by Aranda	Cleland, Tindale 1959 p.133	Haast Bluff	Aranda
		unmuta	-	Steamed and eaten	Cleland, Johnston 1937-8 p.209	Musgrave Range	Bidjandjadjara
	Lepidium rotundum	several	-	Steamed and eaten by Aranda. Pintubi do not use this method or eat plant.	Cleland, Tindale 1959 p.133	Haast Bluff	several
	Lepidium ruderale	-	-	Eaten raw or cooked	Stirling 1896 p.55	Central Australia	-
	Livistona mariae	-	-	White basal parts of inner leaves eaten raw or cooked	Stirling 1896 p.60	Central Australia	-
	Marsdenia australis	jubali	-	Young pods eaten raw. Mature pods cooked. Leaves eaten raw. Important food.	Sweeney 1947 p.290	-	Waljbiri
		jubali	Bush banana	-	Meggitt 1962 p.8	-	Waljbiri
		poi-ya	Silky-pear	Flower buds, leaves and stems eaten.	Johnston, Cleland 1942 p.101	Ooldea	-
		jupalia	-	Leaves and pods eaten. Considered good food.	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
		-	-	Pods and seedling shoots eaten.	Cleland 1932 p.37	MacDonald Downs	
	Pentatropis kempeana	several	-	Leaves eaten if found while hunting. Stop to eat their fill when found.	Cleland, Tindale 1959 p.136	Haast Bluff	several
		'manilba	-	Bean-like folicles eaten.	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
	Portulaca ballonnensis	-	Munyeroo	Leaves eaten.	Basedow 1904 p.18	Musgrave, Tomkinson, Western Mann Ranges	-
	Portulaca intraterranea	several	-	Plant above ground eaten raw	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several
	Portulaca sp?	wagadi	Pig weed	Stems eaten	Meggitt 1962 p.8	-	Waljbiri
	Portulaca sp?	wagadi		Stems eaten	Sweeney 1947 p.292	-	Waljbiri
	Stenopetalum velutinum	unmata	-	Leaves, stems eaten. Preparation as for Le idium muelleri-fernandi.	Cleland, Johnston 1937-8 p.209	Musgrave Range	Bidjandjadjara
	Trigonella sauvissima	several	Native clover	Plant eaten raw	Johnston, Cleland 1943 p.153	North eastern corner of S.A.	several

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Leaves stems and flowers	Typha augustifolia	-	-	Young shoots eaten raw	Stirling 1896 p.60	Central Australia	-
	Xanthorrhoea thorntoni	-	-	White basal parts of inner leaves eaten raw or roasted	Stirling 1896 p.59	Central Australia	-
Exudations and Nectar	Acacia aneura	several	Mulga	Honey dew at base of phyllodes collected.	Cleland, Tindale 1959 p.124	Haast Bluff	-
		koraka	Mulga	as above	Cleland Johnston 1937-8 p.210	Musgrave Range	Bidjandjadjara
		maruka	Mulga	Gum eaten	Johnston, Cleland 1942 p.98	Ooldea	-
	Acacia aneura var. latifolia	several	Blue mulga	Honey dew at base of phyllodes collected.	Cleland, Tindale 1959 p.134	Haast Bluff	several
	Acacia notabilis	mandala	Wattle	Gum eaten	Meggitt 1962 p.5	-	Waljbiri
	Acacia sp?	-	Desert wattle	Gum eaten	Sweeney 1947 p.294	-	Waljbiri
	Acacia sp?	girrdi	-	Gum eaten	Johnston, Cleland 1942 p.98	Ooldea	-
	Bauhinia hookerii	gundji	-	Nectar from flowers eaten	Meggitt 1962 p.6	-	Waljbiri
	Brachysema chambersi	several	-	Sugar obtained from flower	Cleland, Tindale 1959 p.135	Haast Bluff	several
	Eremophilum spp?	-	-	Flowers sucked to obtain nectar	Cleland, Johnston 1942 p.101	Ooldea	-
	Eucalyptus gamophylla	'waralju	-	Nectar from flowers	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
	Eucalyptus pachyphylla	tjitilbara	-	Nectar from flowers	Cleland, Tindale 1954 p.85	Yuendumu	Ngalia
	Eucalyptus terminalis	several	-	Nectar from flowers	Cleland Tindale 1959 p.136	Haast Bluff	-
	Hakea ivoryi	several	Corkwood	Nectar from flowers. Steeped in water. Obtained in summer	Cleland, Tindale 1959 p.131	Haast Bluff	-
	Hakea lorea	several	Corkwood	Nectar from flowers. Steeped in water.	Cleland, Tindale 1959 p.131	Haast Bluff	-
	Hakea spp?	-	Corkwood	Nectar from 4 species	Cleland, Tindale 1954 p.82	Yuendumu	Ngalia
	Leptospermum coriaceum	winba-la	-	Nectar from flowers	Johnston, Cleland 1942 p.99	Ooldea	-
	Owenia reticulata	munda	-	Gum eaten	Cleland, Johnston 1939 p.24	The Granites	Waljbiri
Fungi	Psalliota nova sp?	tjanbi	-	Edible mushroom	Johnston, Cleland 1942 p.102	Ooldea	
	Tuberales sp?	mulbo	Truffles	Found in considerable quantities along the feet of sand dunes.	Thomson 1962 p.154	Lake Mackay	Bindubi
	Scleroderma sp.	wiljari	Truffle	-	Meggitt 1962 p.9	-	Waljbiri
Moisture yielding Plants	Claytonia spp?	-	Muneryoo	Leaves eaten raw as thirst quencher	Basedow 1925 p.149	Central Australia	-
	Eucalyptus trans-continentalis	-	-	Root less than 1" diam. and 1 yard long holds about 4ozs liquid.	Cleland 1939 p.9	Central Australia	-
	Hakea leucoptera	kuluwa	-	Root pulled up, broken into pieces and stripped of bark. Blown at one end to expel water.	Johnston, Cleland 1943 p.153	Ooldea	-
		several	-	Roots source of water	Cleland, Tindale 1959 p.131	Haast Bluff	several
		kooloova	Needle-bush	Bush burned, then roots dug up. One end of root placed in fire, water trickles from other.	Koch 1898 p.110	Mt Lyndhurst S.A.	-
		-	Yam	Native subsisted on moisture from yams.	Terry 1934 p.505	Lake Mackay	-

Berndts' (1942) list contains references to water being obtained from the roots of 2 types of Mallee, 1 Gum tree [Eucalypt?], the Kurrajong and 2 unidentifiable trees by the natives in the Ooldea region.

CHAPTER 4

THE RIVERINE TRIBES OF SOUTHEASTERN AUSTRALIA

It is not possible to define riverine groups with the same precision with which coastal groups may be defined. While it is easy to distinguish between coastal and inland tribes, most groups living around the periphery of the continent at least, lived in areas where permanent and semi-permanent water courses provided a certain amount of aquatic food. However, the importance of this food, and the degree to which it was exploited, varied considerably. Riverine groups can only be defined as those groups who spent at least some seasons of the year in continuous settlement on the rivers, and whose economy at this time showed some specialisation in the collection of riverine foods. Several areas in Australia provide conditions amenable to the development of such economies, of which the Murray-Darling region is undoubtedly the best known.

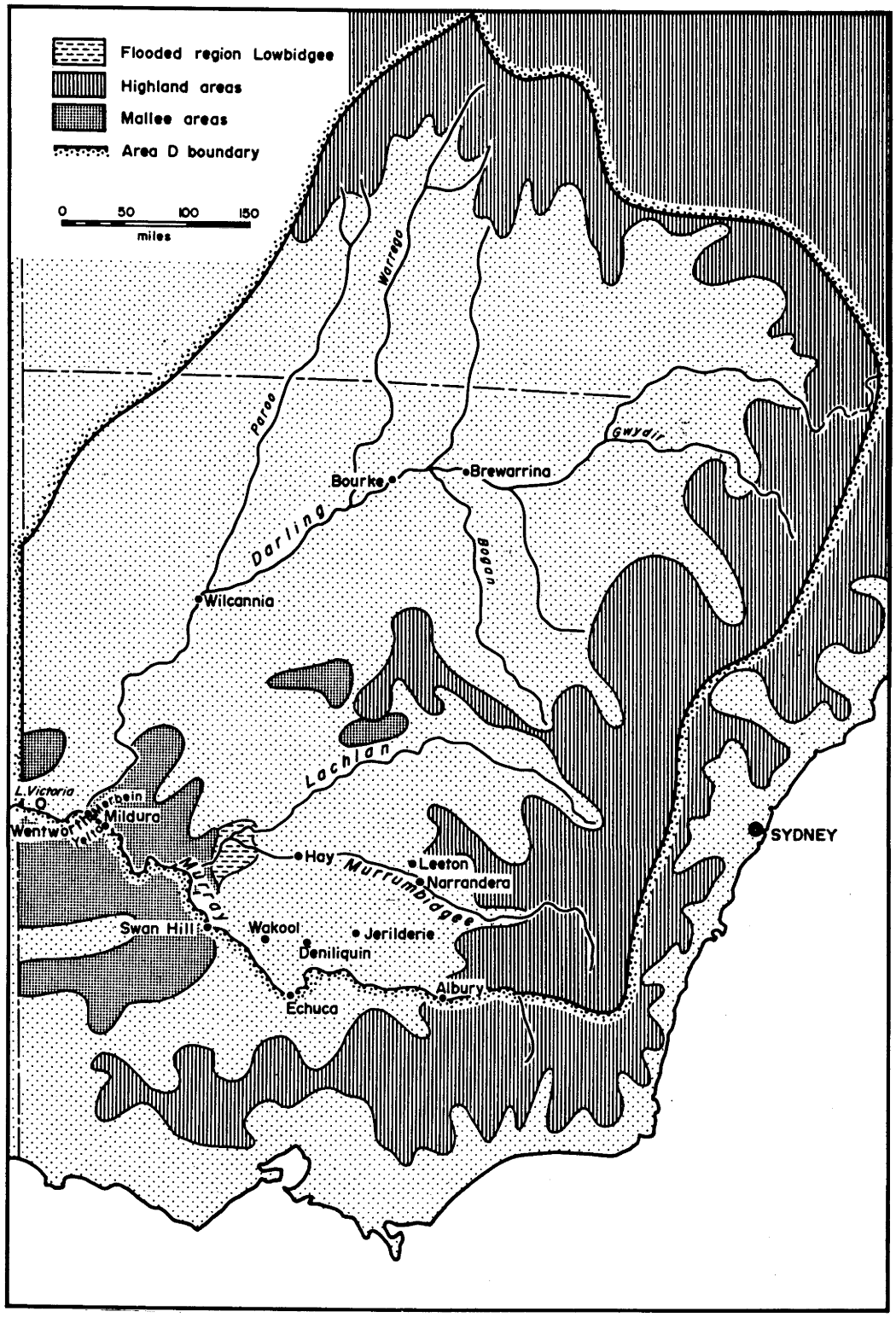
(I) THE HABITAT OF THE RIVERINE TRIBES

The major rivers flowing through the area are the Darling, Lachlan, Murrumbidgee and Murray Rivers and their tributaries. They rise in the well-watered Eastern Highlands, and flow across areas of decreasing rainfall. In the east, Albury receives an average annual rainfall of 27.66 inches, while Balranald, to the west, receives an average annual total of 11.53 inches. In this respect the

river flow over much of the area is not a reflection of local conditions, but rather reflects the conditions in the catchment areas to the east. If the Water Balance method (Thornthwaite and Mather 1955, 1957) is used to calculate the average monthly runoff for stations in the area, the following stations have no runoff at any month of the year; Leeton, Hay, Wentworth, Wilcannia and Swan Hill, while Albury has runoff for about five months of the year. This picture is somewhat distorted because of the fact that average values are used and no account is taken of the intensity of the rainfall. Russell's (1899, p.58) observations show this very well. In one instance between ten and eleven inches of rain fell on the country around Wilcannia and sufficient water ran off to raise the level of the river to a maximum of 28 feet above summer level, and the river did not subside to its old level for 35 days. However, the major, seasonal fluctuations in river level are due to outside factors. It is impossible to quantify, or even indicate the true nature of these changes because dams and weirs have been constructed to regularise the river flow, and the flow values recorded at the gauging stations refer to this, and not the natural situation. One has to rely on the more subjective reports of early observers. Pollitzer, quoted by Tate (1883-4, p.27), states that the Murray reaches its maximum volume in the summer months of December and January when its flow is supplemented by snow-melt. The 'freshes' on the Darling result from tropical rains falling on the northern sectors of the catchment during December. Despite the regulation of flow by dams there have been several instances where the Darling and Lachlan Rivers, together with the distributaries of the Murrumbidgee and Murray, have ceased

to flow for periods of a month or more (Water Conservation and Irrigation Commission 1956, Vols I, II). Another factor which should not be ignored is the changing salinity of the rivers. When Sturt (1833, I, p.87) reached the Darling at New Year's Creek on February 4th 1829 it was so salty that it could not be drunk and the surrounding native camps were deserted.

The nature of the rivers and the effect of the seasonal floods depends largely on the area through which the rivers flow. The area under study has been divided into three physiographic provinces (Dept. Nat. Devel. 1947, p.21). The first of these if bounded in the east by the Eastern Highlands and in the west by the Mallee plains (Map 9). The area consists of a lowland region of uniform topography. The area north of the Murray slopes to the west with a gradient ranging from four feet per mile in the east to less than one foot per mile in the west. South of the Murray the land surface slopes gently to the north. Butler (1950, p.233) describes the relief of the plain as being subdued and consisting of low, winding ridges, 'high plains', 'low plains' (Butler's terminology), depressions, swamps and scattered sand dunes. The river pattern is characterised by a maze of wandering courses, branching into distributaries and anabranches; in some cases connecting the major rivers in the area. In the higher sections of the plain the rivers flow in incised flood plains 15 to 25 feet below the level of the plain. In the lower sections of their courses the rivers have no flood plains and flow in narrow winding defiles 10 to 20 feet below the level of the plain. During flood times the rising river waters fill the distributaries and billabongs,



Map 9. Area D - Locality map. (Mallee areas after Atlas of Australian Resources)

often overflowing the banks and flooding large areas of land. The water may lie for weeks or months before draining back into the streams as the river levels subside. The Lowbidgee area at the junction of the Lachlan and Murrumbidgee Rivers is the area where widespread flooding is most common. The annual nature of this flooding meant that its occurrence had an important part in the seasonal activities of the Aborigines.

The Mallee area extends westwards to below Mildura and consists of a flat to gently undulating surface of broad ridges as well as extensive areas of sand dunes. With the exception of the main rivers, which rise outside the area, it is distinguished by an absence of flowing streams. The rivers rising in the Grampians fail to penetrate the Mallee and reach the Murray. Drainage is into depressions which receive water only after floods and give rise to ephemeral lakes and swamps. The water in these is lost by evaporation and downward percolation.

The third section concerns only the Murray Valley. From Mildura to Overland Corner the valley averages six miles in width. Downstream from Overland Corner the river flows through a low gorge about a mile wide and in many places is bordered by swamps.

Vegetation

A considerable amount of detailed work has been done on the vegetation and land types of small areas, but the broad characteristics of the vegetation associations will suffice here. Rainfall is highest in the east along the slopes of the dividing range and decreases. Albury receives an average annual rainfall of 27.66 inches, at

Swan Hill it diminishes to 13.09 inches and to 9.71 inches at Merbein. The vegetation formations change from dry sclerophyll forests in the eastern foothills through various woodland formations to grassland and shrub steppe. Fringing zones of River Red Gum (Eucalyptus rostrata) occur along the rivers, accompanied by parallel zones of Black Box (Eucalyptus bicolor) and Lignum (Meuhlenbeckia cunninghamii). On the levees, higher prior-stream beds, the source bordering dunes and the scattered sand ridges, Cypress Pine (Callitris hugelii) is the dominant species. Mallee species (Eucalyptus spp.) dominate the area to the north-west where calcareous soils occur. The most important characteristic of all these woodland and forest communities is that they exhibit few shrubs and poor ground flora, a factor which must have considerable effect on the amount of vegetable food available to the Aborigines. The grassland areas, bordering the Murrumbidgee in the Deniliquin, Jerilderie area, are characterised by extensive areas of treeless plains and scattered clumps of Black Box, Grey Box and Buloke (Casuarina luehmannii). Langford Smith (1960, p.368) claims that, despite its desolate appearance, this area provides some of Australia's best natural pasture. One assumes that the carrying capacity of this area, in terms of indigenous grazing animals would also have been high. The steppe areas consist of saltbush (Atriplex spp.) and bluebush (Kochia spp.) associations which take the form of low scrub three to four feet high.

While rainfall is an obvious factor in determining the vegetation association in any one area, its seasonal pattern and availability throughout the year also has a

very marked effect on the patterns of growth within each association. This is particularly important in reference to the presence of annual and ephemeral edible plants. Smith, Herriot and Johnston (1943, p.10) calculated that the average growing period at Wakool extended from April to September, but this would be prolonged in abnormally wet years, while in a drought year conditions might not be conducive to plant growth during any portion of the year.

Most of the literature available refers to the tribes living in the first physiographic province between the Eastern Highlands and the Mallee (Map 9). There appear to have been no great barriers to movement. No great mountain ranges separate the major rivers in the area, and for this reason it is perhaps unreasonable to expect highly distinctive and localised economies, like some of the coastal examples to develop. However, it is evident that the way of life of some groups in the area differed from that of those on the headwaters and also from the currently accepted view of the 'normal' inland economy. This difference stems from the groups activities in exploiting the rich resources of fish and other aquatic life in their area. It appears that small groups lived in this manner throughout the year, but during certain seasons much larger groupings of people gathered on the rivers and lived on the foods gained from them. In this, the activities of the people, their movements and the hunting methods they employed showed a seasonal rhythm in step with the seasonal variations in river flow.

(II) THE ECONOMIC LIFE OF THE RIVERINE TRIBES OF SOUTHEASTERN AUSTRALIA

The entire length of the rivers in this region (Map 9) was not populated by groups whose economies conformed with the definition given at the beginning of this chapter. Sturt's (1833, II) observations made during his journey down the Murrumbidgee and Murray Rivers during January and February 1830 show that the population was not uniformly dense along the river and, because of the short time span involved, these differences can hardly be attributed to seasonal factors. Sturt (1833, II, p.39) marvelled at the sparseness of the population of the country as far downstream as Hamilton's Plains (Narrandera) despite the fineness of the country and the nobility of the river. He did not see more than 50 Aborigines along 180 miles of river (1833, II, p.50). But between the Lachlan junction and the confluence of the Murrumbidgee and Murray he saw a camp consisting of not less than 120 people (1833, II, p.81) and the country became more populous past the junction of the Murray and the Darling (Sturt 1833, II, p.124). Other authors record similarly large gatherings on the lower reaches of the rivers. Eyre (1845, II, p.252) reports a group of 600 at Lake Victoria and Mitchell (1838, II, p.36) a group of about 100 at Regent's Lake on the Lachlan. While one must be prepared to accept Eyre's (1845, II, p.218) statement that the numbers in any one area varied with the season, and that tribes from surrounding areas occasionally visited the river, this cannot explain the differences in density seen by Sturt during the one season. It might be argued that large number of Aborigines did in fact live on the upper reaches of the rivers, but were hidden at the time of

Sturt's visit. There is no evidence to support this. The available information suggests that the lower reaches of the rivers were more densely populated than the upper parts, and by people whose economic activities were more readily observed by the explorers travelling along the rivers.

The emphasis of the aboriginal economy in exploiting the food supplied by the rivers was immediately evident to the explorers. After seeing the natives on the Darling, Mitchell (1838, I, p.268) writes '...these tribes inhabiting the banks of the Darling may be considered Ichthyophagi, in the strictest sense,....' Elsewhere he notes (1838, I, p.307) that these tribes were less nomadic than the tribes dependent upon hunting kangaroos and possums. Sturt (1833, I, p.106) is less extreme in his statements, and says of the tribes on the Darling: '...their chief food is fish, of which they have great supplies in the river; still they have their seasons for hunting their emus and kangaroos'. He also makes the interesting observation (1833, II, p.114) that owing to the indifference of the natives to fish, they seldom ate it when other food could be procured. This is neither supported, nor discredited, by the observations of other writers.

These statements in substance with the observations of writers having prolonged contact with the Aborigines in the area. Beveridge (1883, p.36) states that the tribes living on the lower reaches of the Darling, Lachlan, Murrumbidgee and Murray Rivers lived principally on fish, and had a super-abundance of this food for eight months of the year. Eyre (1845, II, p.250) stresses the seasonal

variation in the diet of the Aborigines on the lower Murray and gives no assessment of the importance of marine foods in their diet, but cites instances (1845, II, pp.252-3, 288) where large groups came together and procured large quantities of fish, shellfish, crayfish and waterfowl. In reference to the often quoted fish traps at Brewarrina, Mathews (1903, p.152) states that the members of the Ngjamba tribe always mustered there in considerable numbers during the fishing season, or at times when fish were expected to be plentiful. The same people did not remain there all the time and only a few straggling members of the tribe remained about the fishing grounds throughout the year. In connection with this last point the reports of the explorers are particularly valuable because they show that the methods used in fishing changed with the season and the condition of the river, and the efficiency of each method, in relation to the amount of food available, presumably determined the population which could be supported at any one instance.

Despite the prominence given to river foods in the literature, both Eyre and Beveridge give lengthy accounts of the methods used in hunting such land animals as kangaroos, wallabies, possums, flying squirrels, koalas, emus and brolgas, as well as lists of the vegetable foods collected, but neither attempts to estimate the relative importance of the various food sources. To this end the reports of archaeological excavations provide illuminating but meagre information. The upper layer of Hale and Tindale's excavations at Devon Downs and Tartanga revealed (Hale and Tindale 1930, p.177) dense hearths of Unio (mussel) shells, remains of other molluscs, crayfish, fish,

tortoises, snakes, lizards and such animals as bandicoots, possums, wallabies, kangaroos, wombats, native rats and dingoes, but little clear-cut evidence of diet specialisation. Mulvaney's excavations at Fromm's Landing (1960, 1964) revealed a similar range of faunal remains with a few additions. While it is not possible to draw detailed conclusions about the relative importance of marine and terrestrial foods in the diet of the people who occupied the area, both Hale and Tindale's and Mulvaney's excavations do show that even when camped directly on the river, some members of the camp hunted land animals and brought the carcasses back to the camp, thus showing that the economy was not orientated exclusively towards the collection of riverine foods when camps were made on the rivers, and conversely, that the hunting of land animals did not necessarily lead to a movement of the camp as a body away from the river.

It is reasonably clear from the various sources that the nature of settlement and the economy of the Aborigines living on the lower reaches of the rivers differed both from that in the surrounding areas and from that in the higher parts of the catchment. During certain seasons fish, shellfish, and waterfowl formed a large part of the flesh diet and during which period large groups could come together and live off a relatively small area. At other seasons the numbers living on the rivers were greatly reduced. At these times aquatic foods were still collected, but the fishing methods used changed considerably. It is also highly probable that the hunting of land animals became more important during this period. This did not necessarily mean a movement away from the rivers. The food-gathering activities of the remaining

groups became more diversified. The rather meagre information available suggests that this seasonal pattern in the economic life of the Aborigines was directly related to the seasonal fluctuations in river flow.

The activities of the Aborigines show the widely encountered division of labour based on sex. Tables 3, 4 and 6 show that the women were mainly concerned with collecting shellfish, crayfish, shrimps, young fish fry, frogs, insects, small land game and vegetable foods, while the men concentrated on the larger fish and game, using a considerably greater range of implements and techniques. With the change in technology attendant upon European contact and the introduction of european fish hooks this pattern was slightly modified. Krefft (1862-5, p.368) observes that the women at Yelta on the Murray were very expert with the hook and line and this situation reflects the position on the southeastern coast where fish hooks were in use when the Europeans arrived.

Fishing Methods

If the literature reflects the true situation it would appear that fish and fishing were pre-eminent in the diet and activities of at least some of the people. The most common fish caught in the area included Murray Cod, Yellow-bellied Perch (Wyndham 1890, p.113). There were probably minor differences in the hunting techniques used in catching the different species, but the major variations were related to differences in river conditions. This relationship is evident in the material summarised in Table 3.

The fishing methods employed by the Aborigines fall into two main groups, the joint activities involving the co-operation of more than one individual, and the individual pursuits. Table 3 shows that the former were more commonly employed in the seasons when the annual flooding of the rivers occurred; when the swamps and river flats were inundated and the billabongs filled. This period coincided with the time when large gatherings were seen in the area. Large groups of people were employed in netting fish and crayfish, spearing fish and, as the rivers began to subside, building fish weirs across outlet channels to trap the fish returning from the swamps to the main stream.

Once the river level had dropped and the waters were confined once more to their normal channels, the whole pattern of activities changed. Nowhere is there any evidence of the large gatherings described previously. Group activities were now confined to underwater drives for fish in the broader reaches of the rivers using short, stout spears. The women used moveable bough and grass weirs to scour the remaining shallow pools. As the river flow dwindled and the fish became concentrated in smaller and smaller pools, fish-poisoning could be effectively employed. With the rising of the river in early spring the cycle began again.

These examples show that the fishing methods employed were not a matter of random choice, but were part of an annual cycle related to the seasonal fluctuations in river level and flow. The differences in the productivity of the methods and seasonal variations in the amount of marine food available meant that the population dependent upon these methods and foods showed similar fluctuations.

Unlike the methods employed, the material culture shows no such close relationship with the environment. None of the equipment used in fishing is unique to the area, or even to riverine environments generally. The greatest differences relate to the emphasis placed on certain sectors of the technology and the extent to which particular techniques were employed.

While the actual techniques employed in preparing twine and manufacturing nets do not appear to have differed greatly from those used in other areas where nets were made, the emphasis placed on net-fishing and the variety of the techniques employed lent a certain amount of distinctiveness to the fishing economy of the area. Nets were known to the natives in both the coastal areas studied, but they did not employ nets in fishing at Sydney and the Cape York groups used framed nets but not seines and gill nets. Both seines and gill nets have been recorded in other areas.

Fish weirs and stone fish traps have been recorded in use in widely separated areas of both coastal and inland Australia, the examples in this area show how the choice of either was an adaptation to the local situation. Fish weirs appear to have been used where the rising flood-waters flowed through breaks in the levee banks to form pools behind them, and then flowed back into the river as the water level began to drop again. The stone fish traps have been recorded across the mainstream only, and relied upon the fish becoming entrapped in the maze of enclosures as they swam upstream with the spring freshes on the river. Mitchell's (1838, II, p.153) observations suggest that in building the brush weirs the natives

anticipated the rise in river level and the trap was designed to catch the fish as they moved from the main river into the distributary, as well as the opposite when the river level began to fall. The latter period was probably more productive and supported a greater number of people.

Apart from the use of local materials, the design and use of the pronged fish-spear differed in no way from that in other areas. It would perhaps be more useful to consider the frequency with which it was used than its formal characteristics. These spears appear to have been used mainly during the time when the reed-beds were filled with water and therefore were probably not as important to these people throughout the year. The spear was also used to pole and paddle the canoes.

The question of the use of fish hooks in the area raises some problems. None of the explorers observed them in use and most of the early settlers state emphatically that they were not in use when the Europeans arrived. Later references to line fishing probably refer to the use of European hooks. However, two references to native-made fish hooks do occur in the literature. The first of these is particularly problematical because it comes from Kirby's writings and Kirby lived with Beveridge at Swan Hill. Beveridge makes no reference to the use of native fish hooks in the area even though he gives detailed descriptions of other fishing methods.

Canoes appear to have been used mainly in fishing, hunting waterfowl and collecting eggs in the reedswamps. During flood time they provided an important means of transport.

Hunting Methods

The discussion so far has tended to emphasise the importance of riverine foods, but if Mathew's (1903, p.153) and Sturt's (1833, II, p.114) reports are correct, probably only a small proportion of the total population hunted and collected these foods throughout the year. The congregations of the swamps and rivers were probably important events in the annual cycle of activities of most groups in the area, but for the greater part of the year their activities would have been concerned with hunting land animals in the hinterland. The faunal remains from Mulvaney's excavations at Fromm's Landing (1960, pp.61-73) suggest that land animals were hunted even while groups were camped directly on the rivers.

The descriptions of the methods used in hunting land animals (summarised in Table 4) show that several factors influenced the choice of methods used. The size and habits of the animals affected the way in which they could be approached, and most techniques were modified to some extent to capitalise on the peculiar habits of different animals. At another level, the number of people available to take part in any hunt also affected the way in which the pursuit could be carried out. This applies particularly to the hunting of kangaroos, wallabies and emus, where organised drives for game were carried out.

No adequate description of hunting methods in their seasonal context exists in the literature on the areas. If large congregations of people were possible only when the rivers were flooded and marine food plentiful, it would appear that large scale drives for game could only be organised during the spring-summer period, or within a

limited radius of the major rivers at other times of the year. However, Eyre (1865, II, p.277) states that the use of nets in conjunction with drives reduced the number of people necessary, while still achieving much the same results. There is no evidence to suggest that this latter method was employed only when insufficient numbers were available to conduct large scale drives. The use of fire was recorded by Eyre (1845, II, p.278), but whether this was widely used is not clear. Newlands (1920-1, p.4) states that the Wombungee, a section of the Wongaibon on the Upper Darling, were careful not to burn the country, and that the area showed little evidence of previous bushfires.

The fluctuations in river level affected not only the fishing activities of the Aborigines, for this seasonal pattern was reflected in the breeding seasons and migrations of the waterfowl. The different methods recorded in Table 4 probably reflect this, but the extant information does not permit each activity to be placed in its correct seasonal or environmental context. Individual hunting methods, such as netting ducks on the wing illustrate how well the Aborigines understood the movements of the ducks, and how close observation of their habits enabled them to enhance the success of the catch by capitalising on the instinctive response of the flying duck to a whirling piece of bark thrown to simulate the flight of a hawk. The richness of the habitat of this area, and its potential for the exploitation of waterfowl possibly meant that these methods were used more frequently than in some other areas of Australia.

Most of the remaining hunting methods listed in Table 4 concerned only the individual, or small groups of hunters. Whether this meant that their activities were less seasonally restricted, than those of the larger groups might have been, cannot be assessed.

Insect Foods

Table 5 lists the references to the insects eaten. It is probably an incomplete picture, but, on the other hand, it is not at all clear how important this source of food was. The much quoted example of the bogong moths has been ignored because of the failure of the observers to specify which tribes were concerned. Bennett (1834, p.274) visited the 'Bugong Mountains' (near Tumut) and observed that the natives at Jugiong (near Yass) knew of the presence of these insects, but did not travel to the areas where they were available even though it was the correct season. Eyre (1845, II, p.253) describes these moths as the favourite food of the natives in certain localities in the eastern portion of the continent. The area where he describes the eating of 'Bougon' moths in his Autobiographical Narrative (1832-9, I, p.55) was the Tinderry Range south of Canberra, and it is to this area that the above comments probably refer. Andrews (1920, p.40) states that the Aborigines met around Albury to gather bogong moths. It is clear that the natives on the lower portions of the rivers were not concerned with this food source.

Vegetable Foods

All the references encountered by the writer to the vegetable foods eaten by Aborigines are collected together and classified in Table 6. As sources of food the examples fall into two groups with rather indeterminate boundaries. The first includes those foods which were eaten mainly for enjoyment and variety and were not eaten in quantity over an extended period of time. The exudations, particularly manna and the Myoporum exudations, and possibly some of the fruits and stems would fall into this first category. The seed of the Nardoo would probably be included here if Newland's (1920-1, p.14) statement that it was used only as an emergency food is correct. The roots and seeds made up the bulk of the second sector.

Little information is available on the seasonal availability of the various types of plant foods, but certain inferences can be drawn from the information available. The growth of the aquatic plants, including bulrushes, flags and reeds was closely connected with the flooding of the swamps. Thus these foods were probably not available in any quantities until some time in spring and continued into early autumn. Bennett (1834, p.183) records that the root of the bulrush 'cormiork' was eaten in spring. Krefft (1862-5, p.361) considered that the Typha 'wongal' was eaten most extensively during January and February. At least some of this type of food was available after the floods had receded because Eyre (1845, II, p.269) notes that the root of the Cooper's Reed was considered at its best when the plants had died and the tops decayed.

Another factor which would have affected the availability of plant foods was the fact that the lack of rainfall induced a marked growing season which lasted, on average, from April to September. This may have had considerable effect on the collection of leaves, stems and fruit, particularly in areas away from the rivers. It seems that seed foods became available at the end of this period and continued through the summer. Parker's (1905, p.118) observations suggest that grass seeds were more important than the bulbs previously described in the diet of the Aborigines living away from the swamps.

In reference to the preparation of plant foods, seed were ground, made into dough and baked. Most of the leaves and fruits were eaten raw while the rootstocks were invariably roasted. Nowhere is there any evidence of the widespread use of such elaborate preparations to rid foods of toxic and unpleasant elements as were noted in Northern Australia. Eyre (1845, II, p.271) states that 'netting' was baked to remove the bitter taste and the growing tops of a kind of cress were steamed before being eaten (1845, II, p.254). Whether the roasting of rootstocks was intended to achieve the same end is not known, but the above examples suggest that the basic knowledge of some preparation methods did exist in the area.

Water

Certain plants were utilised as a means of obtaining water. Several types are listed in Table 6, but the Mallee is the most frequently quoted example. This means of obtaining water was probably more important in the Mallee areas where no flowing rivers persisted for any

length of time and surface waters rapidly disappeared. In the area between the Lachlan and Darling Rivers Bennett (1883, p.214) claims that the Aborigines depended upon this source of water for four or five months every year. In other parts of this region wells were dug to ensure a supply of water.

Material Culture

Spears were the most widely used implement in hunting land animals. No spear was used exclusively for one type of game, although the smaller and lighter reed-spear (kiko) was used for spearing birds and other small game. The design of the butt end of the spears used with a spear-thrower differed from the others in that they were not tapered. The barbs used were of quartz or flint cemented to the shaft, or a single piece of bone lashed to the point of the spear with kangaroo sinews, or the barbs were cut into the shaft. Eyre (1845, II, p.308) describes four different spear-throwers but is not explicit as to which one comes from the Moorunde area. The other weapon which appears to have been widely used in hunting is the wooden club, or 'Bwirri', which was thrown at the game. There is no definite record of the boomerang being used in hunting, although Eyre (1845, II, p.308) cites it as being used in hunting and warfare. He makes no reference to the use of boomerangs in his earlier detailed descriptions of hunting methods.

The nets used in hunting differe from those used in fishing only in their overall size and the size of the mesh. The game hunted determined the size of the net used. Eyre (1845, II, p.312) describes the normal kangaroo net

as being up to 130 feet long, five feet high and with a mesh of six inches. This net was also used to trap emus. The wallaby nets were smaller, being only 30 feet long and 18 inches high. Several of these were set up at varying intervals in the one area.

The fish hook described by Kirby (N.D., p.34) consisted of two kangaroo eye-teeth lashed and cemented together to form a 'V'. The other reference to fish hooks comes from the Bourke area. Dunbar (1943-4, p.176) describes hooks fashioned from small mulga forks or bent pieces of mulga. Whatever the accuracy of these observations, the only significant conclusion that can be drawn is that fish hooks were not widely in use, if at all. There is no record of the use, by the present day Aborigines, of the bone fish gorge or muduk described by Hale and Tindale in their report of the excavation at Devon Downs (1930, p.213). Mulvaney recovered several muduks from excavations at Fromm's Landing (1960, p.76) and cites two references to the use of wooden fish gorges (1960, p.77); one in Victoria and one on the Lower Murray.

The design of the canoes used in this area was perhaps the most rudimentary found in Australia. They consisted of a simple sheet of bark, usually of the River Red Gum (Eucalyptus rostrata), kept open by stretchers, and if necessary, stopped at each end with a ridge of clay or clay and grass. Several authors (Eyre 1845, II, p.313, Krefft 1862-5, p.362, Berndt 1941, p.22, Dunbar 1943-4, p.174, Black 1947, p.351) refer to the use of heat and pressure in shaping the vessel. Both Krefft (1862-5, p.362) and Beveridge 1883, p.40) state that particular shaped trees were chosen to lessen the necessity for this.

Helm's (1895, p.401) description of the folding and pinning of the bows and stern can be ignored because this type of canoe was not recorded elsewhere, and more importantly, because his information was not gathered at first hand. Berndt (1941, p.22) claims that the canoes could only be cut during the cold season, but this may not be of particular significance in the light of Beveridge's (1883, p.40) claim that the canoes lasted for several years.

The digging stick appears to have been the principal implement used by the women collecting vegetable foods. Mitchell (1838, II, p.23) Eyre (1845, II, p.313) and Dunbar (1943-4, p.172) describe a 'grub shovel' or small wooden spade used in digging up mallee-roots, grubs and ants. Massola (1959, p.290) shows that these implements were widely distributed in western New South Wales and northern Victoria. The utensils used in transporting and preparing food were somewhat more varied. Water was carried in bark troughs and skin water bags made from the skins of possums, wallabies, or young kangaroos turned inside out and the legs, tail and neck tied shut. Similar bags were also recorded by Parker (1905, p.18) and these were used to store grain. Baskets of various designs made from grass or rushes, net bags and coolamons were used in carrying food and other equipment. Beveridge (1883, p.50) describes the use of a wooden trough as a cooking receptacle, being placed on a bed of coals covered with a layer of cold ashes. Flints, mussel shells, kangaroo bones and split reeds were used in cutting and skinning foods. Slightly dished, stones were used for pounding roots and milling seed.

Very few references to equipment used in technology are to be found. Most writers record the existence of ground stone axes and one has to assume that these were used in cutting and shaping. Boty Eyre (1845, II, p.308) and Berndt (1941, p.22) refer to the use of wooden and stone chisels as cutting tools. Berndt describes the use of a wooden chisel with a wooden or stone maul in cutting out a bark canoe. Eyre (1845, II, p.314) records the use of shell and flint scrapers in shaping spear points, but gives no description of any diagnostic value. The paucity of references to stone implements may in fact reflect the scarcity of stone in the area. Sturt (1833, I, p.138) states that in all the length of the Castlereagh he traversed, no stones or pebbles were seen in its bed. On the other hand Mulvaney (1964, p.492) concludes, after studying the artefacts excavated in a rock shelter at Fromm's Landing that 'for a so-called stone age people, the Aborigines in recent centuries were extra-ordinarily averse to using stone'.

The fibulae of kangaroos and emus were used as knives for skinning and cutting and also awls and needles. Kangaroo and wallaby sinews were used as lashings. Eyre (1845, II, p.310) describes the netting needle as being a little round piece of stick or reed about the size of a lead pencil around which the string was wound.

In contrast to the lack of variety in the weapons and utensils used directly in gaining a living, the manufacture for warfare, ceremonial activities and ornamentation were far more varied. Eyre (1845, II, p.509) lists three spear designs which he implies were used only in warfare. Other weapons include the boomerang, various different types of

clubs, sword-like weapons, wooden picks and shields, all used in close combat. The ceremonial objects are not well enumerated. Eyre (1845, II, p.511) describes the bullroarers ('Mooym karr') but was evidently not well acquainted with other ceremonial artefacts. Personal ornaments and clothing included fur cloaks of possum or kangaroo skin, fur-string aprons, net caps, head bands of possum string or feathers, necklaces of reeds cut into short lengths, dyed feathers and kangaroo teeth and dingo tails.

The unevenness in the distribution and detail of information makes it difficult to come to any definite conclusions on the relationship between the economy and the environment of the area. The available evidence suggests that the activities of the Aborigines on the lower reaches of the rivers differed considerably from that of those at the headwaters of the rivers and this could reasonably be attributed to the increasing richness of the riverine food sources. However, the literature also indicates that probably only small groups possessed and followed what might be called a 'riverine' economy throughout the year. Beveridge (1883, p.36) describes the activities of the natives around Swan Hill and these people appeared to live mainly on fish and other foods derived from the riverine environment. The larger groups described by Eyre (1845, II, p.250) and Matthews (1963, p.152) evidently did not live on the rivers throughout the year and during the remaining seasons probably possessed what might be called a 'normal' inland economy. Thus it is probable that two types of economy existed in the area. The first involving a relatively small proportion of the total population, living a less nomadic life close to the

rivers, and whose diet reflected this. At the other extreme were the groups whose activities concentrated mainly on the exploitation of the hinterland, but who, at certain times of the year when fish and other marine foods were particularly abundant, gathered on the rivers and lived a life similar to that of the preceding group.

It is not possible to come to any real assessment of the importance of food from various sources in the diet of these people, because it would obviously differ with the nature of the economy and the environment. It is reasonably clear, however, that fish and the like were the most important part of the diet of the groups remaining on the rivers. Beveridge (1883, p.36) states that these Aborigines had a super-abundance of fish for eight months of the year. In comparison vegetable and animal foods would have been less important. On the other hand, fish may only have formed a seasonally important part of the diet of the other groups, with animal and vegetable foods being relatively more important. It is interesting to note that no reference to environmentally-orientated local groups names occurs in the literature. Whether this means that specialisation was not sufficiently well developed to encourage the use of such names, or whether it is only that they were not recorded is not clear. It is probably the latter because the use of these names was widespread and Howitt (in Brough Smyth, 1878, II, p.301) records these names in the area to the west of that studied.

The technology and hunting methods used in the area do not seem to possess any formally distinctive qualities. Both the equipment and the methods have been recorded in other areas. However, this approach is probably not very revealing and would tend to cloak regional differences of

a certain type. While the information available is probably subjective it appears that netting techniques played a more important part in the economy of this area than in the coastal areas studied, and conversely the use of the multi-pronged fish spear seasonally restricted and line-fishing probably absent. While these methods cannot be pictured as responses to particular environmental situations, the choice between known methods, and their employment in different seasons and situations suggests a degree of adaptation which can now never be fully appraised or understood.

(III) POPULATION TOTALS AND DENSITIES IN THE RIVERINE AREA OF SOUTHEASTERN AUSTRALIA

One cannot but agree with Eyre (1845, II, p.368) when he says that:

> ...there is scarcely any point connected with the subject of the Aborigines of New Holland, upon which it is more difficult to found an opinion, even approximating to the truth, than that of the aggregate population of the continent, or the average number of persons to be found in any given space.

The main references to population numbers fall into two groups. The first of these encompasses the records of numbers seen in a place at any one time. These cannot usually be used in density calculations because no reference to the area occupied is given, but, if dated, they do give some impression of the variation in the size of local groups with the seasons. The second, and perhaps more suspect estimates relate to the numbers inhabiting large areas of land, and the validity of these is probably a function of the author's knowledge of the area.

The population figures belonging to the first group support to some extent the conclusions arrived at in the preceding chapter. All the reports by explorers and travellers of very large gatherings of Aborigines fall in the December-January period, with the exception of two observations; one from Mitchell (1838, II, p.35) where, in April, 100 natives were at Regent's Lake on the Lachlan collecting mussels, and the other from Krefft (1862-5, p.367) recording the gathering of 200 Aborigines at Yelta on the Murray for a corroboree in July. It could be argued that this evidence is suspect because the observers did not travel in the area in all seasons, but the picture it paints supplements the observations made by Eyre who had several years contact with the area. Another factor which tends to support this contention is the absence of large groupings of the more permanent winter shelters which consisted of semi-circles of boughs thatched with grass or covered with bark. If the large gatherings occurred large villages should attest their presence. Smaller groupings, up to twenty in number, of these huts have been recorded throughout the area, but not in numbers commensurate with the numbers of people seen. The temporary windbreaks which were constructed in summer probably did not persist for long. How long these large groupings remained together is not clear. In all probability they were exceedingly temporary groupings coming together when food supplies permitted and disbanding on their exhaustion. Beveridge (1883, p.48) states that the normal period over which the fish weirs were productive lasted for five to six weeks. Whether the people leaving the group went into the hinterland or spread themselves more thinly along the rivers is not known.

Sturt's (1833, II, pp.81-134) record of population numbers on the Murrumbidgee and Murray is illuminating. He found that the population increased as he went further downstream, and that the people were not uniformly distributed along the rivers. He saw 120 natives in a camp on the Murrumbidgee between the Lachlan and the Murray, but after seeing this group he did not see any natives for the next four days. While on the Murray he saw small scattered groups each day and it was not until he reached the Darling that he encountered really large groups. At the junction of the Murray and the Darling he met a group which he considered could not have numbered less than 600 (1833, II, p.107). Further down the Murray he encountered groups of 230, 60 and 270 respectively. Few natives were seen between these groups. It could be argued that these groupings were atypical and were a response to the presence of strangers in the area. Even so they give some indication of the numbers living in the area and are of the same order as those recorded by Eyre (1845, II, p.251) under normal conditions.

Both Mitchell (1838, I, p.86) and Sturt's (1833, I, pp.139, 187) observations suggest that the more northerly parts of the Darling system were less densely populated than the downstream sectors. Both explorers visited the area in January and saw similar fishing techniques to those in the south being used. In Sturt's observations the sparsity of population was probably due to the salinity of the river (Sturt, 1833, I, p.87) but even under better conditions the group seen by Mitchell were small. He records (1838, I, p.86) the presence of a group of 30 people on the Bogan River living on fish, crayfish and kangaroo meat.

The estimates of the population inhabiting larger areas are not very enlightening. Bonney (1883-4, p.123) estimates the average population density in the Ba:gundji tribal areas to be in the order of one person to every 20 square miles. Teulon (in Curr 1886, II, p.186) states that in 1845 the Ba:gundji tribe numbered 3,000. When the figure is calculated against the tribal area given by Tindale (1940), this gives a density of one person per 3.1 square miles. The former figure is perhaps too low when compared with the possibly better documented densities in central Australia, but the latter figure is perhaps too high.

The impression created by the observations on the population of the Lower Murray is that by any standards the size of the local group was large even in the periods when food was less plentiful, and comparable with those experienced on the richest parts of the coastline. Eyre (1845, II, p.372) estimates that there were three to four natives to every mile of river in the Moorunde area, and this did not include the migratory population from the surrounding country. Le Souef's (1895, p.34) statement that in 1848 the population of the Murray from Echuca to the Darling junction was 3,000 can be dismissed because it far exceeds Eyre's estimate which was based on intimate knowledge of a much smaller area. Eyre's estimate does not exceed the estimated five persons per mile of shoreline in Port Jackson and this would probably place the Lower Murray well up in the census of the more densely populated parts of Australia.

TABLE 3 REFERENCES TO THE FISHING METHODS EMPLOYED IN THE RIVERINE AREA OF SOUTHEASTERN AUSTRALIA 4:i

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Spearing	-	Multi-pronged spears (1) Shaft 10-16 feet long, 1½ inches in diameter made of pine. 2 hardwood prongs lashed to end. Project 5-6 inches (2) Three prongs, centre one made of bone and ½ inch shorter. Prongs tipped or barbed with bone. Spear also used to propel canoe.	Fish speared in swamps or rivers from canoe or wading in shallows. Fires in canoes when fishing at night. Position of fish recognised by quivering reeds. Pieces of white peeled wood used as a decoy. Apparently used most frequently when swamps and lagoons filled, but also when river was low.	Individual	Eyre 1845 II p.263 Beveridge 1883 p.41 Wyndham 1890 p.115 Dunbar 1943-4 p.172 Krefft 1862-65 p.368 Mitchell 1838 I p.368 Mitchell 1842-1923 p.54 Kirby N.D., p.35	Moorunde Lower Murrumbidgee, Murray Rs. Western Rivers, N.S.W. Brewarrina Yelta, Murray River Darling River - Swan Hill	Several Several - Ngjamba - - Wiradhuri -
	-	Smooth, pointed, barbless, single-pronged spear about 6 feet long. With stone barbs (Dawson).	Used underwater. Organised drive towards the centre of large pools. Used when fish concentrated in the larger pools. Seen in June by Mitchell and in December (drought year) by Sturt.	Group activity. Up to 30 involved.	Eyre 1845, II, p.262 Mitchell 1838 I p.266 Sturt 1833 I. p.17 Krefft 1862-65 p.368 Dawson 1834-90 p.129	Moorunde Darling River Macquarie River Yelta, Murray River Murray River	Several - - - -
	Crayfish	Spear, not described	Used in spearing large crayfish from the bank.	Individual	Eyre 1845 II p.265	Moorunde	Several
Netting		Seines. Rectangular net up to 300 yards long, 4 feet wide and with 3" mesh. Buoyed by grass floats, weighted by stones or calcined clay.	Set from canoe or by wading or swimming. Usually set in semi-circle from shore and hauled in. Employed when rivers flooded and billabongs and swamps full.	Joint	Eyre 1845 II p.254 Beveridge 1883 p.45 Sturt 1833 I p.92 Bucknell 1933 p.34	Moorunde Lower Murrumbidgee, Murray Rivers Darling River Boomi River	Several Several - Gamilaroi
	Larger fish	Gill nets. Long net, not more than 2-3 feet deep. Large mesh.	Top supported with rope attached to spears stuck in mud. Set in zig-zag 20 yards from shore. Top of net level with surface. Employed when swamps and lagoons full.	Joint	Eyre 1845 p.254 Beveridge 1883 p.47	Moorunde Lower Murrumbidgee, Murray Rs.	Several Several
	Murray Cod	Oval framed or bow nets. Net oval at mouth, 6-8 feet long, 2 feet deep. Frame oval or bow-shaped.	Held between 2 natives who dived and placed net over mouth of cavity. Fish then frightened into net. Spawning Murray Cod mainly caught. Spawning season September-November.	Joint	Eyre 1845 II p.261	Moorunde	Several
	Crayfish	Large bow nets. Net oval at mouth 6-8 feet long, 2 feet across and 2 feet deep. Frame bow-shaped.	Flat side dragged over bottom in shallow areas. Used only after crayfish leave their burrows with the inundation of the river flats.	Joint	Eyre 1845 II pp.251,267 Beveridge 1883 p.49 Krefft 1862-65 p.368	Moorunde Lower Murrumbidgee, Murray Rs. Yelta, Murray River	Several Several -

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Netting	-	Small hoop nets. Oval frame 20 inches by 9 inches net 5-7 inches deep	Held individually or between 2 men who dived and placed net over fish lying on the bottom	Individual or joint	Eyre 1845 II p.261 Wyndham 1890 p.115 Matthews 1901 p.47	Moorunde Western Rivers, N.S.W. Upper Murray	Several - -
			Used in catching fish in shallow water	Individual	Eyre 1845 II p.261	Moorunde	Several
			Fine mesh nets used to catch fry, shrimps and tadpoles in shallow water	Individual	Eyre 1845 II p.261 Beveridge 1883 p.50	Moorunde Lower Murrumbidgee, Murray Rivers	Several Several
Fish Weirs and Traps	-	Fence of stakes interwoven with grass and bushes built across channel connecting river and lagoons etc. Openings left in centre over which nets were placed	Trapped fish returning to main river channel as water level in the lagoons fell. Mitchell states that example on the Murray was designed to trap fish moving from main channel into the lagoon with the rising water level	Large gatherings involved	Eyre 1845 II p.253 Beveridge 1883 p.48 Krefft 1862-5 p.368 Mitchell 1838 I p.100 II p.152 Sturt 1849 p.185 Kirby N.D., p.35	Moorunde Lower Murrumbidgee, Murray Rivers Yelta, Murray River Lower Gwydir River Mt.Hope, Murray River Moorunde Swan Hill	Several Several - - - - -
	-	Channel completely blocked by pallisade. Second fence with opening built 5-6 feet upstream	Fish driven from lagoon into dam and opening closed	Joint	Bland 1831 p.39 (footnote)	Murray River	
	-	Wall built out into marshes with weir at termination. Description not clear.	-	-	Sturt 1833 I p.41	Macquarie Marshes	-
	-	Moveable fence of grass	Pushed before group across shallow pool	Joint	Mitchell 1838 I p.332	Bogan River	-
	Murray Cod, black bream, yellow-belly	Maze of stone walls built across main channel. Pens so formed opening in the direction from which fish came. Some pens higher than others and used when river was at different levels	When sufficient number of fish in maze pens were closed and fish driven into smaller pens. Large fish clubbed, smaller fish caught with hands.	Large gatherings involved	Mathews 1903 pp.148-53 Norton 1907 p.102	Brewarrina Junction Warrego and Darling Rivers	Ngjamba -
Line Fishing	-	Hook made from 2 kangaroo teeth lashed together	Not used in lagoons because of rushes	Individual	Kirby N.D., p.36	Swan Hill	-
	-	Hooks made from mulga forks or bent pieces of mulga	Mussels used for bait	Individual	Dunbar 1943-44 p.176	Brewarrina	Ngjamba
Fish Poisons	-	Eucalyptus sp. Plants and leaves (unnamed)	Pools filled with cut boughs of trees	- -	Mitchell 1838 p.24 Wyndham 1890 p.115	Lachlan River Western Rivers, N.S.W.	- -
Misc.	-	Snare. Description vague. No similar method recorded elsewhere.	Noose set at opening in brush fence. Snare sprung as fish swims through.	-	Kirby N.D., p.36	Swan Hill	-

Tortoises, crayfish, frogs and mussels caught or collected by hand.

TABLE 4 REFERENCES TO THE HUNTING METHODS EMPLOYED IN THE RIVERINE AREA OF SOUTHEASTERN AUSTRALIA

Method	Game Hunted	Equipment Used	Technique Employed	Nature of Activity	Source	Area	Tribe
Spearing	Kangaroo, wallaby, dingo, platypus, emu, native companion, duck, swan.	Spears described by Eyre include (1) Reed spear, unbarbed with hardwood point. 6-7 ft long. Used with spearthrower to kill birds and other game. (2) Hardwood spear with grass-tree butt. 8 ft long. Used with spearthrower. General purpose spear. (3) Hardwood spear with barbs cut in both sides. 10½ ft long. Used in war and hunting. (4) Hardwood spear with single bone barb. 8 ft long. Used with spearthrower. No spear used exclusively for one type of game.	Game stalked and speared	Individual	Eyre 1845, II, p.276 Bennett 1839 p.241	Moorunde Jugiong	Several -
	Kangaroo		Game tracked over several days. Tired then speared.	Small group of 2-3 men.	Eyre 1845, II, p.276	Moorunde	
	Kangaroo, wallaby, emu.		Hide or hut constructed at waterhole or spring. Animals speared as they come to drink.	Individual	Eyre 1845, II, p.276	Moorunde	Several
	Emu		Hide constructed in tree. Bird attracted with bunch of bright feathers. Whistle used as decoy.	Individual	Bucknell 1933 p.34 Dunbar 1943-4 p.175	Boomi River Central Darling	Gamilaroi Ngjamba
	Kangaroo		Organised drives aimed at herding animals into rivers or over precipices.	Large parties involved	Eyre 1845, II, p.277 Bennett 1839 p.287	Moorunde Murrumbidgee River	Several -
	Kangaroo, wallaby, emu.		Game driven towards semi-circle of hunters. Fire was also used at times.	Large parties involved	Eyre 1845, II, pp.276-277 Wyndham 1890 p.115	Moorunde Western Rivers, N.S.W.	Several Several
Clubs	Wallaby	Hardwood club, 2 ft long, with rounded knob at one end for grip.	Thrown at game. Beaters drove game into ambush.	Large parties involved	Eyre 1845, II, p.282	Moorunde	
	Wallaby		Animals clubbed by hunters waiting at apex of V-shaped brush fence. Brush fences possibly seen by Mitchell.	Large parties involved	Eyre 1845, II, p.283 Mitchell 1838, I, p.235	Moorunde Darling River, Rankin's Range	Several -
	Birds		Clubs thrown at birds on the wing, roosting, or on water.	Individual	Eyre 1845, II, p.284	Moorunde	Several
Netting	Kangaroo, emu, wallaby.	Nets up to 130 ft long, 5 ft wide, 6 in. mesh. Net supported by stakes. Wallaby nets 30 ft long, 1½ ft wide.	Net placed across path frequented by game. Hunters waited in ambush at net. Beaters drove animals into net. Spears or clubs used to kill animals.	Can be employed when only small numbers present.	Eyre 1845, II, pp.277, 312 Dunbar 1943-4 p.175	Moorunde Central Darling River	Several Ngjamba
	Emu		Net set near sleeping-place used by emu. Men with fire-sticks formed wings at either side of net. Bird put up an attempt to escape through space between the firesticks. Caught in net and immobilised with bare hands. Similar method without firesticks used in daylight.	Large parties involved	Eyre 1845, II, p.278 Beveridge 1883 p.45	Moorunde Lower Murrumbidgee, Murray Rivers	Several Several

TABLE 4 (CONTINUATION) REFERENCES TO THE HUNTING METHODS EMPLOYED IN THE RIVERINE AREA OF SOUTHEASTERN AUSTRALIA

Method	Game Hunted	Equipment Used	Technique Employed	Nature of Activity	Source	Area	Tribe
Netting	Geese, duck, teal, widgeon, shag, pelican.	Nets 30-60 ft long, 20-40 ft wide. Several old fishing nets joined together (Eyre). Nets 300 ft long, 6 ft wide, 4 inch mesh (Beveridge).	Net suspended across path used by birds. Poles erected if no trees available. Birds fly into net which was then lowered. If birds fly too high, bark thrown to simulate hawk. Causes flock to drop lower. Used evening or early morning. Net raised in front of flock. Ducks made to swim into net.	Joint	Eyre 1845, II, p.278 Bucknell 1933 p.34 Beveridge 1883 p.46 Dawson 1834-90 p.127 Mitchell 1838, I, p.302, II, p.152 Krefft 1862-5 p.369 Illustrated Sydney News 1868, 5, 52 p.37	Moorunde Boomi River Lower Murrumbidgee, Murray Rivers Murray River Darling River Yelta, Lower Murray River Murray River	Several Gamilaroi Several - - -
	Pigeon, parrot.	Smaller nets used.	Not described.		Mitchell 1838, I, p.302	Darling River	-
Snares	Duck, teal.	Large numbers of triangles of bent reeds with slip nooses hanging from them placed around feeding grounds.	Ducks push heads through noose and hang themselves.	Individual	Eyre 1845, II, p.285	Moorunde	Several
	Duck	Tapered rod, 10 ft long, topmost joint flexible. Slip noose attached to top.	Native disguises head with grass and weeds. Approaches birds with head only above the water. Slips noose over bird's head and draws bird towards him under water. Generally used in windy weather when water surface ruffled.	Individual	Eyre 1845, II, p.285	Moorunde	Several
	Scrub turkey	Similar to above - used in conjunction with hide and bird decoy.	Hide built in clearing frequented by turkey. Small bird decoy used to attract turkey to hide. Noose then passed over turkey's neck.	Individual	Mathews 1904 p.256 Le Souef 1895 p.34	Northern Victoria Murray River	- -
Asphyxiation	Wombat	-	Fire lit in burrow and and entrances closed. Wombat dug out.	Individual	Eyre 1845, II, p.284	Moorunde	Several
	Possum	-	Opening cut in hollow tree at furthest point possum can retreat to. Fire lit in tree to drive it out.	Individual	Eyre 1845, II, p.281 Sturt 1833, II, p.32	Moorunde Murrumbidgee River	Several -
	Builder rat	-	Nest of builder rat made of sticks etc. Fired and shelters of skins laid round nest. Fleeing rats leave nest and make for these, where natives club them.	Small parties involved.	Newland 1890 p.24 Eyre 1845, II, p.268	Lower Darling River Moorunde	Ba:gundji Several
Misc.	Possum	-	Dragged from hollows in trees.	Individual	Eyre 1845, II, pp.281-282	Moorunde	Several
	Rat	-	Dug out of burrows.	Individual	Eyre 1845, II, pp.281-282	Moorunde	Several

Animals recorded as being eaten, but for which no hunting method was recorded: flying squirrels, koala (sloths), echidna, bandicoot, kangaroo rat, jeboa, snakes, lizards.

TABLE 5 REFERENCES TO THE INSECT FOODS EATEN IN THE RIVERINE AREA OF SOUTHEASTERN AUSTRALIA 4:v

Insect	Method of Collection	Source	Area	Tribe
Cicada	Not stated	Bennett 1839 p.236	Murrumbidgee River	
Large white grub	Extracted from burrow in ground using hook attached to polygonum stem	Eyre 1845, II, p.268 Wyndham 1890 p.115	Moorunde Western Rivers	Several -
White Ants	Dug out of the ground with digging sticks or wooden shovels	Eyre 1845, II, p.274 Dunbar 1943-4 p.172 Mitchell 1839, I, p.305	Moorunde Central Darling River Darling River	Several Ngjamba
Honey	Bee captured - small piece of down stuck to abdomen, released, and followed to hive. Comb cut out with tomahawks. Also traced by tracks of animals seeking honey. Usually collected by men.	Eyre 1845, II, p.278 Dunbar 1943-4 p.176 Teulon in Curr 1886, III, p.206 Wyndham 1890 p.112	Moorunde Central Darling River Bourke, Darling River Western Rivers	Several Ngjamba - -
Laarp (Beveridge 1883) Taarp (Beveridge 1889) (Excrement of green beetle in which larva is deposited)	Collected from young shoots of mallee. Beveridge states 40-50 pounds could be collected in one day. Queried by Froggatt - 2-3 lbs collected in day. Available for 5-6 weeks in dry summer seasons.	Beveridge 1883 p.63 Beveridge 1889 p.126 Froggatt 1903 p.12	Mallee areas of Riverina Riverina Mallee areas	- - -

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Rootstocks	Typha mulora	Kumpang)	Flag	Root baked-fibre used in making twine, flowerstem also eaten.	Beveridge, 1883 pp.36,42.	Lower Murrumbidgee, Murray Rivers.	Several
	-	Compung)	-	Roasted	Kirby, N.D. p.28.	Swan Hill.	-
	Typha shuttle-worthii	Wongal	-	Roasted-fibre used in making twine. Eaten January-February.	Krefft 1862-5 p.361.	Murray River.	-
	-	Balyan)	Bulrush	Root cut into lengths, outer rind peeled off, root lightly roasted, then twisted to free gluten. Fibre used in making twine.	Mitchell, 1838 II p.53.	Lachlan River.	-
	-	Barleyan)	Bulrush	Roasted and eaten. Recorded April.	Mitchell, 1842-1923 p.3	-	Wiradhuri
	-	Cormiork	Bulrush	Young roots backed - epidermis removed. Available spring.	Bennett, 1834 p.153.	Murrumbidgee River.	-
	-	-	Flag or Cooper's Reed	Roasted and chewed. At best when floods have receded and tops decayed. Available throughout the year.	Eyre, 1845, II p.269.	Moorunde.	Several
	-	Belillah	-	Root roasted and pounded into thin cakes.	Eyre, 1845, II p.269.	Moorunde.	Several
	-	Tamyack	Bulrush	Roasted and eaten.	Mitchell, 1842-1923 p.3.	-	Wiradhuri
	-	-	Water lily	-	Dunbar, 1943-44 p.175.	Central Darling.	Ngjamba
	-	Laboor	Small yellow water lily	Baked before being eaten.	Beveridge, 1883 p.36.	Lower Murrumbidgee, Murray Rivers.	Several
	-	Coobiei	Yam	-	Bucknell, 1933 p.35.	Boomi River.	Gamilaroi
	-	Milarn	Yam	-	Bucknell, 1933 p.35.	Boomi River.	Gamilaroi
	-	-	Yam	-	Krefft, 1862-5 p.371.	Yelta, Murray River.	-
	-	-	Yam	-	Teulon in Curr 1886,II p.193	Bourke, Darling River.	Ba:gundji
	-	-	Yam	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	-	Yam	Some cooked, others eaten raw.	Parker, 1905 p.116.	Darling and Narran Rivers.	Juwalarai
	-	Tao	Small cichoraceous plant.	Recorded October.	Mitchell, 1838, I p.336.	Bogan River.	-
	-	Bundine	Currijong-tree.	Not described. Young shoots and seeds also eaten. Bark used in making twine.	Bennett, 1834 p.264.	Murrumbidgee River.	-
	-	-	Kurrajong	Roots roasted.	Mitchell, 1842-1923 p.3.	-	Wiradhuri
	-	-	Mallee	Roasted and pounded.	Eyre, 1845, I p.250.	-	-
Fruits	-	Netting	-	Baked to remove bitter taste.	Eyre, 1845, II p.271.	Moorunde.	Several
	Fusanus spp.	Ketango	-	-	Eyre, 1845, II p.270.	Moorunde.	Several
	-	-	Quandong	-	Krefft, 1862-5 p.358.	Yelta, Murray River.	-
	Fusanus acuminatus	-	Quandong	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	Nitraria australis	-	-	-	Eyre, 1845, II p.271.	Moorunde.	Several
	-	-	Sloe	Hard stone eaten as well.	Eyre, MS., I p.154.	Junction Lachlan, Murrumbidgee Rivers.	-
	-	Eertapko	-	Berries of mat-forming plant collected by placing bark trays under plant and shaking berries into it.	Eyre, 1845, II p.271.	Moorunde.	Several
	Capparis mitchellii	-	Wild orange	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	Canthium oleafolium	-	Wild lemon	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	Eremophila longifolium	-	Emu apple	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	Owenia acidula	-	Colane tree, gruie apple.	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	Cuk-er-ger	Cotton pod vine.	Pod picked green. Hull and immature seeds eaten.	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	Memsembryanthemum	-	Pig face.	Fruit eaten when ripe, also when withered.	Eyre, 1845, II p.270.	Moorunde.	Several

TABLE 6 (CONTINUATION)

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Seeds	-	Kunnully	Annual Barley Grass	Ground - mixed with water to form dough and baked.	Bucknell, 1933 p.35.	Boomi River.	Gamilaroi
	-	Yarmmara	Barley Grass.	Seed freed from ears by burning, husked by pounding in hollows. Winnowed and stored in skin bags. Ground and made into cakes. Harvest coincided with ceremonial season.	Parker, 1905 p.118.	Darling & Narran Rivers.	Juwalarai
	Acacia aneura	-	Mulga	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	Acacia sp.	-	Wattles (various)	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	-	Whitewood	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	-	Nardoo	Used as emergency food - ignored if other seeds obtainable.	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
					Newland, 1920-1 p.12-14.		Ba:gundji
	-	-	Nardoo	-	Teulon in Curr 1886,II p.193.	Bourke, Darling River.	Ba:gundji
	-	-	Kurrajong	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	Noongah	Sterculia	Ground, made into cakes and baked.	Parker, 1905 p.117.	Darling, Narran Rivers.	Juwalarai
	-	Dheal	-	Ground, made into cakes and baked.	Parker, 1905 p.117.	Darling, Narran Rivers.	Juwalarai
	-	-	Pig weed	Seed eaten.	Teulon in Curr 1886,II p.193.	Bourke, Darling River.	Ba:gundji
Leaves, stems and flowers	-	Bundine	Currijong-tree	Young shoots eaten.	Bennett, 1834 p.264.	Murrumbidgee River.	-
	Xanthorrea sp.	-	Grass tree	Bases of young leaves eaten.	Bennett, 1834 p.264.	Murrumbidgee River.	-
	Memsembryanthemum aequilaterale	-	Pigface	Eaten raw.	Krefft, 1862-5 p.371.	Yelta, Murray River.	-
					Eyre, 1845, II p.270.	Moorunde.	Several
					Teulon in Curr 1886,II p.193.	Bourke, Darling River.	Ba:gundji
	-	-	Pig weed	Eaten raw.	Parker, 1905 p.116.	Darling, Narran Rivers.	Juwalarai
	Typha mulora	Kumpang	Flag	Flower stalk eaten raw. Eaten spring.	Beveridge, 1883 p.36.	Lower Murrumbidgee, Murray Rivers.	Several
	-	-	Cress (kind of)	Growing tops tied in bunches and steamed.	Eyre, 1845, II p.254.	Moorunde.	Several
	-	-	Warrigal cabbage	-	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	-	Trefoil	Eaten raw - grows on land subject to flooding.	Beveridge, 1883 p.36.	Lower Murrumbidgee, Murray Rivers.	Several
					Teulon in Curr 1886,II p.193.	Bourke, Darling River.	Ba:gundji
					Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	-	Sowthistle	Eaten raw.	Beveridge, 1883 p.36.	Lower Murrumbidgee, Murray Rivers.	Several
					Teulon in Curr 1886,II p.193.	Bourke, Darling River.	Ba:gundji
					Parker, 1905 p.116.	Darling, Narran Rivers.	Juwalarai
	-	-	Crowsfoot	-	Parker, 1905 p.116.	Darling, Narran Rivers.	Juwalarai
					Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba
	-	-	Dandelion	Eaten raw.	Beveridge, 1883 p.36.	Lower Murrumbidgee, Murray Rivers.	Several
	Oxalis	-	Sour-grass - sorrel	Not described.	Dunbar, 1943-4 p.175.	Central Darling River.	Ngjamba

TABLE 6 (CONTINUATION)

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Exudations	Acacia spp.	-	Mimosa	Gum made into cakes. Recorded in March.	Sturt, 1883, I p.118.	Castlereagh River.	-
	Acacia spp.	-	Mimosa	-	Eyre, 1845, II p.273.	Moorunde.	Several
	-	-	-	Mottled gum of unidentified tree.	Eyre, 1845, II p.273.	Moorunde.	Several
	-	-	-	Merely gum - probably Acacia.	Teulon in Curr 1886,II p.193.	Bourke, Darling River.	Ba:gundji
	Eucalyptus mannifera	-	Manna	Collected from ground in early morning.	Eyre, 1845, II p.273.	Moorunde.	Several
	Myoporum platycarpum	-	Sandalwood	Collected from trunks and branches - eaten or dissolved to make drink	Bennett, 1882 p.351.	Lower Darling, Murray Rivers.	-
Water producing plants	Eucalyptus spp.	-	Mallee, Gum and Box.	Root dug up, cut into lengths stripped of bark, upended into container to allow water to drain out. Depended upon for 4-5 months sometimes whole year.	Bennett, 1883 p.215.	Between Lachlan, Darling Rivers.	-
	-	-	Gum scrub	Sucked or drained into container.	Eyre, 1845, I p.248.	Moorunde.	Several
	-	-	-	Root chewed or sucked. Recorded May.	Mitchell, 1839, I p.199.	Bogan River.	-
	Hakea sp.	-	-	See author's description above	Bennett, 1883 p.214.	Between Lachlan, Darling Rivers.	-
	-	-	Currajong	See author's description above	Bennett,1883 p.214	Between Lachlan, Darling Rivers	

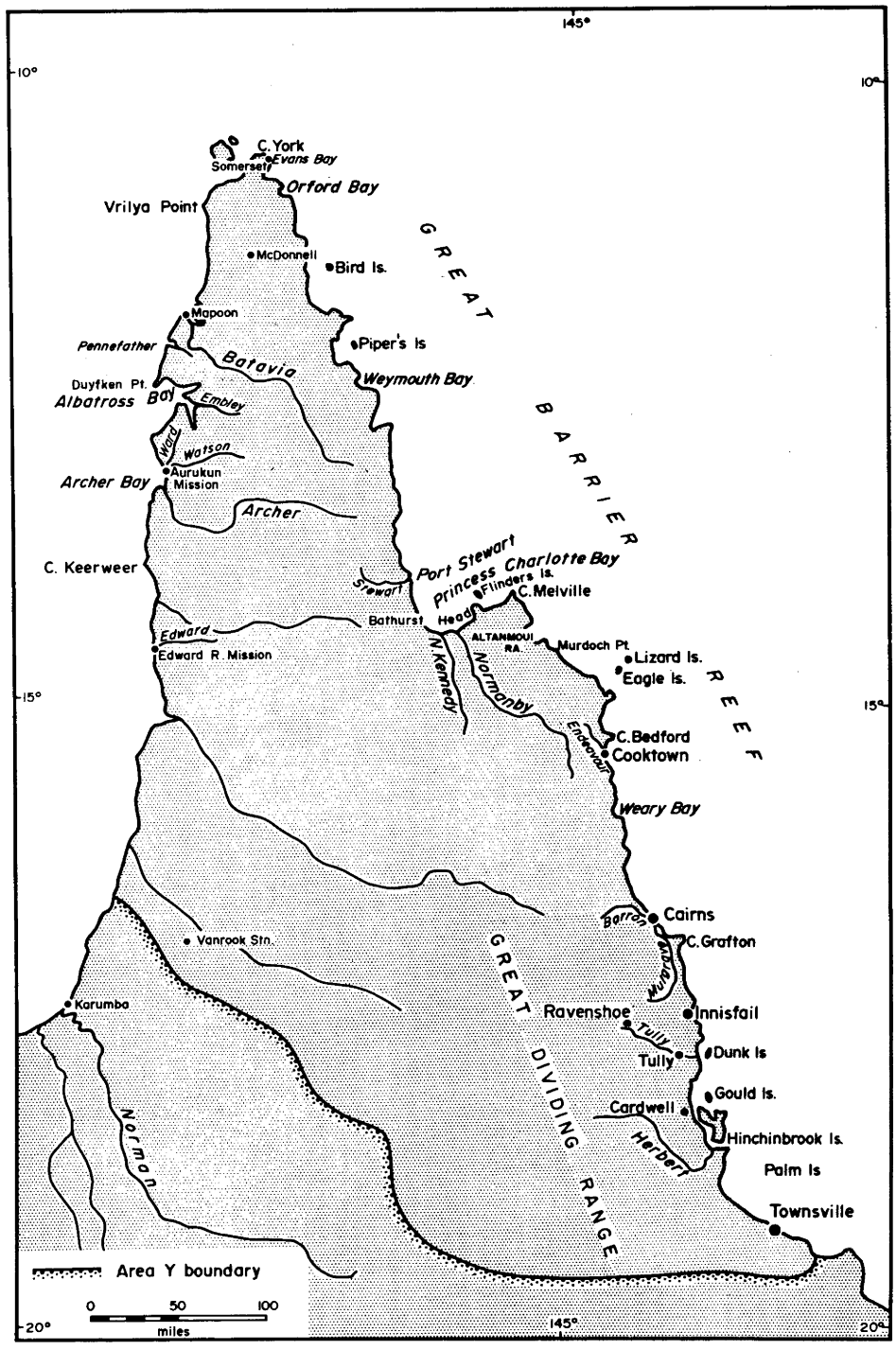
CHAPTER 5

THE COASTAL TRIBES OF SOUTHEASTERN AUSTRALIA AND CAPE YORK

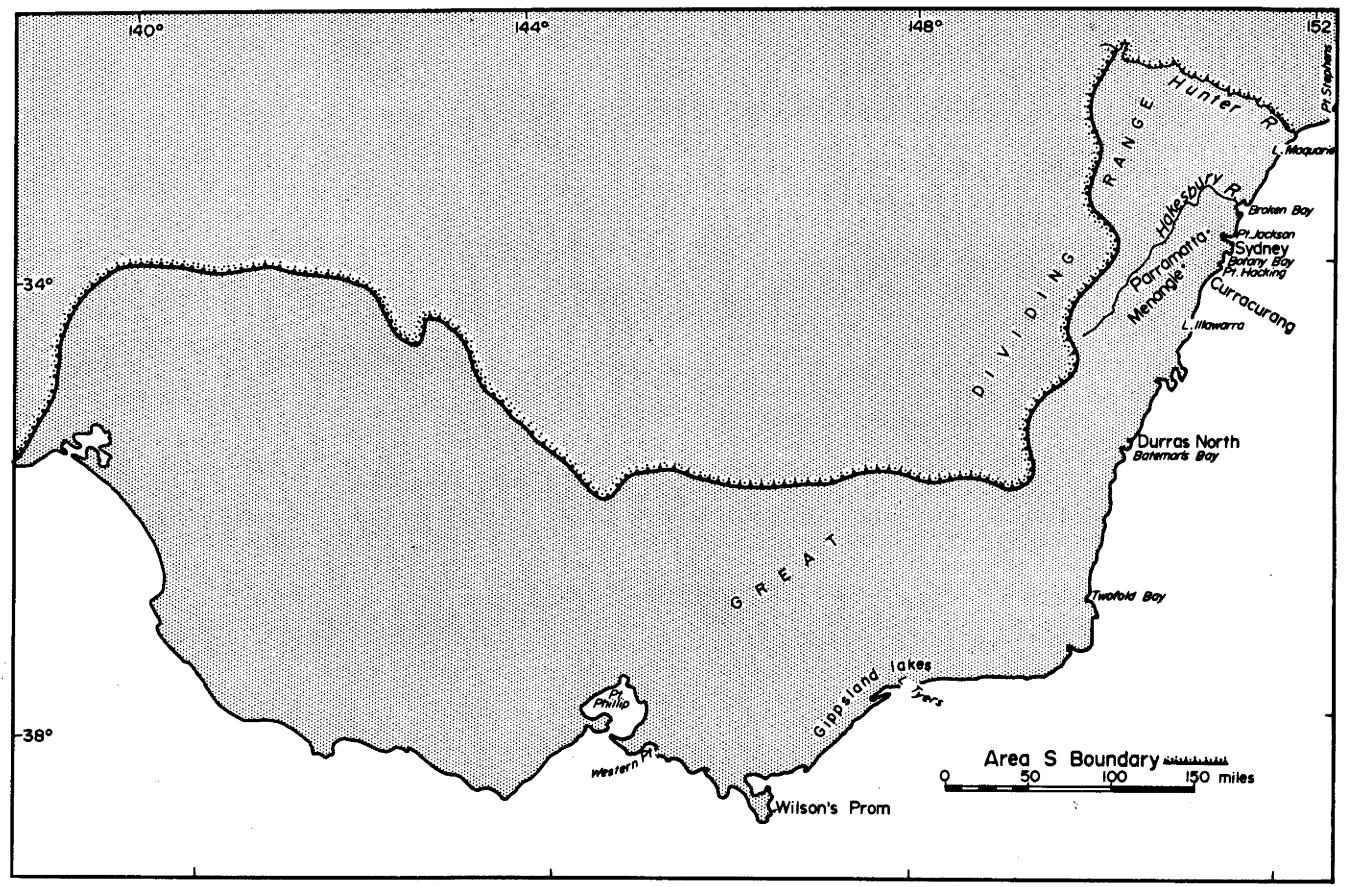
The term 'coastal' is used here to apply not only to the relatively sedentary groups whose territories embraced the shoreline, and who gained a major part of their food supply from this source, but also to the groups who seasonally exploited the produce of the seashores, coastal lakes and estuaries, living inland from the remainder of the year. Specialisation in various fishing and hunting techniques would be the most obvious and expected distinctive feature of their economies. These were recognised by the Aborigines and distinguishing names were given to particular groups. The Yinini clan of the Mudumui tribe lived at Cape Melville and were referred to as alei, or saltwater, by the inland-dwelling Ongwara section of the tribe. This term was also applied to the Walmbaria tribe occupying Flinders' Islands and Bathurst Head (Hale and Tindale 1933-4, p.69). The Umbindhamu, Gan-ganda, Umbila, J'a?O, and Wudjadi tribes lived on the coastal strip between Orford Bay and Princess Charlotte Bay and were referred to by the inland tribes as the Ka:wadji, or people of the east. The Ka:wadji referred to the inland dwelling Ajabadhu and Gandju as Kanidji (bushmen or inlanders), and called themselves the Pämä Mälnkäna, people of the sandbeach (Thomson 1934b, p.237). It is highly probable that this type of nomenclature was common throughout Australia, and that similar, unrecorded examples were present in the Sydney area. Collins (1798,

p.558) records that a tribe living on the Hawkesbury River was called Cah-bro-gal because they ate the Cah-bro worm. These examples show that the Aborigines were acutely aware of the relationship between their economy and their environment.

While the two areas chosen for discussion (see Maps 10 and 11) possess one obvious common characteristic, a coastline, neither the people nor their habitats in the two areas were similar. There are very marked differences in the characteristics of the eastern and western coasts of Cape York. These are sufficiently great to warrant treatment as two separate regions within Area Y. The physical features and culture of the Aborigines on both sides of Cape York showed the influence of ethnic contact with Papuan-types from the islands to the north. Thomson (1934b, p.238) cites the bronze skin and curly, often frizzy hair of the Aborigines at Princess Charlotte Bay as evidence of this contact, and Hale and Tindale (1933-4, p.71) observe that the incidence of wavy to spiralled hair decreased inland and to the south. Since these areas are well to the north of the sugar-growing centres where Kanaka labour was employed, and the people possess cultural affinities with the people to the north of the area, it is possible to counter any suggestion that these physical characteristics resulted from an admixture of Kanaka, rather than Papuan blood. The cultural affinities the groups possessed with the natives of the Torres Strait Islands and Papua included the use of outrigger canoes, house-types, bark strip skirts, drums and several ceremonial sequences. As well as such differences in the people and their culture, the habitats also varied in the



Map 10. Area Y - Locality map



Map 11. Area S - Locality map

physiography of the offshore areas and hinterlands, in vegetation, climate and in faunal assemblages. On a broad scale each area presented considerably different potentials to the tribes living in them.

(I) THE HABITATS OF THE COASTAL TRIBES

Topography

Perhaps the most striking of all the contrasts between the regions is in the nature of the offshore profile. This directly affected the area available to the Aborigines for food-gathering. The offshore profile of the southeastern coast (Fig. 1) is, in comparison with the other areas, steeply sloping; the 100 fathom isobath being usually about 15 miles off the coast. This factor, together with the limited zone exposed by the small tidal range of four feet means that the area supplying readily accessible marine foods was restricted to a narrow belt along the coast and around the occasional offshore island. However, in the Sydney district, the fernleaf-shaped inlets of Broken Bay, Port Jackson and Port Hacking provided some compensation for this. The shoreline of Port Jackson is 152 miles long, while its area is only about 21 square mies. This contrasts with Botany Bay (excluding George's and Cook's Rivers) which, despite its area of 20 square miles, only has a shoreline of approximately 35 miles. Thus the length of shoreline in Port Jackson over which food could have been collected was greater, per unit of area, than that in Botany Bay or similar rounded indentations. To the north and south of

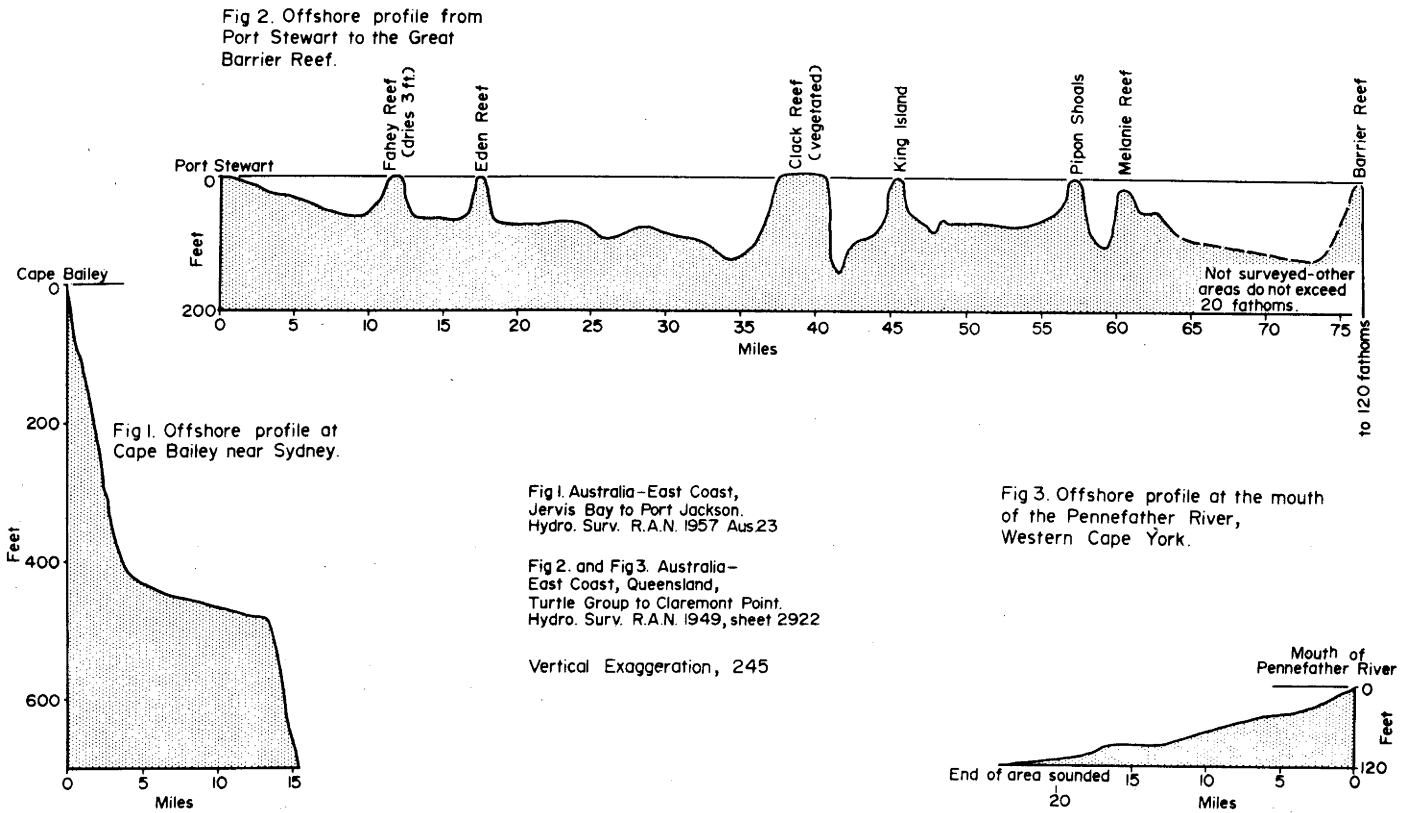


Fig 2. Offshore profile from Port Stewart to the Great Barrier Reef.

Fig 1. Offshore profile at Cape Bailey near Sydney.

Fig 1. Australia–East Coast, Jervis Bay to Port Jackson. Hydro. Surv. R.A.N. 1957 Aus 23

Fig 2. and Fig 3. Australia–East Coast, Queensland, Turtle Group to Claremont Point. Hydro. Surv. R.A.N. 1949, sheet 2922

Vertical Exaggeration, 245

Fig 3. Offshore profile at the mouth of the Pennefather River, Western Cape York.

Figs 1 - 3 Offshore profiles of selected parts of the coast in Southeastern Australia and Cape York.

Sydney the habitats were enhanced by the presence of coastal lakes.

This differs greatly from the reef-fringed coast of eastern Cape York where the effective habitat of the coastline was greatly enlarged by the occurrence of shallow water over numerous shoals, platforms and reefs (Fig. 2). The Great Barrier Reef itself lies 80 miles off the tip of the Peninsula, less than 10 miles off Cape Melville and more than 60 miles off Rockhampton to the south. The tide range (about 7 feet) is sufficient to expose some of these shoals more than 3 feet above low water level. Along with these are the numerous coastal islands. These are divided into two groups: the 'high' or continental islands and the 'low' islands. High islands are severed and partly drowned parts of the continent, often carrying forest vegetation similar to that on the mainland. Several of the larger islands have a permanent water supply derived from streams, springs and soaks and hence were capable of supporting permanent settlement. The better known islands of this type include Hinchingbrook, Dunk, Flinder's and Lizard Islands. Low islands are usually further from the coast and belong to one of two types: coral cays and low wooded islands. Both types are built up by the deposition of debris. Cays carry vegetation ranging from grasses to trees, while the dominant vegetation on the low wooded islands is mangroves. Neither type has a permanent water supply and this limited the seasons and length of time for which the island could be visited.

Very little information is available dealing with the western coast of Cape York. The coastline is not, as

stated by David (1950, II, p.74), a mangrove-lined coast. Valentin (1961, p.71) describes it as a sandy beach bordered seawards by parallel troughs and submarine bars partly exposed at low tide. The very small gradient of the land continues on the sea floor so that the 10 fathom isobath lies 10 to 20 miles offshore (Fig. 3). The Admiralty Chart (Aus. 159, Duyfken Point to Vrilya Point) does not show the presence of any coral shoals or reefs. While mangroves occur rarely on the outer shoreline, the lower courses of many rivers are fringed with mangroves. These are well developed in Archer Bay, which is the estuary of the Archer Watson and Ward Rivers. The tide rise is normally about six feet at the Edward River Mission, but during the wet season the northwest monsoon piles up the water in the southeast, raising high tides by several feet. At Karumba, on the mouth of the Norman River, the tide rises to an average maximum of eighteen feet at this time of the year, with an observed maximum of twenty-two feet (Whitehouse 1944, p.185). This flooding with saltwater during the wet season gives rise to salt flats which remain bare of vegetation during the dry season.

Again, the physiography of the hinterlands varies considerably. This is most evident in comparing the western coast of Cape York with the two regions on the eastern coast, which conform to the general pattern of narrow coastal plains backed by mountain ranges. This contrast can be seen in the cross sections (Figs. 4-6). The coastal plain of eastern Cape York is only a few hundred yards wide at Cardwell, but is over twenty miles wide at Port Stewart and even wider in the vicinity of

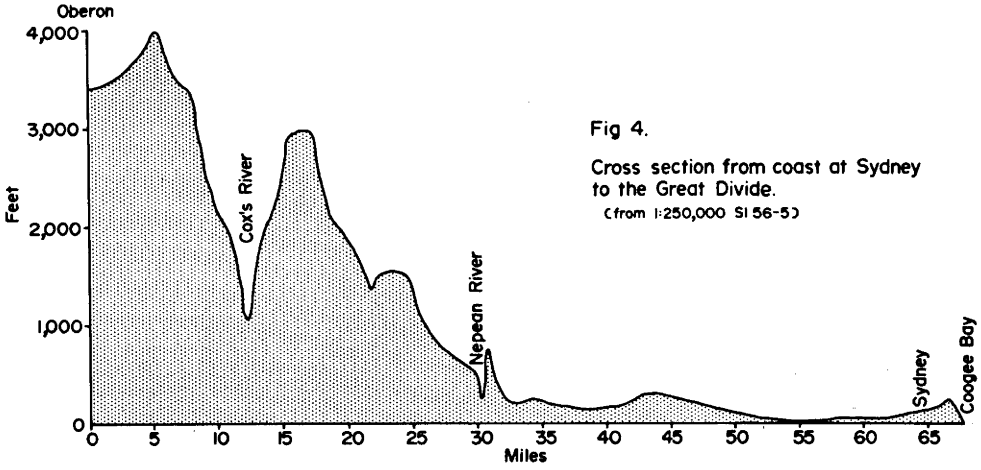


Fig 4.

Cross section from coast at Sydney to the Great Divide.
(from 1:250,000 SI 56-5)

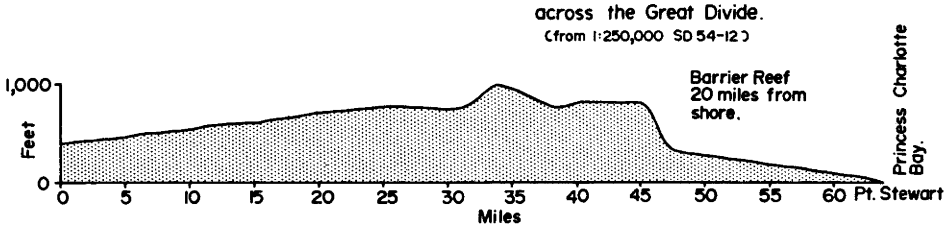


Fig 5.

Cross section from Port Stewart across the Great Divide.
(from 1:250,000 SD 54-12)

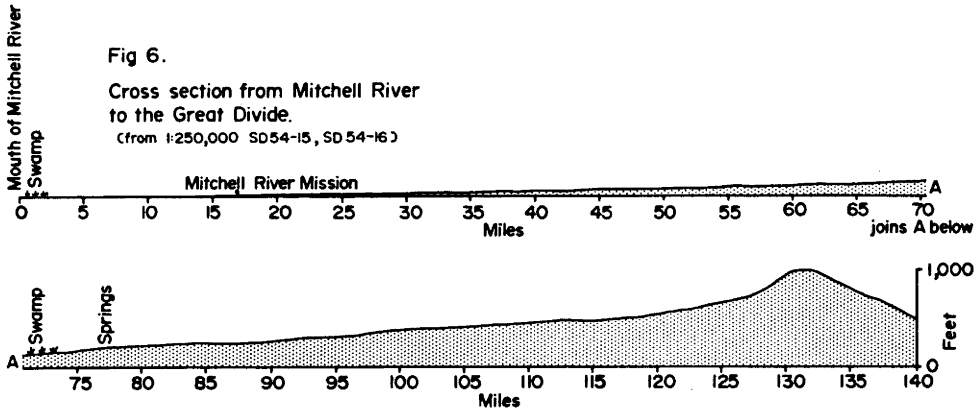


Fig 6.

Cross section from Mitchell River to the Great Divide.
(from 1:250,000 SD54-15, SD 54-16)

Figs 4 - 6 Cross sections of selected parts of the hinterland of Southeastern Australia and Cape York

Weymouth Bay. In most places it is backed by abruptly rising coastal or dividing ranges. While these did not provide an impenetrable barrier to movement, they did restrict contact between the inland and coastal groups, thus helping to reinforce the cultural differences mentioned above. To the south of Princess Charlotte Bay the dissected, red sandstone plateau of the Altanmoiu Range rises abruptly to just over 2,000 feet at the coast. Between this and the main dividing range is a low corridor occupied by the North Kennedy, Bizant and Normanby Rivers. The deltas of these rivers form extensive areas of swampland, lagoons and mudflats. During the dry season the rivers in the area are reduced to small trickles in wide sandy beds.

Like the eastern coast of Cape York, the southeastern coast of Australia is backed by mountain ranges. The coastal plain reaches its widest extent in the north around Wyong, but even here does not exceed twenty miles. The shorewards margins of the plain in this area and to the south of Sydney is bordered by coastal lakes. In the vicinity of Sydney the coastline truncates the ramp and plateau areas giving rise to a rugged sandstone-cliffed coastline in which Broken Bay, Port Jackson, Botany Bay and Port Hacking are the major indentations. The importance of the coastal ranges in limiting movement probably varied from place to place. In the Sydney district the abrupt face of the Blue Mountains provided an initial check to European movement westward and presumably proved a similar check on the Aborigines. Too great importance should not be attached to this because a different dialect was spoken on the Nepean River (Hunter

1793, p.523), and this suggests the presence of a second tribe between the coast and the ranges.

The hinterland of the western coast of Cape York is characterised by a broad belt of beach ridges. Behind this barrier the lagoons have been almost completely filled in to form marshes, salt flats and some mangrove swamps. The lower parts of the flats are subject to flooding with brackish water, the landward edge of this zone being bordered by an old shoreline 2 to 12 miles inland from the present coast. The coastal plain is wide, low and undulating, and a greater part of it is below 250 feet. At the Norman River the plain reaches its widest extent of over 200 miles. The rivers have large catchment areas in the eastern ranges. About 200 miles from the coast many of the southern rivers send off distributaries, covering the plain with a maze of interconnected channels. Whitehouse (1944, p.194) lists several examples where the major rivers are interconnected by smaller water-courses. The rivers are subject to great seasonal variations in flow. Few of them could be regarded as strictly permanent, and by June most of the rivers have stopped flowing, leaving strings of waterholes and billabongs. In the wet season the rivers flood and remain so for one or two months after the end of the wet season. Flooding usually involves the main channels only, but more general flooding, resulting in the inundation of large areas of land does occur. Whitehouse (1944, p.191) records that in the wet season of 1939-40 all of Vanrook Station (3,000 square miles) was inundated except for one sandhill. Near the coastline flooding is increased by the raising of tide levels by the onshore winds. This saline flooding is

responsible for the marked break between the clay pans of the coast and the vegetated plains of the inland. The effect of the flooding in restricting the movements of the Aborigines was noted by both McConnel (1953, p.2) and Thomson (1939, p.212).

Climate

The dominant feature in the climate of Cape York is its markedly seasonal rainfall. Every part of the Peninsula receives more rain in the hotter months (December-March) than in winter. A major part of the Peninsula receives about 95 per cent of its rainfall during the wet season, but on the coast around Cairns this figure drops to around 75 per cent (Dick 1958, Fig. 3D). A considerable variation in the total amount of rainfall over the area is evident. McDonnell in the north has a summer normal rainfall of 60 inches and a winter normal of 9 inches, while Tully, on the east coast, has an estimated summer normal of 110 inches and an estimated winter normal of 53 inches. The variability of the annual rainfall over the Peninsula ranges from 20 to 25 per cent (Dick 1958, Figs.), but because of the sparsity of recording stations important differences might be hidden. During the January and February of 1927 Hale and Tindale (1933-4, p.64) record that less than an inch of rain fell on Flinder's Island while some thirty inches of rain were recorded during the same period at Stewart River forty miles to the west across the bay.

The seasonal differences in rainfall affect not only the growth patterns of the vegetation, but also the surface run-off and the availability of water in rivers,

swamps and waterholes, which had very obvious effects on the movement and economic activities of the Aborigines. Figures 7 and 8 show the estimated average monthly run-off[1] for Mapoon on the west coast and Cooktown on the east. For several months of the year the run-off at these stations is negligible, and river flow would be small, or non-existent for possibly as much as three months of the year.

In contrast to the markedly seasonal variations in rainfall at Cape York, the rainfall of the southeastern coast is 'adequate' throughout the year. There is a marked increase in rainfall during the autumn months with the wettest month (May 501 points at Sydney) receiving almost twice that of the driest (November 269 points). Since the drier months coincide with the warmer parts of the year, run-off during the summer months is at a low level for several months (Fig. 9). This is particularly important in some coastal areas where catchment areas are small or where the creeks discharge into shallow coastal swamps, for despite any wealth of food the area might possess, it can only be exploited if water supplies permit.

Vegetation

It is in the vegetation assemblages of an area that the differences in rainfall, topography and soils find their expression. However, it is possible only to give the broad characteristics of the vegetation assemblages because of the lack of detailed mapping.

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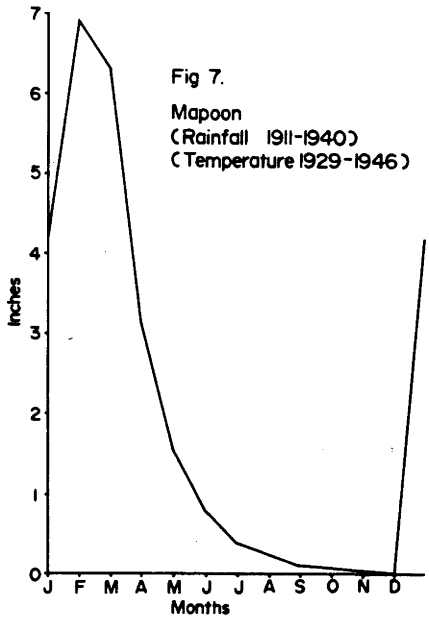
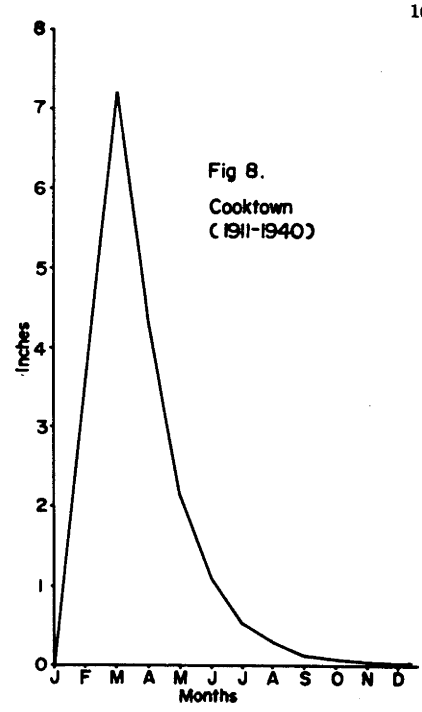
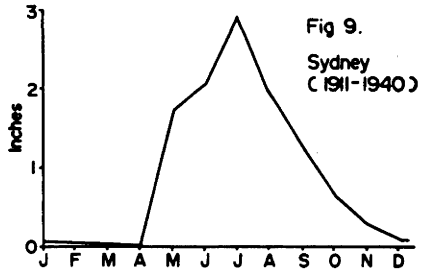
[1] Calculated by the Water Balance Method (Thornthwaite and Mather 1955, 1957) using available rainfall data.







Estimated average monthly runoff for selected stations

Figs 7 - 9 Estimated average monthly run off for selected stations, calculated by the Water Balance Method (Thornthwaite and Mather 1955, 1957) using available rainfall and temperature data.

Along the eastern coast of Cape York tropical rain forest occurs in areas where the rainfall exceeds 60 inches and where there is some topographic shelter from winds and extremes of temperature. This formation is characterised by a dense, continuous canopy of heavy, dark-foliaged trees with an abundance of woody climbers, epiphytes, palms and undergrowth, while herbaceous annuals are almost completely absent. The most important areas of rain forest occur around Cooktown and Cairns, along the range at the back of Princess Charlotte Bay and at other isolated spots along the coast. The most extensive vegetation assemblage on the eastern coast is the mixed coastal woodland which is characterised by a wide variety of formations, including some true tropical rain forest, but in much of it the tree stratum becomes increasingly discontinuous, with understories of small trees, shrubs, grasses and forb layers. The marked wet and dry seasons are reflected in the strong seasonal growth of most formations. Tropical tussock grassland occurs in the delta areas and along the river flood-plains. It consists of one to three metre high perennial grasses showing marked wet season growth.

The salt flats of the western coast of Cape York are covered with water for a greater part of the wet season and, except for a few halophytes on their margins, are bare of vegetation during the dry season. Mangroves are not common on the sea coast proper, but occur on the lower courses of rivers, around bays and in some lagoons. Inland, the vegetation on the old shoreline presents a marked contrast to the land on either side. The sand ridges are densely timbered with several species of eucalypts. The plain itself carries a wide variety of

vegetation. The lower parts subject to flooding are covered with dense grass and scattered shrubs. Much of the rest of the area is covered with a typical savannah of bloodwoods, stringybarks, stunted thickets of quinine and open grassland. The plateau areas carry dense sclerophyll forest.

As a result of the interference of human agencies in the southeastern coastal areas of Australia, and around Sydney in particular, it is rather difficult to come to an accurate assessment of the pre-european vegetation. Low heaths occur on exposed coastal areas and this gives way to rather open dry sclerophyll forest inland. On the sandstone areas the vegetation is very harsh, but on better soils it is somewhat more attractive. On many occasions Phillip, Tench and Hunter wrote of open, well-grassed woodlands to the west of Sydney. South of Sydney the dry sclerophyll forest gives way to wet sclerophyll and sub-tropical rain forest in topographically sheltered areas.

The three areas chosen for study show several basic differences. Firstly, the material culture of the Cape York groups must be viewed against a background of contact with more developed cultures to the north, and such contact is not evident among the tribes to the south. Their habitats show various differences in the nature of the coasts, the hinterlands and their accessibility, the vegetation, both as a source of food and as a living space for various types of fauna, and finally, in the climatic regime experienced by each. Any one of these factors could be expected to exert some influence on the economic life of the Aborigines. However, given that the areas

possess at least one basic similarity, the question does arise as to whether the reaction of the people, as manifested in their economic life, to their coastal environments was similar in each instance and led to the development of what might be termed a typical coastal economy.

(II) THE ECONOMIC LIFE OF THE COASTAL TRIBES

THE SOUTHEASTERN COASTAL GROUPS

The specialisation of these Aborigines in the exploitation of marine foods was evident to the earliest visitors to the region. Cook summed up his impressions of the food-gathering activities of the people at Botany Bay by concluding: 'Altho I have said that shell fish is their chief support yet they catch other sorts of fish' (Beaglehole ed. 1955, p.312). Even the longer acquaintance of the early settlers at Sydney did not lead to any major re-evaluation of this view, and many stressed the differences between the fish diet of the coastal people and the kangaroo and grub diet of the inlanders. Phillip (1788c, p.26) records that while fish was their principal support, the bones of kangaroos and flying squirrels were seen in refuse around their huts.

Additional contemporary observations pointing to the importance of marine foods include references to the Aborigines' attitudes to their habitual foods. Hunter (1793, p.490) records that none of the Sydney natives liked going to Rose Hill (Parramatta), and attributes this to the fact that fish were seldom caught there. Of all the

gifts of food given to the Aborigines, fish was the only one they accepted and ate (Phillip H.R.N.S.W., I, ii, p.132). References to native paths show that the dominant movement was along the coast and not inland (Phillip H.R.N.S.W., I, ii, p.192; Hunter 1793, p.138).

The evidence provided by midden excavations reveals considerable variation over area, both in the type and relative quantity of faunal remains from Megaw's excavations at Gymea Bay in Port Hacking revealed that over 92 per cent of the remains were estuarine shell, while fish and animal bone accounted for less than eight per cent of the total (Megaw, personal communication). It is not clear whether the eight per cent represents complete skeletons of a few animals or portions of many. The surprisingly small quantities of fish remains might also be misleading because these may have been destroyed by burning or have been less resistant to decay than other bone remains. On the other hand, Lampert (1966) describes fishbone remains in Level III of his excavations at Durras North and the C14 age estimation of the bottom of this layer was 480 $\pm$ 80 B.P. The analysis of the faunal remains from Curracurrang has not been completed, but the information available to date indicates that it differs considerably from the former. Shells comprise a smaller percentage of the total and are of marine, not estuarine origin. This reflects the coastal rather than estuarine habitat. The midden also contained a considerable quantity of land mammal remains, including the dingo, as well as whale, seal, fish and bird bone (Megaw, personal communication). Analysis of the faunal remains of an excavation at Durras North led Lampert to conclude that

land mammal remains formed too small a proportion of the total to have been a basic source of food, and that the cave deposits represented either a specialised aspect of the total subsistence of the group, or showed that the group was sufficiently adapted to the coastal environment to enable it to subsist almost entirely from the sea and its shores (Lampert 1966, p.97). The faunal remains in the three excavations suggest firstly that during the occupation of the midden sites, the food supply consisted mainly of marine foods, but differences between sites were evident. The excavations at Gymea Bay and Durras North indicate that comparatively little food was gained from land animals while the midden was used as a camping place, but this source of food may have been more important at Curracurrang.

Because of the superficiality of many observations it is difficult to evaluate, or even discern, the seasonal patterns in the economy. In this respect Bradley is by far the most useful observer. By August 1788 he had watched the Aborigines' activities over a sufficiently long period to enable him to write in his journal (Bradley 1786-92, p.133):

> For a considerable time after our arrival it was supposed that the food of the Natives was entirely Fish, but the Winter convinced us, that if they had not some other resource great numbers of them must perish, as it is they are very hard put to it when Fish is scarce; We have been several days together without getting half a bucket of fish with the seine and having met some of the Natives in a most deplorable situation for the want of food in the winter months.

Some movement away from the Sydney area was observed in April and May (Hunter 1793, p.65), but this did not lead

to a complete, seasonal depopulation of the coastal areas. The large gatherings were seen over too long a period to be explained solely as resulting from the Aborigines' curiosity to see the Europeans at Sydney. There was sufficient food in the area to support large groups for a considerable time. The depopulation seen at Sydney during April and May may not have been due solely to food shortages in the early autumn months because good catches of fish were taken right up to 30th April (Hunter 1793, p.65). The decrease in population was not considered the result of any movement inland because in all the excursions inland to that time very few natives had been seen (Hunter 1793, p.65). It is possible that the large catches of fish during the spring and summer months enabled the Aborigines to congregate in large groups, but with the coming of winter and a shortage of food these groups may have been forced to disperse and spread themselves more thinly along the coast, thus giving the appearance of a decrease in population at any one centre. This explanation appears more feasible in the light of statements by Bradley (1786-92, p.141) that the Aborigines intensified their fishing activities and fished for long hours into the night with fires in their canoes.

These seasonal changes are not to be confused with short-term changes related to ceremonial activities or transient environmental changes. Threlkeld (1826, p.1641) records the movement of the Lake Macquarie natives to the mountains to attend ceremonies and engage in trade. Large gatherings of Aborigines feasting on whales were recorded in several instances (Bradley 1786-92, p.120; Harris 1791, p.4). Short-term depopulation as a result of water

shortages at Bateman's Bay during December 1797 may have been seen by Bass who observed that numbers of native huts were deserted and the wells dug in the centres of the swamps were dry (Bass 1789, p.9).

Contemporary descriptions and the evidence gained from middens suggests rather strongly that considerable numbers of people gained a major part of their food supply from marine sources. Evidence for any seasonal changes in food-source orientation is not strong. Many of the population changes observed were probably due to temporary alterations in the environment, or to attendance at ceremonial gatherings in other areas. There are no observations of a wholesale movement away from the coast and the adoption of a different way of life. The economic life of the people differed considerably from the descriptions of the activities of inlanders on the Hawkesbury (Collins 1789, pp.557-8 [Marsden] 1808, p.26) and at Manangle (Menangle) (Barralier 1802, pp.85-6).

Hunting and Collecting

The division of labour in the southeastern coastal areas appears to have differed significantly from the pattern commonly encountered in inland areas and also from that in some other coastal districts. While the collection of vegetable foods and shellfish was still probably the main responsibility of the women and fishing and hunting that of the men, the women did spend a considerable part of their time fishing (Bradley 1786-92, p.108; Collins 1793, p.556; Hunter 1793, p.63; and Worgan 1788, p.10), and men were seen collecting shellfish (Cook, Beaglehole ed. 1955, p.311; Hunter 1793, p.63; and Bradley 1786-92, p.128) and vegetable foods (Bradley 1786-92,

pp.110-7). In fishing the division of labour appears to have been based on the equipment used. The women fished with hook and line while the men used spears. One exception to this is where men fished from rocks in the surf with hooks baited with octopodes (G[ovett] 1837, p.7).

Table 7 reveals surprisingly little variety in the fishing methods employed, even though the men and women spent a great deal of their time in fishing. Observations at Sydney suggest that spearing and line fishing were the most frequently employed techniques. In areas away from Sydney fish weirs and fish poisons were seen in use as well, but because of the infrequency of observations, their relative importance cannot be assessed. The two references to net fishing (Phillip H.R.N.S.W., I, ii, p.132; Robinson, Mackaness ed. 1941, p.324) are somewhat suspect. Phillip's reference to the use of hoop nets to catch lobsters at Sydney is particularly difficult to interpret because no records of such activities occur in the writings of other equally competent contemporary observers at Sydney. Added to this is Bradley's (1786-92, p.133) statement that crabs and crawfish (lobsters) were never seen in Port Jackson, although they were seen at Broken Bay. Nets were frequently recorded in use as carrying receptacles. If Phillip's observation is valid, nets could not have been in widespread use.

If the statements by Cook that oysters, mussels and cockles were the chief support of the inhabitants of Botany Bay (Cook, Beaglehole ed. 1955, p.311) and the high proportion of estuarine shell in the faunal remains of the midden at Gymea Bay (Megaw, pers. comm.) do reflect accurately the importance of these foods, even for limited

periods, it would appear that these people used no specialised equipment in gaining a considerable part of their food supply. However the differences in the methods used gathering the various species from their respective habitats shows a degree of adaptation. Some were collected from the rocks along the shore, oysters, cockles and mussels were gathered in canoes from the sand and mud flats of Botany Bay (Cook, Beaglehole ed. 1955, p.311), while certain species were dived for among the rocks in the open water (Hunter 1793, p.63). The shell on the distal end of the spear-thrower was used in opening and levering some varieties off the rocks (Bradley 1786-92, p.69) and net bags were used as transport receptacles (Bradley 1786-92, p.69). Blackburn (1791) states that the Aborigines remained in the one area until they had cleared the rocks of shellfish. Given the persistence of the shellfish population in Sydney, it is difficult to accept Blackburn's statement.

The importance of flotsam as a source of food is not easily assessed. The often quoted examples of stranded whales are no exception to this. In the literature surveyed by the writer only three definitely distinguishable instances (Harris 1791, p.4; Bradley 1786-92, p.125; Anon. in Field 1823, p.468) were encountered, together with several references which could apply to these or different occasions. Thus stranded whales could not have provided a continuous source of food, but may have permitted large gatherings to come together for short periods. Stranded seals may also have provided some food. Harper (1826, p.1563) states that seals were hunted at Bateman's Bay, although he gives no description

of the method used. Seal bone was found in the middens at Durras North (Lampert 1966, p.94) and Curracurrang (Megaw, pers. comm.). The bones of shearwaters in the midden at Durras North suggest that the birds drowned during migration may have added considerably to the food supply in summer months (Lampert 1966, pp.97-8).

The observations give no indication of any seasonal change in activities. Most writers note that fish became scarce in the winter months and that population numbers thinned considerably, but those Aborigines remaining under the observation of the Europeans continued in their pursuit of fish. One observation suggests that the fishing effort may have been intensified during this season by fishing long into the night (Bradley 1786-92, p.141). The activities of the people leaving Port Jackson are not described, but it appears that considerable numbers remained in the near vicinity of the Port because 200 natives gathered for a fight in August 1788 (Bradley 1786-92, p.121). It is possible that the people continued living on marine foods, but lived in smaller groups scattered along the coast. The practice of drying fish was recorded by Bradley (1786-92, p.142) but this was only an isolated instance, and the fact that 200 people were present suggests that it was used only in association with large ceremonial gatherings. With the return of large schools of fish in October the natives were again evident in large numbers (Bradley 1786-92, p.125).

Table 7 also reveals an outstanding lack of co-operative fishing activities. This factor might be attributed to the nature of the quarry sought after and the absence of equipment which might lend itself to this

type of activity. The only references to communal activities in fishing are where several men launched spears in unison into schools of sea mullet (Scott, n.d., pp.10-1), and the use of fish weirs where the group probably shared the trapped fish.

The features which distinguished these Aborigines' fishing activities from those of the coastal Cape York natives was the degree of participation by women in fishing and the limited range of techniques employed. Spearing and line fishing appear to have been the principal methods used, while netting apparently was not, and brush fences, stone weirs and fish poisons were probably not frequently employed. The hunting of large marine game apparently was not practised, although whales, seals and porpoises were eaten when stranded. Harper (1826, p.1563) makes reference to the hunting of seals but gives no details of this, nor do any other descriptions read by the writer record similar activities. Despite the prevalence in the Hawkesbury River of the Leatherback Turtle, which grows to nine feet in length (McCarthy 1955, p.287), no record of its being hunted has been found. It formed a rare subject in the outline rock engravings around Sydney (McCarthy 1955, p.287). The major emphasis in the diet therefore appears to have been on fish and shellfish.

Hunting of Land Animals

The relative importance of the hunting of land animals in the economy is very difficult to assess. One one hand are statements that the natives 'were strictly divided into two classes, the hunters and fishers; and that they did

dare encroach upon each other's mode of getting a livelihood' (anon. in Field 1823, p.468). This view is strengthened by Collin's (1798, p.586) recognition of differences in spear and net design and also in the dialects, dances and songs of the coastal and inland-dwelling people at Sydney. Whether the two types of economy were as distinctly differentiated as this first observation suggests is not certain. The finding of a broken spear in the flank of a kangaroo at North Head (Bradley 1786-92, p.110) and the presence of a few oyster and mussel shells at an inland camp-site (Phillip H.R.N.S.W., I, ii, p.135) suggests that even while living on the coast the natives may have engaged in land hunting, and that if they went inland the coastal natives probably did not take sufficient food to support them for the duration of their stay.

The references to hunting methods quoted in Table 8 are very superficial and reflect little variation. This might indicate the relative importance of hunting, but could result from a lack of sufficiently detailed observation of this sector of the Aborigines' economic life. The choice of methods used in hunting the larger game appears to have depended on the number present. Organised drives were employed when numbers permitted, while stalking and hides were probably used when sufficient manpower was unavailable. The use of nets in hunting was not recorded, although netting techniques were known. Such hunting techniques were recorded on the middle and upper reaches of the Hunter River (Miller in Curr 1886, III, p.353; Fawcett 1893, p.153). It is probable that smaller game including possums, flying

squirrels, provided the most consistent and important land prey.

It appears that the cah-bro-grub formed an important part of the diet of the Aborigines on the Hawkesbury River (Collins 1793, p.558, quoted verbatim by [Marsden] 1808, p.26), but otherwise the consumption of insects was not frequently recorded. Ants' eggs, witchetty grubs and the brood of the bee were eaten. Collins (1798, p.558) records that a paste made from fern root and small ants bruised together was eaten.

Vegetable Foods

The references to the collection of vegetable foods give what is an undoubtedly incomplete account. This can easily be seen in the few entries in Table 9. On the other hand several factors suggest that this may be a reasonably accurate picture of the situation. Collins (1798, p.557) states that 'a few berries, the yam and fern-root, the flowers of the different banksia, and at times some honey, make up the whole vegetable catalogue'. Most accounts stress the part played by women in fishing, and this pursuit was probably followed at the expense of time spent in gathering vegetable foods. In fact, the only references (Bradley 1796-92, pp.110, 117) directly describing the collection of vegetable foods involved men, not women. The principal vegetable foods appear to have been fern-root, yams and the nut of the Macrozamia palm. Yams were evidently very important on the Hawkesbury River, where one writer notes that the banks had the appearance of being ploughed, so extensive were the diggings for yams (Hunter 1793, p.150). One observation

suggests that, at certain seasons at least, vegetable foods, and fern-root in particular, were emergency foods (Bradley 1786-92, p.107). At Port Stephens vegetable foods may have been relatively important at certain seasons. At one season groups assembled in a particular place to 'patter bungwall', or eat fern-root (Dawson 1830, p.327). Even if vegetable foods were seasonally important, there is no evidence to support Meggitt's (1964, p.33) claim that vegetable foods comprised over 70 per cent of the food supply.

Several plant foods underwent some form of preparation before being eaten. In the case of the Macrozamia nuts and several yams this was to remove toxic elements, which affected Europeans who ate the foods unprepared. Minor differences were observed in the preparation of the one plant. At Twofold Bay the kernels of the Macrozamia were prepared by bruising them to a pulp and soaking it in water (Robinson, Mackaness ed. 1941, p.335), while at Sydney the kernels were shelled, soaked in daily changes of water for seven or eight days and then roasted (Hunter 1793, p.479).

Water

Despite the relatively high rainfall, problems in obtaining water were experienced in some areas. Cook (Beaglehole ed. 1955, p.305) records that the only fresh water found at Botany Bay came from a small hole dug in the sand. Flinders (1814, I, p.XCIX) found a small well dug a short distance above high water mark at Lake Illawarra. Where the tribes were dependent upon such water sources, the failure of groundwater at times necessitated a

movement away from the coastal areas. One such incident was recorded at Bateman's Bay where the wells dug in the centre of the swamps were dry and the native camps deserted (Bass 1798, p.9).

Material Culture

The material culture of these coastal people reflects the bias of their economy. The multi-pronged fish-spear appears to have been the most important fishing implement, although Bradley (1786-92, p.126) also records the use of a single pointed spear barbed with bone or shell for fishing. The fish-spear consisted of a shaft up to 12 feet long usually made of the flower stalk of the Xanthorrhoea surmounted by four hardwood prongs barbed with shell, or more commonly, bone. Cook's (Beaglehole ed. 1955, p.305) statement that the prongs were pointed with bone suggests that a bone bipoint, functioning both as a point and a barb may have been used. The statements by several observers (Hunter 1793, p.62; Leigh 1821a, p.966) that the shaft could be lengthened when desired possibly refers to the joins in the shaft to obtain a sufficiently long and straight piece of wood, rather than any attempt to produce a spear of easily variable length. In basic design the hunting spear differed little from the fish spear except that it has only one prong. Collins (1798, p.586) states that the woods tribes barbed their spears with stone instead of broken oyster shells. The spear with which Governor Phillip was speared differed from those in general use in that it was longer than usual and was barbed and pointed with hardwood (Hunter 1793, p.462). It was probably a fighting spear. Leigh (1821b, p.1010)

states that four kinds of spear, other than the fish spear were in use. These spears, and on occasions the fish-spear, were thrown with the spear-thrower which consisted of an ovate body tapered to each end, with a stone flake or shell mounted on the distal end. In addition to its use as a spear-thrower it was also employed as a digging implement (Collins 1798, p.585) and the stone or shell served as a cutting implement. Other weapons included clubs, wooden swords, parrying sticks and shields of bark and wood. The 'wamareen', which appears to have been a type of boomerang, was seen in the area (Leigh 1821b, p.1010) but there is no description of its function.

Worgan stated that the natives' 'Hooks and lines not being in very plenty' and therefore they were 'obliged to practice this art of taking them daily' (Worgan 1788, p.11). This is difficult to interpret, because other writers give the impression that line fishing was extensively employed in Port Jackson. The fish hooks were crescentic in shape, barbless and normally made of shell. Two references relate to the use of bone in the manufacture of fish hooks (Scott, Bennett ed. 1929, p.18; Robinson, Mackaness ed. 1941, p.324). Bradley's (1786-92, p.92) description of the manufacture of a fish hook is interesting on two counts. Firstly, it is one of the few recorded instances where a woman was engaged in the manufacture of hunting equipment, and secondly, it shows the use of what is now called a fish hook file, which was a small piece of stone used to grind out the centre of the shell blank and cut back the edges to the required shape. Bird talons were used as fish hooks, but shell hooks were considered better (Hunter 1793, p.63). The lines were

manufactured from bark or palm fibre. If nets were in use (and this is doubtful), they were certainly not widely used.

Canoes were used mainly by the women in fishing and for transport around the harbour and on the open sea. Those in use at Sydney varied in length from 10 to 20 feet and usually consisted of a sheet of stringybark gathered and bound at each end and kept open by thwarts. Worgan's (1788, p.11) reference to the use of the bark of a 'fir-like' tree suggests that the bark of the Casuarina may also have been used. Mid-August may have been the time of year when the bark was most commonly cut because Phillip (H.R.N.S.W., I, ii, p.191) states that large parties were known to be in the woods making new canoes at this time. The paddles were about two feet long and shaped like pudding-stirrers. One paddle was held in each hand.

Of the equipment used in manufacture, the stone or shell mounted on the spear-thrower was the most frequently recorded cutting implement, being used as a knife or chisel in woodworking and as a knife in cutting flesh. Hafted stone axes and adzes were also recorded in use by Bradley (1786-92, p.129). Unhafted, heavy wedge-shaped choppers used in conjunction with a wooden mallet or maul were used in cutting out canoes and shields (Bradley 1786-92, p.129). Shells were also employed as cutting implements, but one observation suggests that no definite shell tools were manufactured and used continually. Tench describes an incident where a native 'snatched up an oyster-shell, and converted it with his teeth into a tool, with which he presently fashioned the spear and rendered it fit for use' (Tench 1789, p.87).

Net bags, folded bark troughs, palm-spathe baskets, bark and wooden dishes were used as transport receptacles and hollowed tree-knots and large shells served as drinking vessels.

The use of clothing seems to have varied considerably from place to place. Cloaks of possum skins sewn together with sinew were apparently not worn at Sydney, but were seen at Hawkesbury River (Bradley 1786-92, p.166), at Broken Bay (Mathews, Havard ed. 1944, p.187), and kangaroo skins were worn by women at Twofold Bay (King 1826, p.4). Fur-twine pubic tassels were recorded in several areas. Little information on personal adornment and ceremonial dress is available, other than the rather doubtful illustrations and etchings accompanying the published accounts. Nose bones were evidently worn by the men.

Over much of the Sydney area the sandstone rock-shelters provided living quarters, but away from these simple bough frames covered with sheets of bark, Cabbage Palm leaves or bushes were erected. At Bateman's Bay the huts were built about half a mile inland (Harper 1826, p.1563). In the Sydney district Tench states that the largest number of huts seen together was twelve (1789, p.106).

The broad characteristics of the economic life of the Aborigines on the coast around Sydney showed a considerable degree of adaptation to the marine environment. Probably most people gained a sustained food supply from the sea and their economic life showed a marked specialisation in collecting methods which capitalised on the potential of the area. A large part of their time was spent in various types of fishing and in the collection of shellfish and

other marine foods. Their material culture reflects this specialisation, both in the weapons and equipment most frequently used, and in the use of bone and shell instead of stone in the manufacture of various utensils. In the Sydney area this specialisation appears to have been fairly complete, and some people were observed following this way of life throughout the year. In other areas this may not have been so, and people may have left the coast at particular seasons of the year, although there is little concrete evidence of this.

THE GROUPS OF THE EASTERN COAST OF CAPE YORK

The economic activities of the Aborigines along the eastern coast of Cape York possess a similar degree of specialisation in the exploitation of marine foods as those on the southeastern coast of Australia, but this was not manifest in the same way over the whole of the coast. To the south, the diet of the Walmbaria on the Flinder's Island and Bathurst Head, consisted principally of marine fish, molluscs, crustaceans and occasional dugongs and turtles, while to the south the Mudumui tribe, which lived on the coastal plain between Murdoch Point and Bathurst Bay, lived mainly on coastal foods, visiting the sandstone tableland country only to hunt rock wallabies and possums and to gather honey. This pattern was repeated among the Ka:wadji tribes to the north where fish formed the staple flesh food of the sand beach people (Thomson 1934b, p.241). These people did obtain part of their food supply from the bush, but in no sense were they dependent upon this source of food (Thomson 1933, p.457). The emphasis of the

economy of this latter group appears to have differed from that of the previous tribes in that dugong formed a very important part of the flesh diet. During the periods Thomson was with the Gan-ganda at Stewart River (May-July and November-December) the camp was never for any length of time without dugong meat (Thomson 1934b, p.239). It appears that the Lama-lama living on the mangrove-lined estuaries at the south of Princess Charlotte Bay were largely an inland dwelling people (Hale and Tindale 1933-4, p.69).

Other evidence pointing to the importance of the coastal habitat in the lives of the people includes the group names referred to above which indicate that the association of a group with a particular environment was sufficiently strong to be recognised and named by the surrounding people. The native pads or tracks reflect the dominant line of movement in the area. At Princess Charlotte Bay these extended along the coast, turning inland only to avoid rocky cliffs (Hale and Tindale 1933-4, p.69). The attitudes shown towards certain types of food give some indication of the relative importance of different food sources. Vegetable foods were scarce in the area occupied by the Walmbaria, and the natives' hunger for carbohydrate led them to consider vegetable food a luxury (Hale and Tindale 1933-4, p.69).

Hale and Tindale's work among the tribes at the southern end of Princess Charlotte Bay covered too short a time to detect any seasonal changes in the economy, but Thomson's work shows that the Gan-ganda at Stewart River remained close to the estuary for long periods and only small parties went inland for a few days, mostly during

the dry season or immediately following the rains, to collect vegetable foods, spear woods, bark for the manufacture of domestic utensils and grass for baskets (Thomson 1933, p.458). The groups generally consisted of a number of men or one or two families. The only move by the camp as a body was when it moved from the estuary to the beach on the coming of the monsoon. There is nothing in this information to suggest that seasonal changes were accompanied by any radical change in their way of life. However, some of Cook's observations at Endeavour River do pose some problems. He arrived there on 15th June and does not record seeing any Aborigines until 10th July (Cook, Beaglehole ed. 1955, p.357). Banks records that Tupia saw two natives on 5th July, and that they ran away in great precipitation (Banks, Beaglehole ed. 1963, II, p.88). One might conclude that the natives were absent from the coast and living inland during the early part of Cook's stay, returning to the coast in July. It is more probable that they avoided the new arrivals and remained hidden from their view. Smoke from fires was seen in the near vicinity of Cook's camp. This conclusion is strengthened by Banks' (Beaglehole ed. 1963, II, p.90) reference to the unaccountable timidity of the people in the area.

While there is no evidence to suggest any seasonal change from marine to terrestrial foods, some seasonal variation in the economic pattern can be detected. In some areas visits of unknown duration were made to outlying islands and cays to gather shellfish and hunt turtle. Vast piles of shell were seen on Lizard Island and piles of turtle carapaces on Eagle Island (Banks,

Beaglehole ed. 1963, II, pp.103-4). This settlement probably occurred during the wet season when water was available and when it was necessary to erect substantial huts. The frames of seven or eight huts were seen on Lizard Island (Banks, Beaglehole ed. 1963, II, p.103). In September wells dug on Piper's Islet were dry (Wilcox 1848-9, p.44). These camps should not be confused with short term visits to islands to collect turtle eggs when settlements may not have been made. Wilcox (1848-9, p.47) and Huxley (Huxley J. ed. 1935, p.144) refer to the plight of three natives windbound on Bird Island without water while collecting turtle eggs.

Hunting and Gathering

The activities of the people on the eastern coast of Cape York show a far more definite division of labour based on sex than was seen at Sydney. The men engaged in netting, line-fishing and spearing fish and large marine game, while the women collected molluscs, crustaceans, vegetable foods and some small game. The division of labour was not all-exclusive, for at times men collected molluscs and women fished for small fish using dilly-bags. However, there was no evidence of the continued employment of women in fishing using specialised equipment.

Fishing

The main fishing techniques are summarised in Table 10. The methods employed varied with the nature of the game and the area in which it was sought. In the shallow waters along the coast and in the estuaries fish were speared and netted. The spears consisted of a light shaft

with several hardwood prongs, barbed in some examples, and were used by natives wading in shallow water or from rocks along the shore. Harpoons were sometimes used for the larger fish. It has been recorded that a native working under favourable conditions could, in less than an hour, spear as many fish as he could carry (Hale and Tindale 1933-4, p.108). Table 10 shows that several designs of framed nets were used, but in each case the nets functioned in the same way. Two men held the net between them and waded through waist-deep water. In some instances the fish were driven towards the nets by beaters (Hale and Tindale 1933-4, p.11). Roth (1901, p.22) states that nets were not in use at Cape Bedford and Endeavour River, although the natives had names for them. If there was any environmental reason for this, it is not known. Line fishing was recorded widely over the area.

Brush fences were used in tidal creeks. Inland, these utilised the falling river levels at the onset of the dry season, but in coastal areas the daily tidal fluctuations produced the same conditions. The fish passed over the fence on the rising tide but were trapped behind it with the fall of the tide. Stone fish weirs and traps were adapted in the same way. The alignment of the walls and pockets in the trap at Hinchingbrook Island showed how well the Aborigines understood the feeding habits and longshore movements of the fish (Stephens 1945, p.1). Moveable fences of grass and boughs were used by women in small shallow waterholes (Roth 1901, p.23).

Where only small volumes of water were involved, the poisoning of water was practised to stupefy or kill the fish. Table 10 lists several plant species used as

poisons, and in some instances different poisons were used in salt and fresh water. Hamlyn-Harris (1916, p.4) claims that this apparent adaptation was not readily explicable in terms of the toxic principles involved.

Women were mainly responsible for the collection of molluscs and crustaceans, although men dived to collect the Rock Lobster. Short sharp sticks were used to spear some of the smaller crabs.

The hunting of turtle showed considerable variation throughout the year. Three types of turtle were taken: the Green Turtle being the most eagerly sought, but the Loggerhead and Hawkesbill Turtle were also hunted. Care was taken so that a gland, allegedly secreting poison was not damaged when carving the last mentioned (Banfield 1908, p.158). Jardine (1866, p.79) states that turtle formed the principal food of the natives at Somerset from November to February. It is probable that turtle hunting expeditions of some duration were made to outlying islands. Banks (Beaglehole ed. 1963, II, p.104) saw piles of carapaces on Eagle Island. These possibly occurred during the wet season, but certain other observations by members of the same expedition lead one to query this. On the same island turtle fins were found hanging in trees by the ship's master, but no people were seen on the island. Cook (Beaglehole ed. 1955, p.374) says the fins were so fresh that the men ate them. On the other hand Banks (Beaglehole ed. 1963, II, p.104) states that they were so well dried that the men could eat them. The journal of Molyneux, the ship's master, which might clarify the issue is in the Public Records Office, London, and does not relate to this period. As it stands the information

permits two possible conclusions: firstly, that the natives visited the island to hunt turtle during August, which is during the dry season, or that they engaged in a form of preservation of turtle meat for future consumption by drying it in the sun. As both writers agree that fins were hung in the trees, these observations should not be confused with those where skulls were placed in trees as part of a turtle increase ritual (Hale and Tindale 1933-4, p.193; King 1826, I, p.231).

During the breeding season turtle lose their accustomed wariness and come closer inshore, and it was during this period that they became more important in the diet. At this time they were captured bare-handed by natives who dived under them and turned them on their backs, dislocating a flipper at the same time to disable them (MacGillivray 1852, II, p.22; Jardine 1866, p.79; Thomson 1934b, p.246). MacGillivray states that the Hawkesbill was not captured in this way because of the sharp edges to its carapace. Female turtles coming ashore to lay their eggs were also taken, and their eggs formed a valuable adjunct to the natives' diet. Expeditions to surrounding islands were made to collect the eggs (Banfield 1908, p.251; Huxley, Huxley, J. ed. 1935, p.144).

At other times of the year turtles were harpooned from outrigger and bark canoes. This was a joint activity involving the co-operation of several people and the prey was divided in accordance with rigid tradition (Thomson 1934b, p.247). Before the introduction of the iron harpoon, turtle hunting was a more exacting task because the turtle had to be struck in the soft part of the neck

or flippers because the wooden dart would not penetrate the hard carapace. Thomson (1934b, p.246) records a statement by the Gan-ganda that turtle hunting was much more difficult when wooden harpoons were in use. McCarthy (1955, p.285) states that turtle was not an important part of the food supply where the harpoon was not in use.

The controversy which surrounds the use of the sucker-fish in turtle hunting has probably magnified its importance. The controversy stems from whether the fish and attached line gave a purchase on the turtle by which it could be hauled in, or whether it merely provided an indication of the position of the turtle. Whichever was true, the method was apparently not frequently used. Banfield (1908, p.245) says that it was rarely used on Dunk Island, while Hale and Tindale (1933-4, p.110) note that the natives knew of it only as being used 'long time ago'.

Thomson (1934b) provides the only detailed account of dugong hunting on the eastern seaboard of Cape York. This was carried out from outrigger canoes using detachable-headed harpoons. The Wudjadi, J'a?o, Umbila and Gan-ganda tribes used canoes with double outriggers, while the Umbuigamu and the tribes to the south used single outriggers. Bark canoes were also used in the south, but here dugong hunting appears to have been less important than it was to the north. A minimum crew of three was required to man a canoe successfully, and each member was named from the position he occupied in the craft. This determined the role he played in the hunt and his share of the game. When landed the carcass was cut up and apportioned to the owner of the canoe and the crew, who, in turn, distributed it to the remainder of the camp in

accordance with kinship obligations. The meat was cut into strips and boiled in bailer shells. In this condition it would remain tolerably fresh for several days. The oil was prized as flavouring for other foods and for use in technology. A platform over dugong grazing grounds was seen at Princess Charlotte Bay, but Thomson (1934b, p.246) dismisses this as a recent introduction from Torres Strait.

The successful exploitation of dugong by the Ka:wadji group of tribes appears to have depended upon the use of more advanced technology, particularly the use of the harpoon and outrigger canoe, neither of which were indigenous to Australia and resulted from cultural diffusion from the north. In accepting them into their culture the Ka:wadji were able to capitalise on the potential of their environment to a greater extent than the tribes to the south, some of which possessed only the harpoon and the indigenous bark canoe. Thus the distinctive features of the Ka:wadji economy might be related to cultural factors rather than to the characteristics of the environment, although this may have had some non-causative influence. The effects of this specialisation can be traced even further. Successful dugong hunting depended upon the co-operation of at least three males, and thus the size of the group maintaining face-to-face relations must have been larger than where more individualistic activities were followed. The obtaining of sufficient flesh food for several days meant that hunting was not such a pressing need during times when dugong and turtle were plentiful.

The hunting of crocodiles is recorded in several places (Banfield 1908, p.277; Roth 1901, pp.24-5; Hale and Tindale 1933-4, p.109), but their importance in the total diet is open to question. They were probably more important to people living on estuaries than those on exposed coasts.

Hunting of Land Animals

While the available information indicates that marine derived foods were pre-eminent in the coastal Aborigines' diet, some time was spent hunting and collecting in their hinterlands. It is impossible to detect any seasonal pattern in this, but it is probable that these activities became more important towards the end of the wet season and the early dry season when vegetable foods were most abundant and stormy conditions made fishing more difficult. Among the Ka:wadji at least this did not lead to any permanent movement away from the coastal areas.

The references to the hunting of land animals are summarised in Table 11. The methods used in hunting kangaroos, wallabies and larger game varied with the size of the hunting party. If only one or a few hunters were involved the game was stalked and speared, but if larger numbers were present organised drives, sometimes using fire and nets, were made. Pits were used to trap wallabies. Small game taken included bandicoots, flying foxes, lizards, and during the wet season, frogs and snails. Insect foods included green ants, grubs, larvae and honey.

The range of hunting methods used in trapping birds was possibly greater than in other areas, but this

impression might be due to the thoroughness of Roth's observations there. Larger birds were speared, simple-pointed spears being used on land and multi-pronged spears over water (Roth 1901, p.27). Snares and lawyer cane traps were employed to catch Scrub-Turkeys. Where smaller birds were known to fly in flocks along definite paths, these were knocked down with switches. Apart from the use of a purse net to catch roosting Swamp Peasants (Roth 1901, p.27), there is no record of nets being used to catch birds even though such methods were in use in the south-western parts of the Peninsula.

Vegetable Foods

Even to the most casual observers it was obvious that the Aborigines had a considerable knowledge of the plants and plant communities in their area. It seemed to hurt Banks' pride as a gentleman-botanist to observe that 'tho their manner of life, but one degree removd from Brutes, does not seem to promise much yet they had some knowledge of plants, as we plainly could percieve their having names for them' (Banks, Beaglehole ed. 1963, II, p.116).

Table 12 lists the references to vegetable foods in the literature surveyed by the writer. Numerically, fruits form the largest part of the list, but this is probably not a true reflection of their importance in the diet. Fruits were usually gathered and eaten while on the move and only some species were brought back to camp to undergo any form of preparation. Many soft fruits were available only for limited time periods. Various rootstocks, particularly the Dioscoria and Ipomoea yams, the tubers of the water-lily and the corms of several

swamp rushes appear to have been the most important sources of vegetable food. The Round Yam (Dioscoria sativa) was collected in great quantities during the wet season when it was easily distinguished by its growing tops. It was also harvested in the dry season, probably in smaller quantities, when it was recognised by the dried off stalks (Banks, Beaglehole ed. 1963, II, p.127). Like many other tubers it underwent elaborate preparation to remove unpleasant or toxic elements. Preparation involved variations on grating, washing and cooking, with some minor differences between areas. The Walmbaria tribe prepared the tuber by grating it, washing the pulp in several changes of water and boiling it in a bailer shell (Hale and Tindale 1933-4, p.113), a technique made possible by the size of these shells. The Je'landji, an inland tribe, prepared the tuber by baking then mashing it, straining the pulp in a grass dilly-bag, washing the resulting slurry and straining it in a depression in the sand (Roth 1901, pp.11-2). The knowledge of these techniques was widespread in Australia. Local variations were probably due to experimentation with particular species.

Similar methods were used in the preparation of the nuts of the Cycas media palm, the seeds of the Moreton Bay Chestnut (Castanospermum australe), the Matchbox Bean (Entada scandens) and the radicles and hypocotyl of the mangroves Bruguiera rheedii and Avicennia officinalis. The preparation of these involved various sequences of cooking by roasting, steaming or boiling, breaking up by cutting, grating or crushing, and leaching by washing. The preparation of the Matchbox Bean was evidently so

arduous, in relation to the results produced, that it was regarded more as a stand-by than a staple. However, this and the fruits of the Pandanus were important because they served to tide the natives over lean periods when other food was unprocurable.

Water

While it was noted previously that the lack of permanent water supplies prevented long term settlement being made on some islands, the marked wet and dry seasons also affected the availability of surface water on the mainland. During the dry season wells were sunk in the beaches just above high tide level and along the banks of estuaries (Thomson 1933, p.458, 1934b, p.241; Hale and Tindale 1933-4, p.116). Thomson (1934b, p.241) records that the water obtained from these wells was too brackish for the European palate. Away from the coast Pandanus palms were regarded as indicators showing likely spots for the sinking of successful wells (Roth 1901, p.8). The lateral bulges of the Melaleuca were also tapped for small quantities of water (Roth 1901, p.8), but the overall importance of this source is not indicated.

Material Culture

The equipment used in fishing by the Aborigines on the eastern coast of Cape York showed far more variety than that in use further to the south. To some extent this was the result of cultural diffusion from the north, but this does not account for every difference between the two. As in the Sydney area, the most common fishing spear consisted of a shaft with three or four barbed, hardwood

prongs. The harpoon used in hunting dugong, turtle and large fish was probably introduced from the north and was in use as far south as Keppel Islands (McCarthy 1955, p.286), well to the south of the study area. The shaft consisted of a long straight piece of light wood with a socket in the end to accommodate the harpoon head. In most instances iron harpoons were in use. The original heads were about one foot long and made of hardwood, some being barbed with a wooden peg. On penetrating the prey the head pulled free from the shaft, and the rope attached to it served to connect the hunter and his prey. In some areas wooden floats were attached to the line to aid in tiring the game.

The fish hooks used in the area fall into two groups. To the north a composite hook made from a slip of bone lashed to a tapering pencil of wood was used (Roth 1901, p.21). Crescent shaped hooks of shell, similar to those in use at Sydney, were seen at Dunk Island (Banfield 1908, pp.266-7), Tully River and Cape Grafton (Roth 1901, p.20) and at Endeavour River (Banks, Beaglehole ed. 1963, II, p.130). Massola (1956, p.15) makes brief mention of a hook from Cape Grafton made from freshwater mussel shell. He attributed its 'bent pin' shape to local evolution and the influence of the different material used, but attributes the previous differences in design to historical rather than environmental factors.

Unlike the Sydney tribes whose knowledge of net making was not extended to the manufacture of fishing nets, the Cape York natives did employ nets in fishing. However, the range of designs in use was not as great as that evident in the riverine areas of New South Wales. The nets

were of a shallow bag-shape and mounted on an oval frame. The fixed frames could only be used by two people, but it was possible for nets with a hinged, folding frame to be used single-handed.

The adoption of the outrigger canoe was an important factor in enabling the Ka:wadji to capitalise more fully on the potential of their environment. Two canoe designs were present in the area; the double outrigger being used in the north and the single outrigger to the south. These have been described in detail by Roth (1910, pp.12-4) and Thomson (1934b, p.243). In each design the hull consisted of a hollowed out tree trunk. Hale and Tindale disagree with Roth (1910, p.11) that the single outrigger was a local modification of the double outrigger and claim that both were due to external influences different in time (Hale and Tindale 1933-4, p.121). As well as these basic differences in design, there was considerable variation in bow and stern design. Hale and Tindale (1933-4, p.118) describe four different bow and two stern designs from the Princess Charlotte Bay area. Thomson (1956, p.76) states that the modification of the bow to form a projecting lip provided a platform on which the harpooner could stand. At Princess Charlotte Bay the Lama-lama people had access to the trees most commonly used in canoe manufacture and traded finished canoes with the Mudumui and Walmbaria tribes (Hale and Tindale 1933-4, pp.117-8). Thomson (1952, Map 1) gives the distribution of outrigger canoes on the east coast as extending a little to the south of Endeavour River, but explorers' accounts, show that they were seen much further south. Cook (Beaglehole ed. 1955, p.337), saw an outrigger canoe at Cumberland Island off what is now

Proserpine. A footnote by the editor refers to a statement by Pickersgill that this was the first outrigger canoe seen. One can infer from Huxley's statements that outrigger canoes were seen at Palm Island, particularly when he says that the natives of Gould (Goold) Island to the north approached their ship, 'this time in ordinary small bark canoes' (Huxley, Huxley, J. ed. 1935, p.139). Banfield (1908, p.238) states that outriggers were in use 20 miles to the north of Dunk Island. His dismissal of a local native's description of the manufacture of an outrigger canoe as imagination and the result of travel, may not have been justified in the light of the previous observations. However, in these more southern areas, the outrigger did not displace the indigenous bark canoe, as it appears to have done north of the Endeavour River.

The hunting spear used in the area consisted of a single pronged spear barbed with a bone bipoint. At least three types of fighting spear were used in the area, many of these barbed with elaborate arrangements of stingray spines. The spear thrower in use is distinguished from those previously described by the shell grip at one end. This consisted of two bailer-shell discs bound with string and cemented with beeswax. The purpose of this grip was said to be that it prevented the spear-thrower slipping from the hand when being used as a parrying stick to deflect spears in a fight (Hale and Tindale 1933-4, p.100). Shields were known but not used in the area. The Lama-lama knew of the boomerang but did not make them (Hale and Tindale 1933-4, p.172).

The ground stone axe had apparently been used in hollowing out the canoe (Hale and Tindale 1933-4, p.117),

although at the time the writers were in the area none were in use. Crude hand-choppers produced by breaking pebbles were the only other stone implements recorded in the literature. The lower jawbone of the wallaby with the incisor still in place was used as a scraper or chisel, the tooth being broken from time to time to produce a fresh cutting edge. Bone gouges were also recorded in the area. A small flat piece of wood was employed to smooth the resin applied to joints in spears.

In the preparation of food, bamboo knives (Thomson 1934b, p.247), land snail-shell scrapers (Banfield 1908, p.260) and crude stone choppers (Hale and Tindale 1933-4, p.131) were used in cutting, while wooden mallets and millstones served to pound, crush and grind vegetable foods. The scarcity of suitable stone in the Gan-ganda tribal area led these people to value their grinding stones very highly (Hale and Tindale 1933-4, p.131). Other domestic utensils included the digging stick and various bags, baskets, troughs and gourds used as transport receptacles. Net bags were manufactured from acacia bark and cabbage palm fibre in sizes ranging from three inches to two feet in diameter and in various mesh sizes. Some of the finer ones were used as strainers. The bark troughs were pleated at each end and secured with a wooden skewer or bound with twine. Gourds fitted with grass corks and filled with water were seen at Goold Island and Weary Bay (Cunningham 1819-22, II, p.29). Coconut and nautilus shells were used as drinking vessels, but perhaps the most striking utensil of this type was the bailer shell, which, with the ventral surface broken away, was used to hold water, various types of food, bail canoes,

and also as a vessel in which food could be boiled on a fire.

Little or no clothing was worn. Young girls wore pubic tassels of string and some men wore strips of bark hanging from a belt. In contrast to this, the variety of ornaments worn was exceedingly rich. Hale and Tindale (1933-4, pp.141-3) depict several designs of shell necklaces and pendants, reed and grass necklaces, pandanus palm armlets, leg rattles and string belts. Hair pendants, net cloaks and string bands were worn during mourning (Hale and Tindale 1933-4, p.96). Most men and women at Princess Charlotte Bay had their noses pierced and wore various kinds of nose-pegs made of wood, bamboo or bone. Some men also had their ear lobes pierced and artificially distended. Cook observed similar features at Endeavour River (Cook, Beaglehole ed. 1955, p.395).

Rock shelters provided the only permanent shelters in the area, and where present were utilised by large bodies of natives over long periods. Hale and Tindale (1933-4, pp.123-4) divide the house types into the categories of temporary and semi-permanent shelters. Temporary shelters were usually constructed when on short excursions from the main camps and consisted of semi-circular breakwinds of saplings or canes covered with bark and bushes. The open side faced away from the prevailing wind. The more permanent shelters consisted of a dome-shaped framework of boughs thatched with bark and covered with grass and bushes. These huts were up to ten feet in diameter. Thomson (1934b, p.241) relates the differences in house type and the siting of the camp to seasonal factors. At Stewart River the Gan-ganda built windbreaks, similar to

those described above, along the edge of the river or just inside the fringing riverine forest during the dry season, but with the coming of the wet season the camp was moved to the open seashore and more permanent, dome-shaped huts were built. Shade huts were also erected in the camps to provide shelter from the sun during the day.

The economic life of the coastal groups of eastern Cape York show a considerable degree of adaptation to the marine environment. However, because of the greater amount of more detailed information on the area, it is evident that this specialisation was not uniform over the whole area. The Lama-lama people on the estuaries of the North Kennedy and Normanby Rivers were largely an inland dwelling people (Hale and Tindale 1933-4, p.69). Among those tribes gaining a livelihood from the sea, the hunting of large marine game was more important to the north of Princess Charlotte Bay than it was further south. In either case the activities of the people, their material culture and the movements around their tribal territory reflected their specialisation in the exploitation of their marine environment.

THE GROUPS OF THE WESTERN COAST OF CAPE YORK

The Munggan tribe figures pre-eminently in the literature of this area, the tribe being studied in some detail by McConnel and Thomson. However, Thomson is very imprecise in defining the groups he studied and as a result of this care must be exercised in the interpretation of his material. Both Thomson and McConnel agree that the Munggan tribal area extended from the upper reaches of the Archer River almost to the coast (McConnel 1930, p.97;

Thomson 1939, p.211). The coastal strip appears to have been inhabited by kindred coastal tribes and not by the Munggan. In his paper on the Munggan Thomson (1939) refers to coastal camps and Plate XXIII shows a dry season camp on the coast at Cape Keerweer, well outside the area defined as the Munggan tribal territory. According to McConnel this area was settled by the Ngadanja tribe (McConnel 1930, p.191) or the Algan tribe (McConnel 1957, p.XVIII). The major part of Thomson's work undoubtedly refers to the group on the Archer River estuary near the Aurukun Mission, which he studied from December 1932 to August 1933, while the more incidental references relate to the people he encountered on his trips from this base camp up the Watson and Archer Rivers and southwards down the coast as far as Cape Keerweer (Thomson 1935, p.11). Much of McConnel's work applies to the same area. In 1927-8 she spent most of her time on the Archer River, returning to the Aurukun Mission in 1934 to further her studies (McConnel 1957, pp.XIII, XV).

Thus a large part of the material refers to the activities of one or several associated clans (in the sense defined by McConnel (1930, p.181), who occupied the northern shore of the Archer-Watson estuary. It could be argued that this group should not be included in a study of coastal groups since they lived on an estuary, but its inclusion can be justified on the grounds that these people inhabited a coastal area for some part of the year at least, and exploited marine resources during this time.

Practically no information is available on the groups who inhabited the sea coast near the mouth of the Archer. The people at Aurukun were divided into two types; the

coastal people who lived mainly on fish, clams, cockles, oysters, crabs, turtle and dugong, and who occasionally gathered inland foods, and the inland-dwelling people (personal communication from Rev. W.F. MacKenzie, former Superintendent of Aurukun Mission). The Ngadanja tribe concentrated about the two arms of the sea called Yoinka and Arimanka (McConnel 1930, p.98) and were probably engaged mainly in hunting and gathering marine foods. The material culture of the Djonggandji, described by Thomson (1934a, p.229) suggests that their economy was oriented towards the exploitation of their marine environment. In none of these instances is a detailed account of the economic life available.

From McConnel and Thomson's accounts of the Munggan it is immediately apparent that their food source orientation differed radically from that in the other coastal areas discussed. During the wet season the groups studied lived in more or less permanent camps on well-drained land near rivers or on the raised beaches inland from the coast. During this time fish, shellfish and crabs formed a very important part of the flesh diet, and were supplemented by kangaroos, tortoises, crocodiles and the flesh and eggs of waterfowl. Turtle and dugong were hunted in the sea of the Archer River (McConnel 1930, p.103, 1953, p.6) and at Albatross Bay (Thomson 1939, pp.202, 212), but whether the Munggan were involved is not clear. Vegetable foods do not appear to have been very important during this period, being restricted to several types of fruit and other vegetable foods obtained in small quantities. Thomson (1939, p.211) found that while the Munggan did engage in fishing they were much less

dependent upon the sea than the tribes on the eastern coast of Cape York. Nomadic life began at the end of the wet season, and from this time until the height of the dry season vegetable foods formed a major part of the diet, together with fish, wallabies and honey. As the dry season progressed vegetable foods became more scarce and remained so until the end of the wet season. Possums, native cats, bandicoots, goannas and honey became important sources of food during the latter part of the dry season. Thus, unlike the other coastal areas where marine foods appear to have been important throughout the year, the economic life of the Munggan was an annual cycle in which various types of food became important at different seasons of the year, and the way of life of the Munggan changed with the changes in food supply. At one season groups may have led a similar life to that of the coastal groups described earlier, but at others a life more like that of inland nomadic groups.

Hunting and Gathering

Because of the cyclic pattern in the activities of the Munggan, their hunting methods varied with the season. Thomson (1939, p.209) considers that an onlooker, seeing the diverse occupations of the one group at different times of the year, might conclude that he was in fact studying different groups. Because of this the importance of the men and women in their roles as food gatherers would also vary. During the late dry season and the major part of the wet season vegetable foods were scarce and the women's time was taken up in the collection of shellfish, crabs, tortoises and the eggs of waterfowl and crocodiles.

At this time the men were engaged in fishing and hunting kangaroos. With the waning of the wet season and the beginning of the great vegetable harvest the importance of the women's contribution to the food supply would have increased greatly.

Fishing

During the wet season when more or less permanent camps were established the main fishing methods used (see Table 13) were spearing and netting. In estuaries the larger fish were speared from bark canoes, the 'bone-fish' being speared at night with the aid of tea-tree torches (McConnel 1930, p.101). As the floodwaters receded towards the end of the wet season fish fences and traps were built in the streams carrying the receding floodwaters and the sheets of shallow water left on the plains were scoured with nets. The netting of fish continued through the early part of the dry season, but once the fish became concentrated in the deep permanent lagoons poisoning could be effectively employed (Thomson 1939, p.214). No description of the types of net or fish poisons used was given, but Roth (1901, p.22) states that the non-folding, oval-framed net was used on the Embley, Pennefather and Batavia Rivers and folding oval-framed nets were in use over the whole of the Peninsula. He makes the additional observation that among the Nggerigudi on the Pennefather River nets were manufactured and used by women only. Three fish poisons in use on the western coast are listed in Table 7. Line fishing was employed during the winter months on the upper reaches of the rivers (McConnel 1930, p.101) but neither Thomson nor McConnel record the

practice on the estuary. Thomson depicts a fish hook made by the Munggan (Thomson 1939, fig. 1). The women were responsible for the collection of shellfish which formed an important part of the diet during the wet season. Roth (1901, pp.17-9) lists 43 molluscs utilised for food in the area. Turtle and dugong were hunted by the people living on the coast, both from outrigger and bark cannoes.

Hunting Methods

Like the fishing methods, the choice of hunting methods (see Table 14) takes on a new perspective when viewed in their seasonal context. During the rainy season the kangaroos could be stalked and speared more easily under the shelter of high winds. Roth (1901, p.29) records that the natives on the Pennefather River smeared themselves with yellow ochre to kill the smell of perspiration and to make themselves resemble an anthill. A disguise of branches was carried when stalking emus (Roth 1901, p.26). The wet season growth prevented organised drives being made during the early dry season even though sufficient numbers were present. Once the vegetation could be burned organised drives towards ambushes or with fire were employed. Where fire was used the men stood before it and speared the animals as they fled. The women followed up the fire digging out the bush rats, bandicoots, snakes and lizards which had taken refuge from the fire (McConnel 1930, p.101). After the grass had been burnt, game was more easily seen but more difficult to stalk. An example cited by Thomson (1939, p.217) shows how well the Aborigines understood the habits of the animals they hunted, and also how they capitalised

on the peculiarities of the local area. The raised beaches along the coast were clothed with dense tree cover, while the country on either side was bare. Because the wallabies took refuge in this cover during the day and were loath to leave it when disturbed, it was possible to drive them along the ridge towards a waiting ambush. The swamps provided a considerable supply of wildfowl during the wet season and these were speared (McConnel 1953, p.26) or knocked down with long switches (Roth 1901, p.27). At the end of the wet season when the ground was soft women dug for bush rats (McConnel 1930, p.103).

Vegetable Foods

Table 15 lists the references to plant foods eaten by the Aborigines in the area. The importance of vegetable food and the species harvested varied throughout the year. With the onset of the dry season the great vegetable harvest began. Root stocks comprised a large proportion of the produce collected at this time. The Long and Round Yams (Dioscoria transversa and D. sativa) and the Arrowroot (Tacca pinnatifida) as well as the seeds of the White and Black Mangroves (Avicennia marina and Bruguiera rheedii) underwent involved preparation to leach toxic elements. The methods employed do not differ substantially from those discussed earlier. With the progression of the dry season vegetable foods became less abundant. The Round Yam was still available but other foods, including the corms of the swamp rushes Scirpus littoralis and Heliocharis sphaceta, and the fruit of the Nonda Plum, became important. The latter was stored in dry sand where it became dessicated. This fruit and stored tubers of the

Round Yam provided some food during the wet season when vegetable foods were particularly scarce. At this time vegetable foods were restricted to Ficus and Eugenia fruits, the Black Fruit (Vitex glabrata), and several casual foods, including the Matchbox Bean which was eaten as a standby rather than a relished food.

Water

When surface water supplies became exhuasted in the dry season several methods were used to obtain water. In coastal areas wells were sunk into the shell beds associated with the raised beaches (Thomson 1939, p.216). In cases of extreme scarcity, the lateral bulges in the Melaleuca trunks were tapped (Roth 1901, p.12).

Material Culture

The duality of the Munggan economy might be expected to promote significant differences in their material culture, but this was not so. The range of techniques and equipment used in their economic life was comparable with that in use on the eastern coast of Cape York where similar contact was probably experienced. The literature suggests minor differences, but in most instances these may have been more apparent than real, and stem from McConnel's (1953) more thorough descriptions of Munggan material culture.

The spears used in fishing had three prongs of hardwood barbed with bone and a softwood shaft, a single-pronged barbless spear and a bamboo spear with a barbed, single-pronged hardwood head. It is probable that none of these spears was used exclusively in fishing. The harpoon

head depicted by Thomson (1939, Fig. 1) appears comparable with those described earlier. The nets used in fishing were made of acacia bark twine and mounted on fixed or folding oval frames. The fish hooks consisted of a bone barb set in resin and lashed with sinew to a pencil of wood.

Two types of canoe were used in the area; the indigenous bark canoe and the outrigger canoe. The double outrigger but not the single outrigger was used in the area, and at the time of European contact the use of the double outrigger had only spread as far south as the Batavia River (Thomson 1934a, p.229; McConnel 1953, p.9). It subsequently spread further south to Cape Keerweer. The initial borrowing appears to have taken place some considerable time ago since native names are used for all parts of the canoe and well-grounded traditions governing the choice of materials were evident (Thomson 1934a, p.231). Unlike the situation on the eastern coast of Cape York where the outrigger canoe displaced the indigenous bark canoe, both were retained with specialised uses. The outrigger was used as a seagoing craft for hunting dugong and turtle, while the bark canoe was largely an estuarine craft used in fishing and for transport on the rivers. It was used by the coastal people at Albatross Bay for hunting dugong and turtle (Thomson 1939, p.212). Because of the seasonal changes in the way of life of the Munggan the bark canoe was only important during the wet season and early dry season when travel was difficult. Later it appears to have been discarded. The bark canoe was made from a strip of Messmate bark sewn at each end with cane; the sides being drawn together with straps of green

hibiscus bark and kept open by forked sticks supporting ties. Canoes were constructed at the end of the wet season when the sap was flowing and the bark could be stripped from the trees (Thomson 1939, p.219).

McConnel (1953, pp.25-6) describes six spear designs used in hunting, and an additional seven evidently used only in warfare. The bamboo spear used in fishing was also employed in hunting birds and goannas, and the different weights of multi-pronged spears barbed with bone were used in hunting emu, wallaby, jabiru and large game. Spear-throwers were of similar design to those encountered on the eastern coast of Cape York. Hardwood clubs, sometimes ending in a rounded knob were used in fighting at close quarters and for warding off spears. Neither shields nor boomerangs were encountered in the area, but McConnel (1953, p.6) states that the boomerang was recorded in Algan legends as having been used to clear scrub, and that while no boomerangs were in use McConnel (1953, p.6) states that they could still be made. Bows and arrows were seen in the area but had no economic significance. They were used in ceremonial dances (McConnel 1953, p.23) and by children shooting at fish (Hale and Tindale 1933-4, p.172).

Information on the utensils used in the manufacture of equipment is very sparse. McConnel's (1953) account alone remains the only work treating this aspect of culture in any detail at all. As stone and flint are lacking over most of the area, axes and knives were rare and valued possessions. Shells and wallaby jawbones served as scrapers and took the place of the flint implements used in other areas. Wallaby incisors were used as

engravers and bone awls were employed boring holes in bark, particularly in the sewing of canoe ends. A drill made from a conical shell lashed to a stick twirled between the palms of the hands was used to bore holes in shell for the manufacture of necklaces. Small wooden pallets or spear-smoothers were employed in smoothing the hot gum on spear joints and points.

For the collection and preparation of food bark troughs, string dilly-bags and grass baskets were made. The size of the weave in the grass baskets varied with the purpose for which it was used. Tightly woven ones were made to carry honey, and some were woven with a solid base and open sides to serve as a colander. Wooden mallets were used in pounding Heliocharis corms and shells provided knives and spoons. The large bailer shell made a vessel in which foods could be boiled.

Clothing was rarely worn by either sex. String aprons of various designs were worn by women on particular occasions and the design indicated its significance. String headbands and girdles were worn, together with shell necklaces and pendants. Both sexes favoured shell nose pegs. Men alone wore wooden ear cylinders and pandanus arm bands.

The huts constructed by the Munggan showed both the effect of seasonal variation and outside cultural influence. During the dry season a semi-circular breakwind of bushes was the most commonly built shelter, but in the early dry season when mosquitoes were still troublesome the sleeping platform was used. This was probably of Papuan origin and consisted of a simple platform supported on four sticks and covered with a bed

of melaleuca bark. Fires were lighted beneath the platform to drive away mosquitoes. Wet season huts were built to several designs. A second framework similar to that of the sleeping platform was built above the sleeping platform and covered with long strips of bark. Dome-shaped houses with a framework of pliant saplings bent and lashed in the centre and roofed with melaleuca bark were also built. Bough shelters were used during the day in hot weather.

The economic life of the Munggan differed from that of the coastal groups previously studied in that it had a dual character. The economy showed a marked difference in food source orientation at different seasons. During the dry season the Munggan led a life which, in many respects, was similar to the nomadic life of inland groups, but during the wet season their activities differed little from those of the coastal groups discussed previously. However, the duality of their economy had little obvious effect on their material culture. If one excludes the outrigger canoe and harpoon which were doubtful components of the Munggan cultural kit, few of their array of weapons and utensils were used exclusively in their life on the coast. The canoe was valued for fishing but was also very necessary as a means of transport about the flooded coastal plains. Both nets and fish hooks were employed in inland areas, and the 'fish spear' a design normally associated exclusively with fishing was also used in hunting land animals. The economic activities of the Munggan underline how little specialised their material culture was and how it could be used successfully to exploit a considerable range of environments.

(III) POPULATION MOVEMENTS AND DENSITIES

The material available on these aspects suffers from all the shortcomings outlined in Chapter 2. The early observers did not remain in the one area long enough to become aware of the movements of the people or to gain any accurate estimate of their numbers. Even where groups were studied in greater depth by anthropologists, little interest was shown in such questions.

The Southeastern Coast of Australia

Contrary to the popularly accepted notion that people in coastal areas lived in relatively stable and sedentary groups, the available evidence suggests that the Aborigines at Port Jackson, at least, were highly mobile, probably within closely defined limits. Bradley (1786-92, pp.73-6) records that on 30th January 1788, 72 men, excluding women and children, were seen on the northern arm of Port Jackson. No natives were seen during the next two days. On 5th February small parties were seen in every part of the harbour. No one group appears to have been associated with a particular area. On 30th March in the same year a party of 30 people in 17 canoes arrived at a bay in the harbour and remained there until 2nd April, when they moved two coves up the harbour. The following day another party arrived and camped in the caves the former had left (Bradley 1786-92, pp.98-9). Arnold (1810) states that the normal 'hord' consisted of about 20 persons. Blackburn (1788) considered the family the most common unit, 40 being the greatest number seen together under normal conditions and groups of 300 very exceptional. Very large

groups were transient and probably related to the arrival of schools of fish, whale feasts and ceremonial activities. Tooth avulsion ceremonies were carried out in February and Hunter (1793, p.506) recorded the presence of over 100 at one ceremony. The largest number of huts seen together was, according to Tench (1789, p.106) just over twelve. As well as the short term changes described above, Hunter (1793, p.65) records that the number of natives seen around Sydney decreased during March and April, and since the numbers inland did not appear to increase, conjectured that they moved northwards. Phillip (H.R.N.S.W., I, ii, p.192) denies this but offers no alternative opinion. It is possible that during the lean periods the larger groups dispersed and family units spread themselves more thinly along the coast, giving the appearance of a depopulation in any one area.

Any estimate of population in the Sydney area must relate to the period before April 1789, because at this time small-pox began to appear among the natives and reached plague proportions by 1790. Contemporary observations suggest that it reduced the native population by at least half (Phillip H.R.N.S.W., I, ii, p.308; Hunter 1793, p.133; Collins 1798, p.598). The only concerted effort to assess the native population at Sydney was when Phillip ordered a census to be taken of all the natives and canoes visible on Port Jackson. It produced the following results: 67 canoes, 94 men, 34 women and 9 children (Bradley 1786-92, p.119). Phillip states that 133 people were seen and was surprised at the smallness of the total. He concluded that many people were away in the woods getting bark for canoes (Phillip H.R.N.S.W., I, ii, p.191). Phillip (1788) estimates that 1,500 Aborigines

lived on the coast around Botany Bay, Port Jackson and Broken Bay, including the intermediate coast. If this total is calculated against the area of land between the northern side of Botany Bay in the south and the southern side of Broken Bay as far west as Berowra Creek, this gives a density of five persons per square mile. When calculated against the length of shoreline involved, this total gives a figure of just over four people per mile of coast. No other estimates are available against which Phillip's figure could be checked. Arnold (1810) makes the vague statement that 200,000 acres was necessary to support 20 people, and this gives a population density of one person per 15.6 square miles, a figure well below the density in other coastal areas.

The Eastern Coast of Cape York

While Thomson gives in various papers a reasonably detailed account of the economic life of the Gan-ganda, he gives no indication of the size or number of family units comprising the group he was studying. Seasonal changes in its composition were evidently not great and only small parties left it to go inland for short periods. The major move to the exposed coast at the onset of the wet season was made by the group as a unit. In other areas the Aborigines may have left the coast for longer periods. Morril (1863, p.9) was stranded on Cape Cleveland for 14 days in April before being found by the natives, and Cook did not see any Aborigines for 25 consecutive days of his stay at Endeavour River during June, July and August (Cook, Beaglehole ed. 1955, pp.349-57). Natives were in the near vicinity of his camp during this period. As well as any

movement inland there were also visits of unknown duration to outlying islands where shell heaps and hut frames gave evidence of their occupation.

Very few direct population figures are available for this area. The size of groups most frequently seen ranged up to 30. Wilcox saw 150 people at Evan's Bay, but records that they did not stay long because of the shortage of food (Wilcox 1848-9, p.49). At the time when ceremonial dances were held on Flinder's Island, the camp at Apa consisted of 11 huts (Hale and Tindale 1933-4, p.123). Jardine (1866, p.83) assessed the population of the four northern-most tribes on Cape York (these appear to have been four sub-groups of the Djagaraga tribe) as being between 250 and 300 men. Even if the lower figure is accepted and calculated against the tribal area given by Tindale (1940) it gives the impossibly high figure of 12 people per square mile and 35 people per mile of coastline. Hale and Tindale (1933-4, p.79) reconstruct from genealogies the population of the Walmbaria tribe two generations ago and come to the conclusion that approximately 100 people lived on Flinders Island and Bathurst Head, and this gives a density of two per square mile.

The Western Coast of Cape York

The seasonal movements of the Munggan are better documented than those of the tribes in the preceding areas. During the wet season large permanent camps were established along the rivers and on the raised beaches. Movements were restricted by flooding. As the floodwaters receded groups began a more nomadic life. While vegetable

food and game were abundant larger groups continued to hunt together, but as the dry season progressed groups became progressively smaller. The basic hunting unit was the family plus one or more old relatives. At the height of the dry season a further concentration of population sometimes occurred when scarcity of water forced groups to range in close vicinity of available water. The area occupied by each clan was between 50 and 100 square miles, but at any one time the population could be augmented or depleted by visiting friends and relatives who were invited to gather periodically on such favourite hunting grounds as the panja swamps, the water-lily lagoons and the lower reaches of the rivers when fish were plentiful (McConnel 1930, p.181).

McConnel's estimates provide the only indications of the Munggan population. Before contact she postulates that the tribe numbered between 1,500 and 2,000 people and occupied an area of approximately 3,000 square miles (McConnel 1930, p.97). At a larger scale she estimates that the size of each clan was between 40 and 50 members and it occupied an area between 50 and 100 square miles (McConnel 1930, p.181). Both of these estimates suggest a density of around one person per two square miles.

As far as this scanty information warrants any conclusions, it would appear that the population density of the two groups living continually on the coast was greater than that of the Munggan who lived on the coast only at certain seasons of the year. Jardine's estimate of the Djagaraga population (Jardine 1866, p.83) is well in excess of the other two estimates and should be ignored. Phillip's estimate for Sydney (Phillip 1788) is not out of

the realm of possibility although Hale and Tindale's estimate of two persons per square mile for the Walmbaria on Bathurst Head and Flinders Island (Hale and Tindale 1933-4, p.79) is possibly more reliable since it relates to a smaller area. Being calculated from genealogies suggests there might be a tendency to understate population. Even the lower estimates for the Munggan are considerably in excess of the maximum population densities postulated by Birdsell (1953) for inland areas of high rainfall, which he alleges were most conducive to high population densities. The densities in coastal areas were higher than those in inland areas and if all Australia supported a population density equivalent to that of Flinders Island the figure would exceed 2,000,000 a far cry from Radcliffe Brown's (1930, p.696) estimate of 300,000 for the continent as a whole.

Discussion

While the economic life of the Aborigines in each of the areas studied showed considerable emphasis on the exploitation of the marine environment, the specialisation was not manifest to the same degree in each area, nor did it follow the same pattern. The Munggan hunted and collected marine foods only at certain times of the year, and for the remainder lived a nomadic life inland. This differed considerably from the situation on the eastern coast of Cape York and in the Sydney area where some groups at least spent the major part of the year on the coast and made only short visits to their hinterland. The reasons for these differences might have been due to environmental differences. Along the eastern coast the

coastal plains are often narrow and backed by mountain ranges which could limit the access of the coastal people to the inland areas. This contrasts with the situation on the western coast of Cape York where no ranges exist and access to the wide coastal plains is unrestricted. The area itself contains a large number of swamps and watercourses and is very rich in bird and animal life. This factor might also have been important in the development of the Munggan economy. Several objections can be raised against the initial hypothesis. In the Sydney area there appears to have been a tribe or tribes living between the coastal groups and the Blue Mountains and their way of life differed considerably from that of the coastal people (Collins 1793, p.586). This suggests that all the people living on the coastal plain at Sydney were not concerned in getting a livelihood from the sea and that the mountains did not separate the coastal from the inland people. It is possible that the estuaries on which the Munggan lived, provided less attractive hunting areas than the open coastline. This is supported by Hale and Tindale's statement that the Lama-lama tribes living on the mangrove-lined estuaries of the rivers flowing into the south of Princess Charlotte Bay were largely an inland dwelling tribe (Hale and Tindale 1933-4, p.69). When the economies are studied in greater detail appeal cannot be made exclusively to seasonal differences to explain the pattern of Munggan activities because the eastern coast of Cape York is subject to a similar climatic regime and the economies did not show the same definite seasonal pattern. Seasonal differences undoubtedly influenced both groups' activities, but it is questionable whether it caused them to develop in the way they did.

In each area the range of fishing methods employed does not appear to have differed greatly. The use of the harpoon and outrigger canoe was restricted to the northern part of Australia and it is doubtful whether nets were used in fishing at Sydney. Fish hooks appear to have been largely limited to coastal or near coastal areas, and the major differences in design relate to cultural importations rather than local developments. The composite hook of bone and wood may have been an introduction from New Guinea, and because of its ease of manufacture, was replacing the crescentic, shell hook (Massola 1956, p.15). The distribution of the latter extended from Cape York to Lake Tyers in Victoria, and apart from its use in some coastal rivers, was absent from inland areas. The techniques of netting, spearing and poisoning fish, and the construction of stone and brush fish traps and weirs were widely employed in inland areas and were not in any sense exclusively coastal activities. Nor were watercraft found only in coastal areas. No canoes were used on the coast between Murray River and Shark Bay in Western Australia (Davidson 1935, p.3) and bark canoes were widely employed on the Murray-Darling system. The outrigger canoes were cultural importations from the north. Davidson (1935, p.204) considers the variation in design of bark canoes to represent the historical development of the canoe within Australia, and thus it is unlikely that these variations now have any valid environmental significance. There is very little in the equipment assemblages of the coastal groups which might distinguish them from those of the surrounding areas. The fish hook appears to be the only widely distributed implement which may have been restricted primarily to

coastal areas. The most significant differences in the equipment of various coastal groups resulted from cultural borrowing rather than from invention prompted by environmental stimuli.

The importance of the substitution of coastal materials for those normally used in manufacture has often been quoted as another field in which environmental adaptations took place. Many instances do occur where shell and bone were employed where stone was used in other areas, but from the Aborigine's point of view these were not a substitute for materials unavailable in the local area, but as 'normal' materials used in implements whose manufacture was governed by well-grounded tradition. In addition to this trade in weapons and utensils lessened the importance of environmental differences.

However, these factors did not mean that the environment had no effect on the economy generally. Because some groups specialised in hunting particular types of game, differing emphases were placed on particular sectors of the equipment assemblage and this gave rise to a certain amount of distinctiveness in the economy. Because of the emphasis in the economy on the hunting of dugong and turtle the outrigger canoe and harpoon were far more important in the material culture of the Gan-ganda than they were to the tribes to the south where the hunting of dugong and turtle was evidently not so important. In the Sydney area conditions apparently favoured the use of the spear and the hook and line, which were the most frequently used equipment in fishing, while in other areas nets and fish weirs were also used. In each instance this specialisation had obvious effects on

the activities of the people without necessarily affecting their material culture.

The fact of living in a coastal area did not appear to give rise to a distinctive settlement pattern. The obvious differences between the more settled coastal people and the seasonally nomadic Munggan does not need further elaboration, but even within those groups living continually on the coast some differences were evident. The Gan-ganda lived in camps comprising several family units, and apart from short visits to the hinterland these remained in the one area, making only short moves in the interests of hygiene and slightly longer seasonal moves. This pattern was not evident in the Sydney area where the available information suggests that small groups were highly mobile, probably within a restricted area, even though they remained on the coast for most of the year.

TABLE 7 REFERENCES TO FISHING METHODS EMPLOYED ON THE SOUTHEASTERN COAST OF AUSTRALIA 5:i

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Spearing		Spears described include (1) 4 prongs pointed with bone	Fished from canoes	Individual	Cook(Beaglehole ed.)1955 p.305	Botany Bay	-
		(2) 2-4 prongs 1 ft. long, barbed with bone. Shaft 12 ft. long.	Fished from rocks or canoe. Fire used for light at night. Spear-thrower not used.	Individual	Bradley 1786-92 pp.126,129,141	Sydney	-
		(3) Single point, barbed with bone or shell. Barbs along shaft.					
		(4) 1-4 prongs. Shaft can be lengthened.	Lay across canoe.	Individual	Hunter 1793 p.62.	Sydney	-
		(5) 1-4 prongs, barbed with hook of bone. Shaft 12 ft. long, can be lengthened.	In summer lay across canoe.	Individual	Leigh 1821a p.966.	Sydney	-
		(6) 4 ironbark prongs. Shaft of gigantic lily, counter shaft of grass-tree.	Lay across canoe, also dived to procure fish.	Individual	Barrington 1802 p.16	Sydney	-
			Fish speared in shallow water by torch light.	Individual	Anon in Field 1823 p.467	Red Point, Lake Illawarra	-
			Speared fish in surf.	Individual	Dawson 1830 p.225	Port Stephens	-
	Sea mullet and others	Heavier spear used for larger fish.	Group waded out and threw spears in unison into large schools of sea mullet, swimming along shore.	Individual and group	Scott, N.D. pp.10-11	Port Stephens	-
Netting	Lobster	Small hoop net	Used in catching lobsters	-	Phillip HRNSW,I,ii p.132	Sydney	-
		Not described	Fish caught with nets.	-	Robinson (Mackaness ed.) 1941 p.324	Gippsland Lakes	-
Fish Weirs & Fish Traps		Fish weir	-	-	Grant 1803 p.154	Ash Island, Hunter River	-
		Fish weir made of branches inter-woven with mangrove bushes	-	-	Mann 1885 p.55	Not specified, probably Clyde R., Bateman's Bay.	-
		Not described	-	-	Robinson(Mackaness ed.) 1941 p.336	Twofold Bay	-
		Fish weir not described	Utilized tidal change.	-	Cary 1904 p.34	Barwon R. Victoria	-
	Eel	Hollow log traps	Put in freshwater lagoons to trap eels during April.	-	Collins 1798 p.558	Sydney (inland)	-
Line Fishing		Not described	Women constantly employed in fishing.	Individual	Phillip 1788 b p.19	Sydney	-
		Hooks of shell or birds'claws. Line Livistona fibre. Hook not barbed.	Women fished from canoes in open sea outside Heads.	Individual	Bradley 1786-92 p.133	Sydney	-
		Hooks of pearly shell, lines of	Women fished in sea below South Head. Hooks and lines not common.	Individual	Worgan 1788 pp.10,11,30.	Sydney	-

TABLE 7 (CONTINUATION)

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Line Fishing		Not described	Women spat chewed oysters, mussels or broiled fish into water as burley.	Individual	Collins 1798 p.557	Sydney	-
		Hooks of shell or birds' talons. Lines of beaten-bark.	Women fished from canoes	Individual	Hunter 1793 p.63	Sydney	-
		Not described	Women fished from canoes. Men did not use lines.	Individual	Harris 1791 p.6	Sydney	-
		Line of bark.	Women fished from canoes.	Individual	Leigh 1821a p.966	Sydney	-
		Hook not described					
		Hook of shell, line bark of Conguwa tree.	Women always used lines.	Individual	Leigh 1821b p.1010	Sydney	-
		Lines of inner bark of Kurrajong; prepared by women	-	-	Scott, N.D. p.10	Port Stephens	-
		Some hooks were fashioned from bone.	-	-	Scott (Bennett ed.)1929 p.18	Port Stephens	-
	Snapper etc.	Not described	Men fish from rocks in surf. Starfish (octapus), used for bait.	Individual	G[ovett] 1837 p.7	Sydney area	-
		Hook made from bone.	-	-	Robinson (Mackaness ed)1941 p.324	Gippsland Lakes	-
Fish Poisons	Eel & other fish	Bark of plant	Used in ponds	-	Robinson (Mackaness ed)1941 p.324	Twofold Bay	-
		Bark of plant		-	Hovell (Bland ed.) 1831 p.39	Western Port	-
Miscellaneous			Fish caught with hands by torchlight at night.	Individual	Anon in Field 1823 p.467	Red Point, Lake Illawarra	-
	Lobster		Women dive among rocks in surf for lobsters.	Individual	Scott (Bennett ed.) 1929 p.19	Port Stephens	-
	Crab		Women impale crabs on sharp sticks.	Individual	Mathews (Havard ed.) 1944 p.217	Broken Bay	-
	Shellfish		Collect shellfish from mud and sand banks in canoes.	-	Cook (Beaglehole ed.) 1955 p.305	Botany Bay	-
	Shellfish		Shellfish prized off rocks with shell blade on spear-thrower.	Individual	Bradley 1786-92 p.69	Sydney	-
	Shellfish		Men dive in surf for shell-fish.	Individual	Hunter 1793 p.63	Sydney	-
	Shellfish		Remain in one area until shellfish supply exhausted.	-	Blackburn 1791	Sydney	-
	Cunjevoy		Cunjevoy detached from rocks and roasted.	Individual	Leigh 1821b p.1010	Sydney	-
	Cunjevoy		Water squeezed from cunjevoy, opened with sharp stick, and inside removed	Individual	Mathews (Havard ed.) 1944 p.217	Broken Bay	-

TABLE 8 REFERENCES TO HUNTING METHODS EMPLOYED BY THE COASTAL ABORIGINES OF SOUTHEASTERN AUSTRALIA

Method	Game Hunted	Equipment Used	Technique Employed	Nature of Activity	Source	Area	Tribe
Spearing	Kangaroo, Wallaby	Spear 12-14 ft long - shaft of Yellow Gum Tree (Xanthorrhoea). Head 3 ft long and of hardwood, barbed with bone or shell. Thrown with spear-thrower (Harris 1791 p.5)	Drives for game in open country. Form circle at 20-30 paces apart, enclosing 1 to 2 miles. Grass fired and hunters closed in yelling and shouting. Enclosed animals speared.	Involved large groups.	Barralier 1802 p.86	Manangle (Menangle)	-
			Wallabies driven from rocky ridges onto flats where ambush waiting with spears and dogs.	Joint	Mathews (Harvard ed.) 1944 p.237	Mouth of MacDonald River.	-
			Hides of bark bent over stick frame-work built to conceal hunter. Open at both ends.	-	Bradley 1786-92 p.134 Hunter 1793 p.60	Sydney Sydney	- -
Traps and Pitfalls	Birds Small game	Tapered alleyway 40-50 ft long, constructed of brambles, rushes etc. with earth thrown up at sides. End closed with wicker grate.	Animals possibly driven in with fire. Common rat and quail seen in trap. Prey probably killed with spears. Birds, chiefly quail caught.	-	Collins 1798 p.557	Richmond Hill (Hawkesbury R.)	-
				-	Tench 1793 p.28	Hawkesbury R.	-
		Pits dug at sides of lagoons and covered with grass.	-	-	Collins 1798 p.558	prob. Hawkesbury R.	-
	Possum and flying squirrel		Hollows cut in trees and country fired. Sheltering animals collected from hollows.	-	Tench 1793 p.28	Sydney	-
Misc.	Possum		Cut from hollows in trees. Notches cut in trunk. Doughs used as ladders.	-	Phillip HRNSW, 1, ii p.135	Sydney	-
	Birds		Native lay in sun as if asleep, holding fish in hands. Attracts birds which were then caught with hands.	Individual	Barrington 1802 p.17 Leigh 1821b p.967	Sydney Sydney	-

Animals recorded as being eaten, but for which no hunting method was recorded: kangaroo rat, wombat, sugar squirrel and echidna, flying fox, snakes, lizards.

TABLE 9 REFERENCES TO PLANTS EATEN BY THE ABORIGINES ON THE SOUTHEASTERN COAST OF AUSTRALIA 5:iv

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Root stocks	[Typhonium eliosurum]	-	Like English Lords and Ladies	Wild Arum. Roasted. Poisonous when raw.	Arnold 1810	Sydney	-
		Wombie	Yam	Baked in ashes	Scott N.D. p.17	Port Stephens	-
	[Nymphaea sp.]	-	Waterlily	Roots roasted	Miller in Curr 1886 III p.353	Hunter River	-
	[Doryanthes excelsa]	minmoi	Gigantic Lily	Root eaten after preparation	Mann 1885 p.55	Clyde River	-
		-	Fern root	[Widely recorded in literature. Possibly Pteridium esculentum, or Blechnum spp.]	Phillip HRNSW, I,ii,p132	Sydney	-
			" "		Blackburn 1788	Sydney	-
			" "	Chewed when eating fish and spat out	Worgan 1788 p.11	Sydney	-
			" "	Eaten when food scarce. Recorded in May.	Bradley 1786-92 p.107	Sydney	-
			" "	Pounded to paste and mixed with crushed ants	Collins 1798 p.558	Sydney	-
			" "	-	Hunter 1793 p.65	Sydney	-
		Bungwall	" "	Roasted. Important when away from coast	Dawson 1830 p.310	Port Stephens	-
Fruits	Astrelama humifusa	-	Native Cranberry	-	Robinson, (Mackaness ed.) 1941 p.336	Twofold Bay	-
	[Billardiera scandens]	-	-	Fruit of vine shaped like pudding. Eaten raw when ripe. Roasted when green.	Scott (Bennett ed.) 1929 p.22	Port Stephens	-
	[Ficus spp.]	-	Wild Fig	-	Phillip HRNSW, I,ii.p.132	Sydney	-
			Fig	-	Worgan 1788 p.11	Sydney	-
			Wild Fig	Pounded into cake. Recorded in February	Bradley 1786-92 p.76	Sydney	-
	Mesembryanthemum equilaterale	-	-	-	Robinson (Mackaness ed.) 1941 p.336	Twofold Bay	-
	Solanum laciniatum	-	Kangaroo Apple	-	" " " "	" "	-
			Kangaroo Apple	-	Haydon 1846 p.85	Port Phillip	-
Seeds	[Macrozamia spp.]	-	-	Caused illness when eaten unprepared	Phillip HRNSW, I,ii,p.132	Sydney	-
		-	-	Nut prepared before being eaten	Worgan 1788 p.7	Sydney	-
			Zamia Palm	Collected in large quantities. Kernel bruised to pulp and soaked in water	Robinson (Mackaness ed.) 1941 p.335	Twofold Bay	-
				Kernel removed from shell, soaked for 7-8 days, then roasted	Hunter 1793 p.65	Sydney	-
			Zamia	Crushed and soaked in water	Mann 1885 p.55	Clyde River	-
Leaves, Stems and Flowers	Cyatheium billardieri	-	Tree Fern	Pulp at crown eaten raw or roasted	Haydon 1846 p.85	Port Phillip	-
	[Doryanthes excelsa]	-	Gigantic Lily	Flower stalk soaked in water then roasted	Scott N.D. p.17	Port Stephens	-
		Memy	Gigantic Lily	-	Dawson 1830 p.310	Port Stephens	-
	[Livistona australis]	-	Cabbage Palm	-	Robinson (Mackaness ed.) 1941 p.336	Twofold Bay	-
Nectar	[Banksia integrifolia]	-	-	Fruit (Flowers) dipped in water and sucked. Recorded in May.	Bradley 1786-92 p.110	Sydney	-
	[Banksia spp.]	-	Banksia	Several species sucked for nectar	Collins 1798 p.557	Sydney	-

TABLE 10 REFERENCES TO FISHING METHODS EMPLOYED ON THE EASTERN COAST OF CAPE YORK 5:v

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Spearing	Eel	Single-pronged spears. Not described.	Spear jabbed up and down by wading native in muddy water hole. Once fish located, it is captured by hand.	Individual, often in unison.	Roth 1901 p.24	Lower Tully River	-
	Barramundi: Black Bream		Large fish speared under water by swimming natives.	Individual	Roth 1901 p.24	Tully River	-
	Small sharks Mullet, Rock cod Groper, Lobster. etc.	Multi-pronged spears. (1) Not described, except generally as fish spears in later section. (2) 3-4 hardwood prongs 18-24" long, prongs usually, but not always barbed. Thrown with or without spear-thrower.	Used from outrigger canoe in Endeavour River estuary.	Probably more than one.	Cook, (Beaglehole ed.) 1955 p.357		
			Used from rocks, wading in shallow water or diving under water.	Individual	Hale, Tindale 1933-4 p.108	Princess Charlotte Bay	Several
	Turtle Dugong	Harpoons described: (1) Shaft of red or orange mangrove. Head 6 inches long, of black palm. Barb attached with resin and fibre lashing. (2) Shaft made of mangrove, 9-15 feet long, head located in socket. Head formerly of wood (Acacia rothii) 15" long, barbed with wood or bone. Rope up to 200 feet in length, 7/16" in diameter, made of hibiscus fibre.	Used in hunting dugong and turtle from bark canoes. Animals harpooned as they surface to breathe. Sucker fish sometimes used to locate turtle.	Several	Banfield 1908 pp.244-45	Dunk Island	
	Turtle and dugong		Used in hunting dugong and turtle from outrigger canoes. Dugong approached by stealth. Harpooner leaps overboard with harpoon to drive it through animal's hide. Once head embedded shaft is pulled free. Harpoon does not kill dugong, must be secured by rope. Turtle secured in same way.	Three to four men	Thomson 1934 b pp.242-258	Princess Charlotte Bay	Several
	Turtle		Where barbless heads used (usually iron) no great tension put on rope. Native slips overboard and secures turtle with rope. Native may dive and attempt to drive turtle to surface. Suckerfish also used.	Several	Roth 1901 p.24	Endeavour River and Cape Grafton	-
	Shark Trevally		Also used to harpoon large fish at day or night.	Several	Roth 1901 p.23	Mouth of Tully River	-

TABLE 10 (CONTINUATION)

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Netting	Snapper, Mullet etc. up to 3-4 lbs. caught.	Non-folding oval-framed nets. Net made of fibre of Acacia latifolia or Livistona australis. Frame several pieces of lawyer-cane lashed to form oval frame. Width about 2½ feet length 5 feet. Shallow bag-like nets on cane or sapling frame.	Held between two people and dragged through the water. Beaters may drive fish towards the net. Used in rivers. Used in sea, Two people wading waist-deep with net between them. Two or more nets used in conjunction with beaters.	Two or more Two or more	Roth 1901 p.22. Hale, Tindale 1933-4 p.111	Princess Charlotte Bay (hinterland) Princess Charlotte Bay	Je'landji Walmbaria Gan-ganda
		Folding framed nets Frame hinged so can shut like a purse. With larger nets each half of frame composed of two pieces of lawyer cane. Net of Sterculia or Malaisia fibre	Can be used by one person On lower Tully River held between two stakes in current, beaters drive fish towards nets. Brush wings sometimes constructed.	One or more	Roth 1901 p.22.	Princess Charlotte Bay Lower Tully River	Lama-lama Gulnggai
	Small fish probably fry.	Folding framed nets. Not described	Used by women to catch small fish which follow river bank up stream at flood time. Also used to catch shrimps and prawns.		Roth 1901 p.21. Roth 1901 p.17.	Lower Tully River	Gulnggai
Fish Weirs and Traps	Crayfish, eel "rock-cod"	Hollow log traps. 4-7 feet in length. Trap made of hollow log. One end stuffed with grass.	Thrown into waterhole. Later brought to surface at an angle with hand covering lower end. Placed in drying up lagoon. Natives make commotion in water and up-end log.	Individual, but several may work in unison. Several	Roth 1901 p.21. Winterbotham 1948 p.34.	Princess Charlotte Bay (hinterland)	
		Moveable brush fence made of grass and leafy branches.	Pushed across shallow water holes by line of women.	All women in the camp.	Roth 1901 p.23.	East coast as far south as Tully River at least.	
		Log fence built across stream, covered with switches. Two spaces left and nets placed across these. Fences up to 100 feet long As above, 25 feet long.	Used in catching fish returning to lower reaches of rivers. Used only in flood time. Used on tidal reaches of river. Fish pass over top on high tide. Trapped behind as tide falls.		Roth 1901 p.23. Hale, Tindale 1933-4 p.110	Princess Charlotte Bay (hinterland) Bathurst Head	 Walmbaria

TABLE 10 (CONTINUATION)

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Fish Weirs and Traps		Stone dams with openings built across rivers. Baskets or nets placed across openings.	Used in rivers as floods subside.		Roth 1901 p.23.	Russell, Barron, Mulgrave Rivers	-
		Semi-circular wall extending seawards for 100 yds. Several bays formed in outer wall, connected to main enclosure by narrow openings. Does not reach beach at high tide.	Operation depends on habit of fish moving along beach at high tide. Moved out as tide drops, and became trapped in enclosure.		Stevens 1945 p.1.	Hinchingbrook Island	-
Line Fishing	Eel	Bobbing. No hooks used. Worms impaled on split lawyer cane and several attached to line. Worms may be tied to line in bunch without impaling on cane first.	Dangled in water until fish takes good bite, fish jerked out of water.	Individual	Roth 1901 p.20.	Lower Tully River	-
	Fry	Line of twisted spider web dipped in juice of spiders abdomen.	Used by men and children in bobbing for small fry.	Individual	Roth 1901 p.20.	Lower Tully River	Gulnggai
		Crescent-shaped hooks of pearl-shell.	No weights or sinkers used. Bait, small crabs tied to hook.	Individual	Roth 1901 p.26.	Cape Grafton, Lower Tully River.	Several
					Banks (Beaglehole ed.) 1962, II, p.130.	Endeavour River	-
					Banfield 1908 pp.266-67.	Dunk Island	-
		Barbless tortoise-shell hooks.		Individual	Jardine 1866 p.82.	Somerset	Several
		Tortoise-shell hook.		Individual	Roth 1901 p.21.	Herbert River	-
		Tapering pencil of hard wood with bone barb lashed to it.		Individual	Roth 1901 p.21.	Princess Charlotte Bay and hinterland.	-
		"Bent-pin" hook of freshwater mussel-shell.		Individual	Massola 1956 p.15.	Cape Grafton	-

TABLE 10 (CONTINUATION)

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Fish Poisons		Barringtonia racemosa.	Bark hammered between stones and placed in water, where it is rubbed with hands.		Roth 1901 p.19.	Cooktown, Bloomfield River	-
		Derris scandens	Leaves bruised and dipped in water. Effect only temporary.		Banfield p.270.	Dunk Island	
		Derris uliginosa	Stems hammered and roasted, put in water.		Roth 1901 p.19.	Cooktown, Tully River	Several
		Diospyros hebecarpa	Fruit warmed and crushed in water.		Roth 1901 p.19.	Widespread	Several
		Eucalyptus sp.	Leafy boughs thrown into pool for several days. Used only at end of dry season.		Winterbotham 1948 p.34	-	-
		Faradaya splendida	Used in small, drying up water holes.		Roth 1901 p.19.	Lower Tully River	Gulnggai
			Used in saltwater. Inner bark scraped off with shell, powdered bark rubbed on hot stones which are then placed in pools left by receding tide.		Banfield 1908 p.270.	Dunk Island	-
		Galactia varians	Bark used.		Roth 1901 p.19.	Musgrave River	Rarmul
		Melia composita	Bark leaves crushed and immersed.		Roth 1901 p.19.	Mouth, Tully River	
		Pongamia glabra	Roots roasted pounded and immersed.		Roth 1901 p.19.	Widespread	Several
		Wimar (native name)	Leaves broken up with hands. Placed in small pools.		Roth 1901 p.20.	Mouth, Tully River	
		Kurgan(native name)	Berries crushed and placed in dilly-bag which is immersed.		Roth 1901 p.20.	Lower Tully River	Gulnggai
Miscellaneous	Turtle	Use of sucker fish attached to line in turtle hunting	Sucker fish caught, line tied to its tail then released near vicinity of turtle. Fish attaches itself to turtle which is then hauled to canoe.	Group	Jardine 1866 p.80.	Somerset	Several
	Turtle		As above except that turtle only hauled within spearing distance. Used "long time ago".	Group	Hale, Tindale 1933-4 p.180.	Bathurst Head	-
	Turtle Dugong	As above.	Sucker fish acts only as guide telling direction and distance of prey.	Group	Roth 1901 p.20.	Coast at Tully River	Gulnggai
	Turtle	Line made of Ficus fasciculata bark, loops made in line to indicate	Hole sometimes bored above backbone of fish to prevent string cutting through tail. Fish only gives information of whereabouts of turtle. Sucker fish comparatively rare		Banfield 1908 pp.240-3	Dunk Island	-

TABLE 10 (CONTINUATION)

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Miscellaneous	Turtle	Turtle hunting where no specialised equipment was used.	Native swims under turtle overturns it and dislocates a fore-flipper. Line then secured to turtle. Method used in breeding season. Turtles sometimes captured by swimming during breeding season. Canoe approaches turtle, native jumps out and secures it with rope. Hawkesbill turtle taken only when depositing eggs because of sharp edge to carapace.	Individual with some assistance.	Jardine 1866 p.79.	Somerset	Several
	Turtle				Thomson 1934 b p.246.	Princess Charlotte Bay	Several
	Turtle				MacGillivray 1852 II p.22.	Evans Bay	Several

Molluscs and crustacea usually collected from rocks and mudflats by women, sometimes by men.

TABLE 11

REFERENCES TO HUNTING METHODS EMPLOYED ON THE EASTERN COAST OF CAPE YORK

Method	Game Hunted	Equipment Used	Technique Employed	Number Employed	Source	Area	Tribe
Spearing	Wallaby, kangaroo, cassowary, pelican, duck, geese, scrub-turkey, goanna, crocodile.	Hunting spear has hardwood head with bone barbs lashed to it. No spears described by Roth.	Stalked and speared. Agile wallaby most commonly hunted.	Individual	Hale, Tindale 1933-34 pp.107-108	Princess Charlotte Bay	Several
			Unwanted spear smeared with sweat thrown past game. Animal moves away from scent towards hunters.	Individual	Roth 1901 pp.26-29	Princess Charlotte Bay	-
			Pelicans stalked at night.	Individual	Roth 1901 p.26	East coast	-
	Wallaby		Drives with fire used.	Large parties involved.	Lumholtz 1890 p.92	Herbert River	-
	Crocodile		Crocodiles cornered, eyes put out with spears.	Joint activity	Hale, Tindale 1933-34 p.109	Stewart River	Gan-ganda
Nets	Wallaby, Kangaroo	Net 15-20 ft long. Mesh 4 ins. Not described	Wallabies chased into nets. Women and children employed as beaters.	Joint Joint	Lumholtz 1890 p.94 Roth 1901 p.29	Herbert River Lower Tully River	- -
	Swamp-Pheasant	Folding purse net	Net dropped over grass clump containing nesting bird. Used at night.	Individual	Roth 1901 p.27	Lower Tully River	-
Brush Fences	Crocodile	Brush fence	Built across tidal river. Space left in middle. Slatted screen used to block gap after crocodile has gone upstream with the rising tide. Animal trapped behind screen when tide falls and speared.	-	Roth 1901 pp.24-25	-	-
Traps	Scrub-turkey scrub-hen	Trap a cage constructed of hoops of lawyer-cane with wings of brush and lawyer-cane hoops.	Nuts and fruits scattered round trap to entice birds. Native may hide and call scrub-turkey.	-	Roth 1901 p.27	Tully River	-
Pitfalls	Wallaby	Pit 6-8 ft wide, 2½ ft deep. Covered with cross-sticks, grass and soil.	Intended to break animal's leg, then dispatched with sticks or spears.		Roth 1901 p.29	Cairns, Cape Grafton	-
Snares	Crocodile	Slip-noose of lawyer-cane.	Crocodile cornered or driven into deep pole where noose slipped over head and hauled ashore. Clubbed to death.	Joint activity. Nine or ten involved.	Roth 1901 p.24 Banfield 1908 p.277	Cape Bedford Lower Tully River	- -
Throwing Sticks	Torres Strait Pigeon	Piece of stick.	Thrown into midst of flock of birds.	Individual	Roth 1901 p.27	Lower Tully River	-
Switches	Torres Strait Pigeon, flying fox.	Long thin switch up to 15 ft long.	Native concealed himself in tree beside birds' accustomed path. Flailed them with switch as they flew past. Similar method used for flying foxes.	Individual	Roth 1901 pp.28, 29	Lower Tully River	-
"Bird Lime"	Small birds	Sap of Ficus sp.	Smeared on branches, trapped birds as they landed.	-	Roth 1901 p.28	Lower Tully River	-
Asphyxiation	Torres Strait Pigeon	Fires	Set under trees during day. Lit at night after birds roost. Birds suffocated in smoke.	-	Roth 1901 p.28	Hinchingbrook Is.	-
Misc.	Bandicoot, goanna, carpet-snake	Digging sticks	Dug out of burrows.	-	Roth 1901 pp.24, 25, 29	Lower Tully River Princess Charlotte Bay	- -

TABLE 12 REFERENCES TO PLANTS EATEN BY THE ABORIGINES ON THE EASTERN COAST OF CAPE YORK

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Rootstocks	Acacia crassicarpa	several	-	Roots roasted	Roth 1901 p.9	widespread	several
	Acrostichum aureum	dai-ingal	-	-	Roth 1901 p.9	Cape Grafton	Gonggandji
	Amorphophallus galbra	bandilin	-	Root baked	Roth 1901 p.9	Cooktown Cape Bedford	Jimidir
	Aponogeton monostachyus	several	-	Roots eaten raw or baked	Roth 1901 p.9	several	several
	Aspidium unitum	ngar-pul	-	Roasted and pounded alternately	Roth 1901 p.9	Cooktown	Jimidir
	Atylosia reticulata	korlbun	-	Roots roasted and pounded	Roth 1901 p.9	Cooktown	Jimidir
	Blechnum orientale	baral	-	Roasted and pounded alternately	Roth 1901 p.10	Cape Bedford	Jimidir
	Bowenia spectabilis	several	-	-	Roth 1901 p.10	several	several
	Colocasia antiquorum	several	Taro	Rootstock baked	Roth 1901 p.11	several	several
	Colocasia macrorrhiza	several	-	Rootstock roasted and pounded	Roth 1901 p.11	several	several
	Colocasia sp.	-	Taara	Rootstock eaten	Cook (Beaglehole ed.) 1955, p.395	Endeavour River	-
	Curculigo ensifolia	several	-	Rhizome roasted	Roth 1901, p.11	several	several
	Curcuma australasica	several	Wild Ginger	Tuberous rootstock roasted or boiled in Melo shell	Roth 1901 p.11	several	several
	Dioscoria bulbifera	-	-	Recorded October	Wilcox 1848-9 p.53	Evans Bay	-
	Dioscoria sativa	-	-	Utilized during wet season. Tops replanted	Hale, Tindale 1933 p.113	Princess Charlotte Bay	several
		several	-	Baked then roasted	Roth 1901 p.11	several	several
	Dioscoria sativa var rotunda	tjarri	-	Cooked and washed	Thomson 1933 p.507	Princess Charlotte Bay	Kawadji Group
		several	-	Main article of food Feb-May. Baked, mashed, strained through dilly-bay. Mash washed in several rinses of water. Strained in sand collander. Eaten February-May	Roth 1901 pp.11-2	several	several
	Dolichos biflorus	several	-	Roasted	Roth 1901 p.12	several	several
	Eriosema chinense	several	-	Rootstock skinned and roasted	Roth 1901 p.12	several	several
	Hardenbergia retusa	several	-	Yam roasted, skinned, pounded, mixed with water	Roth 1901 p.13	several	several
	Heleocharis sphacelata	several	-	Tubers eaten raw or roasted then baked	Roth 1901 p.13	several	several
	Hibiscus rhodopelatus	dai-ru	-	Roots roasted and pounded	Roth 1901 p.13	Princess Charlotte Bay	Rarmul
	Hibiscus sp.	several	-	Roots pounded and eaten raw	Roth 1901 p.13	several	several
	Ipomoea augustifolia	several	-	Rhizome baked then roasted	Roth 1901 p.13	several	several
	Ipomoea eriocarpa	kand-ja	-	Rhizome roasted	Roth 1901 p.13	Cooktown	Jimidir
	Ipomoea pes caprae	several	-	Rhizome baked and pounded	Roth 1901 p.13	Cape Bedford, Cooktown	Jimidir
	Lepironia mucronata	chakata	-	Tubers eaten	Roth 1901 p.13	Cape Grafton	Gonggandji
	Microstemma tuberosum	several	-	Tubers eaten raw or roasted	Roth 1901 p.14	several	several
	Nymphea coerulea	several	-	Rhizome roasted	Roth 1901 p.14	several	several
	Nymphea gigantea	several	-	Rhizome roasted	Roth 1901 p.14	several	several
	Psordlea badocana	several	-	Roots scraped and roasted	Roth 1901 p.13	several	several
	Scirpus littoralis	kalpara	-	Roots roasted and pounded	Roth 1901 p.15	Cooktown	Jimidir
	Tacca pinnatifida	several	-	Tubers pounded, soaked. Sediment cooked in ashes	Roth 1901 p.16	several	several

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Rootstocks	Typhonium brownii	several	-	Tubers roasted and pounded alternately	Roth 1901 p.16	several	several
	Vigna lutea	several	-	Roots roasted	Roth 1901 p.16	several	several
	Vitis clematidea	morbor	-	Rootstock roasted and pounded	Roth 1901 p.16	Cape Bedford	Jimidir
	Vitis opaca	pinnaka	-	Rootstock roasted	Roth 1901 p.16	Cape Bedford	Jimidir
	Vitis trifolia	several	-	Rootstock roasted in antbed oven and skinned	Roth 1901 p.16	several	several
Fruits	Amomum dallachyi	several	-	-	Roth 1901 p.9	several	several
	Amorphophallus galbra	bandilin	-	Roasted	Roth 1901 p.9	Cooktown, Cape Bedford	Jimidir
	Antidesma brunius	several	Bloomfield cherry	Squashed and eaten raw	Roth 1901 p.9	several	several
	Antidesma dallachyanum	ji-jor	-	-	Roth 1901 p.9	Cape Grafton	Gonggandji
	Barringtonia careya	barkaba	-	-	Morrill 1863 p.19	Cape Cleveland	-
	Barringtonia racemosa	several	-	-	Roth 1901 p.10	several	several
	Buchanania muelleri	several	-	-	Roth 1901 p.10	several	several
	Calamus australis	several	Large Lawyer-cane	Berries squashed and mixed with water	Roth 1901 p.10	several	several
	Capparis canescens	kurpori	-	-	Roth 1901 p.10	Cape Grafton	Gonggandji
	Capparis humistrata	ko-par	-	-	Roth 1901 p.10	Cape Grafton	Gonggandji
	Capparis mitchellii	kalm-ba	-	-	Roth 1901 p.10	Cooktown	Jimidir
	Capparis nobilis	kalm-ba	-	-	Roth 1901 p.10	Cooktown	Jimidir
	Carallia integerrina	several	-	-	Roth 1901 p.10	several	several
	Careya australis	several	-	-	Roth 1901 p.10	several	several
	Chilocarpus australis	pai-amara	-	-	Roth 1901 p.10	Lower Tully River	Gulnggai
	Davidsonia pruriens	oria	-	-	Roth 1901 p.11	Lower Tully River	Gulnggai
	Eloecarpus grandis	several	Quandong	Squashed, mixed with water to form paste	Roth 1901 p.12	several	several
	Elettaria scottiana	several	Wild ginger	-	Roth 1901 p.12	several	several
	Enhalus koenigii	wa-pan	-	Roasted and eaten. Salt water plant	Roth 1901 p.12	Cape Bedford	Jimidir
	Eugenia cormiflora	several	-	-	Roth 1901 p.13	several	several
	E. hislopii	several	-	-	Roth 1901 p.13	several	several
	E. leptantha	kai-go	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	E. suborbicularis	several	-	Raw or baked in ashes	Roth 1901 p.13	several	several
	Eugenia sp.	-	-	Recorded October	Wilcox 1848-9 p.53	Evans Bay	-
	Eupomatia laurina	several	-	-	Roth 1901 p.13	several	several
	Exocarpus cupressiformis	bonuboi	-	-	Roth 1901 p.13	Cooktown, Cape Bedford	Jimidir
	Fenzlia obtusa	several	-	-	Roth 1901 p.13	several	several
	Ficus colossea	bannabúlka	-	-	Roth 1901 p.13	Cooktown	Jimidir
	F. ehretioides	magura	-	-	Roth 1901 p.13	Lower Tully River	Gulnggai
	F. esmeralda	pandara	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	F. eugenioides	ku-loi	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	F. fasciculata	several	-	-	Roth 1901 p.13	several	several
	F. hispida	chalkan	-	-	Roth 1901 p.13	Lower Tully River	Gulnggai

TABLE 12 (CONTINUATION) REFERENCES TO PLANTS EATEN BY THE ABORIGINES ON THE EASTERN COAST OF CAPE YORK

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Fruits	F. opposita	several	-	-	Roth 1901 p.13	several	several
	F. pilosa	burrowa	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	F. platypoda	several	-	-	Roth 1901 p.13	several	several
	F. retusa	tunduli	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	F. stenocarpa	ke-ril	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	F. thynneana	dorndorli	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	Fluggea obovata	several	-	Fruit squashed	Roth 1901 p.13	several	several
	Ganophyllum-falcatum	wurraba	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	Ixora timorensis	karantal	-	-	Roth 1901 p.13	Cape Grafton	Gonggandji
	Lucuma galactoxylon	murdarka	-	Fruit picked green and buried for a few days	Roth 1901 p.14	Cape Grafton	Gonggandji
	Lucuma sericea	mornggo	-	-	Roth 1901 p.14	Cape Bedford, Cooktown	Jimidir
	Melastoma malabathricum	di-eni	-	-	Roth 1901 p.14	Cape Bedford	Jimidir
	Mimusops browniana		-	Fruit eaten when red - also buried until turns black	Roth 1901 p.14	several	several
	Mimuspos kanki	-	-	Recorded October	Wilcox 1848-9 p.53	Evans Bay	-
	Mimusops parvifolia	wái-imbal	-	-	Roth 1901 p.14	Cape Grafton	Gonggandji
	Morinda citrifolia	several	-	-	Roth 1901 p.14	several	several
	Musa sp.	jattermo	Scrub banana	-	Roth 1901 p.14	Bloomfield River	Je'landji
	Musa sp.	kulnju	Forest banana	-	Roth 1901 p.14	Bloomfield River	Je'landji
	Musa sp.	-	banana	Large tracks amongst banana groves. Ripe in February	Scott 1865 p.195	Rockingham Bay	-
	Myrsine crassifolia	márada	-	-	Roth 1901 p.14	Cape Grafton	Gonggandji
	Pandanus sp.	several	-	Fruits sucked. Roasted first if not ripe.	Roth 1901 p.14	several	several
	Parinarium nonda	several	-	-	Roth 1901 p.14	several	several
	Passiflora foetida	bata	-	-	Roth 1901 p.14	Lower Tully River	Gulnggai
	Persoonia falcata	several	-	-	Roth 1901 p.15	several	several
	Plectronia barbata	several	-	-	Roth 1901 p.15	several	several
	Plectronia odorata	ngamal	-	-	Roth 1901 p.15	Cooktown	Jimidir
	Pleiogynium solandri	several	Burdekin plum	-	Roth 1901 p.15	several	several
	Podocarpus elata	dalgal	-	-	Roth 1901 p.15	Cape Grafton	Gonggandji
	Pothos loureiri	koi-yo	-	Fruit roasted	Roth 1901 p.15	Lower Tully River	Gulnggai
	Randia filzalani	several	-	Eaten raw when ripe. Baked when green	Roth 1901 p.15	several	several
	Rhodomyrtus macrocarpa	several	-	Eaten raw or baked in ashes	Roth 1901 p.15	several	several
	Sarcocephalus cordatus	several	Leichhardt tree	-	Roth 1901 p.15	several	several
	Schmidelia serrata	several	-	-	Roth 1901 p.15	several	several
	Semecarpus australiensis	several	-	Fruit gathered from ground and roasted	Roth 1901 p.15	several	several
	Sideroxylon brownlessianum	wanakan	-	-	Roth 1901 p.15	Bloomfield River	Je'landji
	Siphonodon pendulum	several	-	-	Roth 1901 p.15	several	several
	Sterculia caudata	several	-	Fruit roasted	Roth 1901 p.15	several	several
	Terminalia sericocarpa	several	-	-	Roth 1901 p.16	several	several

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Fruits	Vitex glabrata	several	-	-	Roth 1901 p.16	several	several
	Vitis acetosa	several	-	-	Roth 1901 p.16	several	several
	Walrothia	-	-	Important food at time. Recorded in October	Wilcox 1848-9 p.53	Evans Bay	-
		-	-	Recorded in October	MacGillivray 1852 I p.127	Evans Bay	-
	Ximenia americana	gotoba	-	-	Roth 1901 p.16	Cape Grafton	Gonggandji
Seeds	Acacia holosericea	warun	-		Roth 1901 p.9	Cooktown, Cape Bedford	Jimidir
	Aleurites moluccana	several	Candle nut	Roasted on slow fire until not cracks	Roth 1901 p.9	several	several
	Avicennia officinalis	several		Seed baked, washin in running water. Remainder squeezed dry and eaten	Roth 1901 p.9	several	several
	Bruguiera rheedii	several	Mangrove	Elongating radicles baked, pounded mash washed and strained in sand collander	Roth 1901 p.10	several	several
	Bruguiera gymnorrhiza	mau-ai	-	Radicle baked, skinned and soaked overnight.	Roth 1901 p.10	Lower Tully River	Gulnggai
	Candelia	-	Mangrove	Vegetating seed sprouts prepared by process between baking and steaming	Wilcox 1848-9 p.53.	Evans Bay	-
		-	Mangrove	Prepared by process between baking and steaming	MacGillivray 1852 I p.127	Evans Bay	-
	Castanospermum australe	several	Moreton Bay Chestnut	Nearly always available. Seed baked, pounded, sifted, washed in running water. Not relished because of long preparation.	Roth 1901 p.10	several	several
			Moreton Bay Chestnut	Beans roasted, shredded and placed in running water for several days.	Banfield 1908 p.260	Dunk Island	-
	Cryptocarya bancrofti	bara	-	Nuts roasted, pounded and washed in running water	Roth 1901 p.11	Lower Tully River	Gulnggai
	Cryptocarya palmerstoni	budjabai	-	as above	Roth 1901 p.11	Bloomfield River	Je'landji
	Cycas media	several	-	Kernels roasted, cracked, stored for some days, pounded, sifted, placed in grass dilly-bags in running water overnight. Steamed shredded and washed in running water.	Roth 1901 p.11	several	several
		-	-	Suspected some preparation carried out.	Banks (Beaglehole ed.) 1962, II p.128	Endeavour River	-
		tabola	-	Roasted and pounded	Lumholtz 1890 p.217	Herbert River	-
	Entada scandens	several	Matchbox bean	Nearly always available. Seed baked, crushed, washed in running water. Eaten when other food not available.	Roth 1901 p.12	several	several
		pi'alä	Matchbox bean	Cooked and washed	Thomson 1933 p.507	Princess Charlotte Bay	Kawadji Group
			Mangroves	2 species eaten. Seeds roasted, crushed, washed in salt water. Sediment collected, rinsed several times more. Eaten with enjoyment when other food scarce.	Hale, Tindale 1933-4 pp.114-5	Princess Charlotte Bay	-
			Mangroves	3 species eaten - cotyledons or hypocotyl.	Thomson 1956 p.36	Princess Charlotte Bay	Kawadji Group
	Nelubium speciosum	-	-	Seeds broken and eaten raw	Roth 1901 p.14	Cooktown	-
	Nymphea coerulea	several	-	Seeds baked in pod - eaten when soft, or pounded and rinsed alternately	Roth 1901 p.14	several	several
	Nymphea gigantea	several	-	as above	Roth 1901 p.14	several	several

TABLE 12 (CONTINUATION) REFERENCES TO PLANTS EATEN BY THE ABORIGINES ON THE EASTERN COAST OF CAPE YORK

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Seeds	Oryza sativa		Wild rice	Seed stalks collected, kept under water, dried, winnowed, ground and cooked as damper.	Roth 1901 p.14	several	several
	Pandanus sp.	several	Screw palm	Shell broken and seeds eaten	Roth 1901 p.14	several	several
		-	-	-	Banks (Beaglehole ed.) II p.127	Endeavour River	-
				Fruit charred and nut extracted. Eaten in lean periods.	Hale, Tindale 1933 p.113	Princess Charlotte Bay	-
	Pygeum turnerianum	junda	-	Kernel, shell and husk pounded, sifted, made into dough. Wrapped in wild ginger leaves and baked. Eaten January-March	Roth 1901 p.15	Bloomfield River	Je'landji
	Sterculia quadrifida	several	-	Seeds eaten raw	Roth 1901 p.15	several	several
	Terminalia catappa	tommin	-	Shell broken, kernel eaten raw	Roth 1901 p.15	Cooktown, Cape Bedford	Jimidir
Leaves, stems and flowers	Amorphophallus galbra	bandilin	-	Stems baked	Roth 1901 p.9	Cooktown, Cape Bedford	Jimidir
	Archontophoenix alexandrae	ko'-pangara	-	Base of growing shoot eaten raw or roasted	Roth 1901 p.9	Lower Tully River	Gulnggai
	Calamus caryotoides	several	Small lawyer-cane	Young shoots eaten	Roth 1901 p.10	several	several
	Calamus moti	bai-kai	-	Young shoots eaten raw	Roth 1901 p.10	Lower Tully River	Gulnggai
	Ficus hispida	chalkan	-	Leaves eaten raw	Roth 1901 p.13	Lower Tully River	Gulnggai
	Gahnia psittacorum	yerer	-	Leaf buds eaten	Roth 1901 p.13	Cape Bedford	Jimidir
	Licuala muellori	chakoro	-	Base of growing shoot eaten	Roth 1901 p.13	Lower Tully River	Gulnggai
	Livistona australis	several	Cabbage-tree Palm	Growing stem eaten	Roth 1901 p.14	several	several
	Nymphea gigantea	several	-	Seed stalk eaten raw or roasted	Roth 1901 p.14	several	several
	Xanthorrhoea arborea	several	Grass-tree	Base of young leaves eaten	Roth 1901 p.16	several	several
Nectar	Banksia dentata	kabir	-	Flowers immersed in water to make drink	Roth 1901 p.9	Cape Bedford	Jimidir
	Melaleuca sp.	several	-	Blossoms sucked for honey	Roth 1901 p.14	several	several
Water-producing plants	Melalenea sp	several	-	Water obtained from bulges in trunk during dry season	Roth 1901 p.14	several	several

TABLE 13

REFERENCES TO FISHING METHODS EMPLOYED ON THE WESTERN COAST OF CAPE YORK

Method	Type of Fish	Equipment Employed	Fishing Technique Employed	Nature of Activity	Source	Area	Tribe
Spearing	Crocodile, rock cod, salmon, white fish, king fish, barramundi, schnapper, night-fish, stingray, bone fish	Spears.(1) Bamboo shaft with 4 acacia prongs. Barbed with bone bipoint. Butt of cane. (2) Bamboo shaft with 1 hardwood prong. Barbed with bone bi-point. (3) Head and shaft one piece of acacia wood. Softwood butt	Speared from canoes Night fish speared from canoe at night by light of tea tree torches Spearing fish important in dry season	Individual Individual	McConnel 1930 p.101 McConnel 1953 p.26 Thomson 1939 p.212	Archer River Archer River Archer River	Munggan Munggan Munggan
	Dugong, turtle	Harpoon consisting of shaft, dart and fibre line	Used in hunting at sea from outrigger canoes	Joint activity	McConnel 1930 p.103	Sea at Archer R. mouth	-
	Dugong, turtle		Used in hunting at sea from bark canoes	Joint activity	Thomson 1939 p.212	Albatross Bay	-
Netting	-	Made of acacia fibre on frame	Small nets used by women	Larger nets operated by two people	McConnel 1930 p.102	Archer River	Munggan
	-	Not described	Used in wet and early dry season, also in sheets of water left on plain at end of wet season		McConnel 1953 p.30 Thomson 1939 p.214	Archer River Archer River	Munggan Munggan
	-	Net with non-folding oval frame	Raised out of water when fish trapped	Can be operated by one man	Roth 1901 p.22	Pennefather, Batavia River	-
	-	Net with folding oval frame	Net shut like purse when fish caught	Can be operated by one man	Roth 1901 p.22	Generally over Peninsula	-
Fish Weirs and Traps	-	Fish weir	Built at end of dry season	-	McConnel 1930 p.102	Archer River	Munggan
	-		Built at end of wet season on streams carrying receding flood waters	-	Thomson 1939 p.214	Archer River	Munggan
	-	Brush fence	Built in tidal waters	-	Roth 1901 p.23	Mapoon	-
Line Fishing	Bream, catfish, sardine fish	Not described	Fish caught on upper reaches of river during winter months	Individual	McConnel 1930 p.101	Archer River	Munggan
	-	'Bent pin' tortoiseshell hook	-		Roth 1901 p.21	Pennefather, Batavia River	-
		Pencil of wood with bone point lashed and cemented to it	-		Thomson 1939 fig. 1	Archer River	Munggan
Fish Poisons	-	Not named	Used in small swamps and waterholes	-	McConnel 1930 p.101	Archer River	Munggan
	-	Not named	Used at height of dry season	-	Thomson 1939 p.214	Archer River	Munggan
	-	Carreya australis Tephrosia rosea	Leaves used as poison Roots hammered, moistened, put in water. Used in freshwater lagoons	-	Roth 1901 p.19 Roth, 1901 p.20	Coast, Staaten, Nassau R. Pennefather River	- Nggerigudi
	-	Ne-ro (native name)	Roots hammered, tied in bundles, hammered under water, then green ants' nests added. Used in salt or brackish water		Roth 1901 p.20	Pennefather River	Nggerigudi

Molluscs, crustaceans and tortoises collected by women.

TABLE 14 REFERENCES TO HUNTING METHODS USED ON THE WESTERN COAST OF CAPE YORK 5:xvii

Method	Game Hunted	Equipment Used	Techniques Employed	Nature of Activity	Source	Area	Tribe
Spearing	Emu, kangaroo, wallaby, jabiru, other large birds, goanna.	Most commonly described spear-types: (1) Bamboo shaft with 4 acacia points. Barbed with bone bipoint. (2) Acacia-wood shaft with 4 hardwood barbed points. (3) Long Bamboo shaft with a one-pronged hardwood head. Terminal barb of bone. (4) Shaft of lancewood with single barb of kangaroo bone.	Stalked with spears. Hunter smeared with ochre to disguise himself as anthill.	Individual	Roth 1901 p.29	Pennefather R.	-
			Hide of branches held before hunter.	Individual	Roth 1901 p.26	Pennefather R.	-
			Kangaroos stalked under cover of high winds during wet season.	Individual	Thomson 1939 p.214	Archer R.	Munggan
	Kangaroo, wallaby		Encircle game	Joint	Roth 1901 p.29	Pennefather R.	-
			Game driven towards ambush	Joint	Roth 1901 p.29	Pennefather R.	-
			Game driven towards ambush	Joint	Thomson 1939 p.217	Archer R.	Munggan
	Kangaroo, wallaby		Fires used to assist drives for game.	Joint	Roth 1901 p.29	Pennefather R.	-
			Fires used when grass dried off at end of wet season.	Joint	McConnel 1930 p.101	Archer R.	Munggan
			Men stood before flames and speared game.		McConnel 1953 p.26		
			Fires most important during dry season.	Joint	Thomson 1939 p.214	Archer R.	Munggan
Switches	Geese	Long thin switch	Birds knocked down on the wing during day and by moonlight.	Individual	Roth 1901 p.27	Pennefather R.	-
Misc.	Bushrat, bandicoot, lizards, snakes	Digging stick	Dug out by women following in wake of fire.	Individual	McConnel 1953 p.6	Archer R.	Munggan
			Bush rats dug out during wet season when ground soft.	Individual	McConnel 1930 p.103	Archer R.	Munggan

Animals recorded as being eaten, but for which no hunting method was recorded: Flying fox, native cat.

TABLE 15

REFERENCES TO PLANTS EATEN BY THE ABORIGINES ON THE WESTERN COAST OF CAPE YORK

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Rootstocks	Aneilema siliculosum	u-un-du	-	Eaten raw or roasted	Roth 1901 p.9	Pennefather, Batavia Rivers	Nggerigudi
	Ceropegia cumingiana	andreata	Yam	-	Roth 1901 p.9	Pennefather, Batavia Rivers	Nggerigudi
	Dioscorea sativa var. elongata	daiperi	-	Rootstock baked and roasted then skinned	Roth 1901 p.9	Pennefather, Batavia Rivers	Nggerigudi
	Dioscorea sativa var. rotunda	several	-	Preparation not described	Roth 1901 p.9	Several	Several
	-	mai ka'arra	Round yam	Staple food for several months. Required elaborate preparation. Eaten May-October.	Thomson 1939 p.215	Archer River	Munggan
	Dioscorea transversa	mai wattiyi	Long yam	Relished food. Roasted in ashes. Eaten May-August	Thomson 1939 p.215	Archer River	Munggan
	Eriosema chinese	mai ot	-	Important staple food. Root roasted, peeled and eaten. Eaten May-July	Thomson 1939 p.215	Archer River	Munggan
	Hardenbergia retusa	ru	-	Yam skinned, hammered and mixed with water	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	Heliocharis sphacelata	panje-a	-	Tubers eaten raw or baked, roasted and pounded into cakes	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	Heliocharis sphacetata	-	-	Most important vegetable food during this season. Eaten October-December	Thomson 1939 p.215	Archer River	Munggan
		panja	rush	-	McConnel 1930 p.100	Archer, Holroyd Rivers	Munggan
	Hibiscus brachysiphonius	yi-awara	-	Roots roasted and hammered	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	Hibiscus microchlaenus	-	-	Roots eaten on Embley R.	Roth 1901 p.13	Embley River	-
	Ipomoea grandiflora	endabari	-	Yam roasted in hot ashes	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	Limnantheum geminatum	murite	-	Tubers roasted or baked	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	Nymphea coerulea	arau	-	Rhizome roasted	Roth 1901 p.14	Pennefather, Batavia Rivers	Nggerigudi
	Nymphea gigantea	-	-	Eaten May-July	Thomson 1939 p.215	Archer River	Munggan
		-	Waterlilies	Roots cooked in antbed oven	McConnel 1953 p.7	Archer, Holroyd, Kendall Rs.	Munggan
	Portulaca australis	me-nama	-	Rootstock roasted	Roth 1901 p.15	Pennefather, Batavia Rivers	Nggerigudi
	Scirpus littoralis	-	-	Young corms roasted in coals. Older ones beaten with wooden hammer into flat cake	McConnel 1953 p.7	Archer, Holroyd, Kendall Rs.	Munggan
	Sterculia quadrifida	mbe-q	-	Roots bruised and roasted	Roth 1901 p.15	Pennefather, Batavia Rivers	Nggerigudi
	Tacca pinnatifida	ni-u	-	Tubers grated on wattle bark, washed in water, sediment allowed to settle, collected, dried and stored in large ball	Roth 1901 p.16	Pennefather, Batavia Rivers	Nggerigudi
	-	mai korta	Arrowroot	Prepared by grating, washing, leeching and cooking. Eaten May-August	Thomson 1939 p.215	Archer River	Munggan
	Tribulus solandri	longarate	-	Root roasted	Roth 1901 p.16	Pennefather, Batavia Rivers	Nggerigudi
	Typhonium angustilobium	wu-ri	-	Roots roasted, pounded and roasted several times more	Roth 1901 p.16	Pennefather, Batavia Rivers	Nggerigudi
	Typhonium brownii	mai ipau	-	Preparation not described. Eaten August-October	Thomson 1939 p.215	Archer River	Munggan
	Vigna canascens	mai want	-	Eaten May-September	Thomson 1939 p.215	Archer River	Munggan
	Vigna vexillata	to-e	-	Root roasted	Roth 1901 p.16	Pennefather, Batavia Rivers	Nggerigudi
	Vigna vexillata	mai lot	-	Root roasted, skinned and pounded to form a flattened cake. Eaten May-October.	Thomson 1939 p.215	Pennefather, Batavia Rivers	Nggerigudi
	Vitis acetosa	mbau-nu	-	Rootstock hammered and roasted	Roth 1901 p.16	Pennefather, Batavia Rivers	Nggerigudi
	Vitis trifolia	takking	-	Rootstock roasted in antbed oven. Skinned before eaten	Roth 1901 p.16	Staaten, Nassau Rivers	Gundara

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Fruits	Canthium lucidum	warra-anji	-	Berries eaten raw	Roth 1901 p.10	Pennefather, Batavia Rivers	Nggerigudi
	Clerodendron inerme	to-anji	-	-	Roth 1901 p.10	Pennefather, Batavia Rivers	Nggerigudi
	Eugenia carissoides	esyu-ro	-	Fruit eaten raw	Roth 1901 p.12	Pennefather, Batavia Rivers	Nggerigudi
	E.suborbicularis	-	Lady Apple	Eaten December-March	Thomson 1939 p.215	Archer River	Munggan
	Ficus cunninghamii	be-ni	-	-	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	F.orbicularis	mo-i	-	-	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	F.spp.	-	-	Eaten December-March	Thomson 1939 p.215	Archer River	Munggan
	Fluggea obvata	las-kwani-kwi	-	-	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	Grewia polygama	mokomid	-	-	Roth 1901 p.13	Staaten, Nassau Rivers	Kundara
	Ixora timorensis	kwaranam	-	-	Roth 1901 p.13	Pennefather, Batavia Rivers	Nggerigudi
	Lucuma sericea	morra	-	-	Roth 1901 p.14	Pennefather, Batavia Rivers	Nggerigudi
	Pandanus sp.	akan-drap	Breadfruit, Screw-Palm	Fruits sucked or soaked in water which is drunk	Roth 1901 p.14	Pennefather, Batavia Rivers	Nggerigudi
	Parinarium nonda	mor-ra	-	-	Roth 1901 p.14	Pennefather, Batavia Rivers	Nggerigudi
		mai'portju	Nonda Plum	Sometimes eaten without preparation. Stored in dry sand where fruit becomes desiccated. Pounded with mallets, covered with water and soaked.	Thomson 1936 p.72	Edward River	Da:jor
		-	Nonda Plum	Also available in desiccated form until February. Eaten mainly by old women. Eaten September-December.	Thomson 1939 p.216	Archer River	Munggan
	Polyantia nitidissima	manguru	-	-	Roth 1901 p.15	Pennefather, Batavia Rivers	Nggerigudi
	Vitex glabrata	-	Black Fruit	Eaten December-March	Thomson 1939 p.215	Archer River	Munggan
Seeds	Avicennia marina var.resinifera	-	White Mangrove	Important vegetable food. Eaten March-August	Thomson 1939 p.215	Archer River	Munggan
	Avicennia officinalis	-	White Mangrove	Cotyledons cooked	Thomson 1939 p.215	Archer River	Munggan
		rdai-ite	-	Seed baked, placed in dilly-bag and washed	Roth 1901 p.9	Pennefather, Batavia Rivers	Nggerigudi
	Avicennia tormentosa	-	-	Seeds steamed, soaked and then baked in ashes	Palmer 1883 p.94	Tidal waters of Gulf	-
	Bruguiera rheedii	mo-odo	Mangrove	Radicle baked in ashes, pounded, skins discarded, resulting mass washed 5-6 times and strained in sand collander.	Roth 1901 p.10	Pennefather, Batavia Rivers	Nggerigudi
		mai kurrpa	Black Mangrove	Hypocotyl prepared by cooking, hammering and decantation. Important staple. Eaten March-August.	Thomson 1939 pl XXII	Archer River	Munggan
	Entada scandens	parpangata	Matchbox bean	Seed baked, crushed and washed in running water. Often mixed with Bruguiera rheedii	Roth 1901 p.12	Pennefather, Batavia Rivers	Nggerigudi
		mai ping	-	Beans roasted, soaked, pulverised and cooked again. Not relished food. Eaten year round.	Thomson 1939 pl.XXI	Archer River	Munggan
		-	Waterlilies	Seeds eaten	McConnel 1953 p.7	Archer, Kendall Holroyd Rs.	Munggan
	Sterculia quadrifida	mbe-a	-	Seeds eaten raw	Roth 1901 p.11	Pennefather, Batavia Rivers	Nggerigudi
	Terminalia catappa	any-o	-	Kernel eaten raw	Roth 1901 p.15	Pennefather, Batavia Rivers	Nggerigudi
	T.microcarpa	draiputo	-	-	Roth 1901 p.15	Pennefather, Batavia Rivers	Nggerigudi
Leaves, stems and flowers	Livistona humilis	dre-amberi	-	Heart baked in ashes, uncovered, holes made in it and then filled with water. Eaten after beating, or mixed with water to make drink	Roth 1901 p.15	Pennefather, Batavia Rivers	Nggerigudi
		-	Waterlilies	Flowers and stalks eaten raw.	McConnel 1953 p.7	Archer, Kendall, Holroyd Rs.	Munggan

TABLE 15 (CONTINUATION) REFERENCES TO PLANTS EATEN BY THE ABORIGINES ON THE WESTERN COAST OF CAPE YORK 5:xx

	Botanical Name	Aboriginal Name	Colloquial Name	Comments	Source	Area	Tribe
Nectar	Eucalyptus, spp.	-	Bloodwood, Messmate	Flowers sucked for nectar	McConnel 1930 p.100	Archer, Holroyd Rivers	Munggan
	Eucalyptus terminalis	raru	-	Manna collected from ground, or scraped off plant with mussel shells. Leaves with manna on them collected, pounded together and roasted in ashes.	Roth 1901 p.12	Pennefather, Batavia Rivers	Nggerigudi
	Melaleuca sp.	rdi-i	-	Blossoms sucked for nectar	Roth 1901 p.12	Pennefather, Batavia Rivers	Nggerigudi
Water-producing plants	Melaleuca sp.	rdi-i	-	Water from bulges in trunk during dry season	Roth 1901 p.12	Pennefather, Batavia Rivers	Nggerigudi

CHAPTER 6

MAN AND ENVIRONMENT IN ABORIGINAL AUSTRALIA

Because they were all of a hunting and gathering type, in a broad classificatory sense all Aboriginal economies throughout Australia possessed some basic similarities. Food for immediate consumption was the ruling principle in their activities, and there was no divergence from this pattern anywhere in the continent. Agriculture and husbandry were not practised in any area, and the scattered references to the replanting of yam tops are no exceptions, because the rationale behind such action was merely to ensure the presence of yams in the future. It was not an attempt to organise production.

The division of labour between the sexes also followed a broadly similar pattern throughout the country. The men's time was spent principally in hunting the larger game, and also in fishing in some of the better watered areas, while it was the women's responsibility to forage for vegetable foods and smaller game. Minor variations in this pattern were evident. Women at Sydney spent a large part of their time in fishing with hooks and lines from canoes; the women in central Australia were employed in collecting seeds, fruits, rootstocks, reptiles and small animals. Despite these differences there appears to have existed the sentiment that certain tasks were the responsibility of either sex. Even though both women and men at Sydney both engaged in fishing, the division

between the sexes was evident in the equipment employed. The women fished with hook and line while the men used spears.

Aboriginal economies showed little evidence of craft specialisation. Each family unit was responsible for its own subsistence and well-being. No group within the community could specialise in a particular sector of production and through exchange gain all the other necessities for existence. Thomson (1934a, pp.231-2) records an instance of rudimentary craft specialisation among the Djonggandji where certain individuals, through their reputation for canoe-making, manufactured canoes for exchange. While this had many of the attributes of craft specialisation and economic exchange, it did not result in the canoe-makers being freed from the necessity of hunting their own food. Regional specialisation and trade has been well documented by McCarthy (1939).

In discussing the general characteristics of Aboriginal material culture, McCarthy (1957, p.93) points to a basic range of weapons and implements which appear to have been in the possession of the Aborigines when they arrived in Australia. It probably included spears, throwing clubs, brush-fence traps, digging sticks, knapped and core implements and a few other things. McCarthy attributes the subsequent modification of this range to 'the various pressures of habitat, invention and introduced ideas, but chiefly to diffusion from neighbouring outside peoples' (1957, p.95). The importance of this latter factor is dealt with more fully in an earlier paper (McCarthy 1940a). After briefly discussing the variation in Aboriginal material culture,

McCarthy concludes that 'invention appears to have played a relatively slight part in the development of the material culture of Australian tribes generally' (1957, p.93), and that the habitat did not produce technical developments of any consequence in Australia (1957, p.94). While McCarthy's conclusions may provide valid generalisations as to the nature of Aboriginal material culture in terms of the origin and variation of specific traits in the Australian culture-complex, he possibly underestimates the influence of the habitat in affecting the frequency and intensity with which particular sectors of the material culture were used by individual groups. Adaptations of this order would be overlooked in a broad study of the formal characteristics of the material culture of the Australian continent generally.

If only the above aspects of Aboriginal life in Australia were to be considered, the information available might warrant the conclusion that there was a basic way of life in Aboriginal Australia and that no forces in the environment succeeded in changing their food-gathering economy to even the most elementary type of agricultural or pastoral economy. However, these conclusions fail to take account of the specialised adjustments made by particular groups to particular habitats, which did not lead however, to radical changes in the broad characteristics of the economy.

Once the economic life of individual groups is considered, a very different picture emerges. The Aborigines recognised regional variations in their own economies, even within small areas and designated them with appropriate ecologically-orientated names. These are

not to be confused with tribal names, but they referred to sections, local groups, and in some instances, to the constellations of tribes. The practice appears to have been widespread in Australia although different bases were evident in the examples cited in the literature. In Cape York, several tribes used a name which designated themselves as the people of the sandbeach and this term distinguished them from the inland tribes (Thomson 1934b, p.237). Within the Mudumui tribe the section names underlined a similar division (Hale and Tindale 1933-4, p.69). In the Ooldea region the tribes were classified on a basis similar to a land-system classification, taking account of vegetation and terrain (Berndt and Berndt 1942, p.325). At Sydney the dominance of particular foods in the diet of what was probably only a local group led to the employment of a distinguishing name referring to this (Collins 1798, p.558). Several inferences can be drawn from the existence of these names. They imply that the Aborigines recognised environmental differences, and that these were of sufficient importance in their way of life, through their influence on their subsistence, to warrant the employment of distinguishing names.

Space does not permit detailed discussion of all the aspects in which particular characteristics of a group's way of life may have been affected by environmental influences. Discussion will be limited to the more important features including the relationship between the habitat on one hand, and the diet, the size, mobility and density of the population, and the range and design of equipment used directly in getting a livelihood on the other.

Previous discussion established that the diets of the people in the areas studied differed considerably and that this variety was directly related to the major contrasts in the floral and faunal assemblages of the areas concerned. Fish, shellfish, marine and aquatic animals and birds provided food sources for the coastal and riverine tribes which were not available to the tribes living away from the coast or larger rivers. Even within the areas studied the effect of environmental differences could be traced in Aboriginal diet. The food supply of the tribes living in the range country of central Australia included kangaroos, wallabies, euros, emus, and various vegetable foods. The diet of the tribes in the spinifex and sandhill country reflected the differences in the natural history of the areas and consisted primarily of lizards, rats, mice, possums and occasional emus and kangaroos, together with a range of vegetable foods differing to some extent from that of the former. Within the one area the diet altered with the seasonal cycles of the plants and animals in the region.

While this point might appear too obvious to warrant enumeration, it is, on the other hand, difficult to maintain that the habitat exclusively determined the diet of the Aborigines. Certainly, it provided a range of edible species which could be utilised by them, but it cannot be seen as a causative factor determining which species among those available were exploited. Under drought conditions in the harsh environment of central Australia it may have put severe limitations on the diet of the tribes in the area, but even here in better seasons when food was more abundant, preferences for particular

species were shown. Preference was probably a very important factor in determining the character of the diet of any group, particularly in areas where the habitat provided a wide range of possible food sources.

The problem of alternative sources of food is brought into even greater relief in the coastal and riverine areas where, in many instances, the full range of food available was not continuously exploited. Many groups specialised in exploiting the marine or aquatic food supplies in their local area, giving less attention to the potential supply of terrestrial food. The mere fact of living on a coast did not mean that the tribe's diet showed automatically a predominance of marine foods. This possibly applied to a majority of the groups in the areas studied, but exceptions were evident. The sparse information available suggests that fishing activities, and hence probably marine foods, were not as important to the tribes at Port Phillip as they were at Sydney. The reasons for this are not clear. It could have been that marine food was not plentiful in Port Phillip, or that the food supply of the hinterland was more attractive. The open exposed nature of Port Phillip may have made it far more dangerous for canoes than the more sheltered coves of Port Jackson where canoes were used more frequently. The fishing equipment of the natives in the two areas appears to have been similar (with the possible absence of fish hooks in Port Phillip) and so it would be difficult to attribute the differences to technological factors and the inability of the Aborigines at Port Phillip to successfully exploit their marine environment.

In Cape York it appears that the mangrove-lined nature of the estuaries at the southern end of Princess Charlotte Bay made the coast unattractive to settlement and encouraged the Lama-lama to concentrate on the exploitation of their land food resources.

The economic life of the Munggan provides yet another variation. During the wet season they lived a comparatively sedentary life on the Archer River estuary and their diet consisted mainly of fish, shellfish and the life. With the onset of the dry season their way of life changed; they left the estuary and vegetable foods, land game and fish from the rivers became more important in their diet. It is difficult to suggest a reason for this. The hinterland may have become relatively more attractive or important as a source during this season.

Once a pattern had been established the forces of conservatism, tradition and possibly population pressure, particularly in riverine and coastal areas where tribal areas tended to be narrow, would operate against any radical modification of this pattern.

The distribution of particular food species did not always coincide with the areas in which they were utilised as food. The dugong provides an excellent example of this. The animal is distributed over a large part of the northern Australian coast, but it appears that it was a major source of food only to a small group of tribes at the north of Princess Charlotte Bay. Thus it cannot be argued that the specialisation of these groups in the hunting of dugong in the area is a reflection of the peculiar nature of the habitat in that area. The significant fact is that the Ka:wadji, using an advanced

technology which had its origin in cultural borrowing from the north, were able to capitalise on the potential of their environment to a far greater extent than did the tribes to the south whose technology was less developed.

This example shows how the adoption of a new technology radically affected the diet of the Ka:wadji. The importance of the reverse process, involving the development of particular techniques to utilise potential food sources is not clear. Tindale and Birdsell (1941, p.8) credit the Aborigines in the Cardwell-Ravenshoe district with the development of leaching techniques by which the toxic elements of certain plant foods could be removed, and point to this as being a response to life in a tropical jungle where the food consisted mainly of roots, seeds, fruits and honey and where animal flesh was scarce. The distribution of these techniques was far wider than this area. McCarthy (1957, p.93) implies that the knowledge of this technique was limited to northern and eastern Australia. The steaming and peeling of Lepidium muelleri-fernandi by the Aranda in central Australia (Cleland and Tindale 1959, p.133) shows that the distribution of similar techniques might have been even more widespread. This suggests that the Aborigines may have brought the knowledge of such techniques with them to Australia, or that they were introduced at a time sufficiently long ago for them to have spread as far as they did. The variation in preparation methods implies that a considerable amount of experimentation with local species did occur. The basic method cannot be explained as a technique developed in response to a particular environment.

It would appear then, that the greatest effect the habitat had on the diet of the Aborigines was that it provided a range of possible food sources within which the economic system operated. The range varied from area to area, and with the seasons in any one area. These factors had an obvious effect on the diets of the people in the areas studied; an effect recognised and named by the Aborigines. However, other factors were perhaps of equal or greater importance in determining the actual character of the diet of individual groups. These included preference for certain types of food, particularly in areas where it was not necessary to exploit the whole range of food types in order to survive. The nature of the habitat could affect the decision to exploit a particular source of food. Technological factors also influenced the ability of the Aborigines to exploit their environment; the full potential of some food sources not being exploited because of the lack of technological ability to do so.

These differences in diet are also reflected in the economic machinery employed to exploit the potential food supplies of the area. The major distinction in type was between the inland hunting economies and the fishing economies of the coastal and riverine areas. In one sense the examples chosen are located towards the extremes of a continuum of possible economic types. At one end was the pure hunting and collecting economy of the central Australian Aborigines, while the coastal and riverine groups possessed an economy which tended towards the other extreme where hunting became less important in comparison with the alternative activities of fishing. The effects

of these differences were evident in the size and mobility of the hunting unit, the population supported by an area and the technique and equipment employed in gaining a living.

The basic economic unit in all the areas studied consisted of the family or extended family and even where the camp consisted of a larger grouping the family was still an easily recognisable unit within the wider structure. The composition of the larger group depended upon kinship and friendship. Its size varied from area to area and with the seasons.

In central Australia the most commonly encountered group under normal conditions consisted of the man, his wife or wives, their children and perhaps an aged parent. In better seasons several groups might link up and forage together, but these larger groupings could only remain intact while food supplies permitted. Once these began to dwindle the groups were forced to split up and lead a highly mobile life making daily hunting forays in search of food and returning at night to known sources of water. In very bad seasons when water was scarce the area over which a family could hunt was considerably limited.

In the riverine area of southeastern Australia groups, consisting of several families lived relatively sedentary lives on the rivers engaged in fishing, and to a lesser extent hunting. During the seasons when 'freshes' occurred on the rivers or when the rivers were flooded and the fish weirs and traps provided large quantities of fish and crayfish were plentiful on the swampy flats very large numbers of Aborigines came to the rivers to feast. When the river levels returned to normal and fish became less

plentiful these people left the rivers and retreated to the back country to hunt.

The coastal areas showed considerably more variation. Along the eastern coast of Cape York the groups comprised several families living together in semi-permanent camps along the shore. At Port Stewart the only movements of the camp were short moves in the interest of hygiene and a longer move to the open seashore with the coming of the wet season. Parties of several people went into the hinterland from time to time to collect vegetable foods and raw materials. The seasonal changes do not appear to have caused any major change in their way of life. They were reflected in the hut-types built; large and more permanent huts being built in the wet season, while simple temporary breakwinds sufficed in the dry. In some areas the increased availability of surface water permitted the Aborigines to travel to the outlying islands and exploit the supplies of shellfish, turtle and other seafoods there.

This pattern was probably followed by some tribes on the western coast of Cape York, but the Munggan on the estuary of the Archer lived a different life. During the wet season, when travel was difficult, groups lived a sedentary life in permanent camps on the estuary. With the onset of dry season families left the estuary and hunted, collected and fished in groups. As the dry season progressed the groups became progressively smaller, until at the height of the dry season the economic unit was invariably the family.

At Sydney the group often consisted of several families who were mobile within a restricted area, thus

giving the impression of a large population during the summer. This appeared to be related to the presence of the schools of fish in Port Jackson. With the onset of winter the population thinned and food was obviously scarce. There is no evidence to verify that the people leaving Port Jackson moved inland. It is possible that they spread more thinly, in smaller units along the coast until the winter was over and the school fish arrived in the spring.

These examples show that the habitat, acting through the food and water supply, had a considerable effect on the size and mobility of groups. In the richer habitats of the coasts and larger rivers the economic units were usually larger and less mobile than those in the harsher inland areas. In most of the areas studied seasonal increases in the food supply were invariably accompanied by increases in the size of the group maintaining direct relationships and functioning as an economic unit. The size of these larger gatherings in coastal and riverine areas was considerably greater than that of similar gatherings recorded in central Australia.

As for the population densities, the literature does not provide a very detailed or satisfactory picture of any of the areas studied. The accuracy of most population estimates is suspect, as are the tribal areas against which these must be calculated to find the densities.

The estimates of population density in central Australia are meagre. Meggitt (1962, p.32) gives values of one person per 35 square miles for the Waljbiri and one person per 12.5 square miles for the Aranda. If reliable, these figures emphasise the difference, in productive

terms, between the sandhill and spinifex areas and the more hospitable range country in central Australia.

The estimates for the riverine area relate only to the Ba:gundji and range from one person per 20 square miles (Bonney 1883-4, p.123) to one person per 3.1 square miles (Teulon in Curr 1886, II, p.186). The variation in these figures is so great as to make it difficult to accept either. Perhaps the most reliable and illuminating figure is Eyre's (1845, II, p.372) estimate that the permanent population living on the Murray River at Moorunde was in the order of three to four persons per mile of river. This figure suggests that the density of population along the river was of the same order as that postulated for some coastal areas.

The estimates for coastal areas give a wide range of values from as high as 12 persons per square mile down to one person per 15.6 square miles. The more reliable figures seem to be in the range of from one person per two square miles up to five persons per square mile. The figures are not of sufficient accuracy to compare densities in different coastal habitats and come to any conclusions as to the relative abilities of the different coasts to support more people. The absence of sufficient data does not permit assessment of the effect of the technological advances of the Ka:wadji on population densities.

As far as these figures warrant any conclusions, it is clear that the population densities were very much greater on the coast and in the riverine area than they were in the more arid areas of inland Australia.

The equipment and techniques employed differed to some degree in all the areas studied. The most obvious distinction was between the hunting and the fishing economies, but within either of these some differences were apparent.

The Bindubi lived in what was perhaps the most difficult habitat in Australia and possessed simple spears, spear-throwers with an adze stone mounted on the distal end, throwing sticks, boomerangs which were regarded almost as ceremonial objects and which were not used in hunting, stone axes, digging sticks, shallow wooden dishes, grindstones and bark sandals. The tribes in the range country of central Australia possessed slightly more equipment including spears, spear-throwers of several designs, throwing sticks, boomerangs, clubs, shields, adzes, stone knives, axes and flakes, digging sticks, grindstones, fur-twine and grass baskets and skin wallets and water-bags. The hunting devices they employed included decoys, hides, brush fences, pit falls and poisons.

The equipment employed by the fishing economies of the coast and riverine areas was more varied and enabled them, with differing degrees of success to exploit their marine and aquatic environments. The people on the lower Murray-Darling possessed fish spears, nets and canoes and brush-fence fish weirs, stone fish traps, hollow log traps and fish poisons were devices in common use. To this must be added the range of equipment which permitted them to exploit their hinterland as well. This included spears, spear-throwers, clubs, boomerangs, nets which were used in trapping animals and birds, stone axes and flake knives, shell, bone and reed knives, stone and wooden chisels,

bone awls and needles, grindstones, digging sticks, wooden spades, bark and gnarl troughs, skin water-bags, grass baskets and net bags. The hunting devices employed included decoys, hides, brush fences, pitfalls, nets and snares.

The equipment employed by the coastal economies studied varied considerably and the examples chosen do not reveal the full range of variation. In southwestern Australia canoes, fish hooks, nets and fish poisons were not used. The Aborigines around Sydney used canoes, spears, hooks and lines, log traps and possibly nets and fish poisons. On land they used spears, spear-throwers, clubs, boomerangs, wooden swords, parrying sticks and shields, digging sticks, hafted and unhafted stone axes, shell scrapers, net bags, folded bark troughs, palm spathe baskets and wooden and bark dishes. At Cape York this was enriched by the use of outrigger canoes, harpoons, harpoon floats and fishing nets as well as bamboo knives, shell spoons, pleated bark containers and bailer shell cooking vessels. The hunting devices used at Sydney are not well recorded and included hides, pitfalls, brush fences and traps and food decoys. In Cape York purse nets, snares, throwing sticks and long thin switches and 'bird lime' were used in catching birds. Boomerangs were absent from the area.

These inventories reveal that there was surprisingly little variation in the range of techniques and weapons employed by the Aborigines in gaining a living. It is possible to point to a range of weapons and techniques common to all areas. This included such weapons as spears, clubs and throwing sticks, and the use of hides, decoys,

brush fences and pitfalls. The equipment in use outside this range was negligible. In coastal areas the spear, the brush-fence weir and the hollow log trap were the only techniques common to all coastal areas, while nets, fish hooks, fish poisons canoes and harpoons were more limited in occurrence. It may be inferred that some of the adaptations made by the Aborigines to the different environments took the form of the modification of a given range of equipment and techniques, rather than the invention of completely new and specialised methods and equipment. In some instances particular techniques were adapted to suit both hunting and fishing economies.

Spears were used both in hunting and fishing. Undoubtedly the multi-pronged spear was widely used in fishing and in the minds of most writers, so closely associated with fishing, that they felt justified in referring to this form as a 'fish spear'. In fact, this design was also used by the Aborigines of western Cape York in spearing jabiru, emus, wallabies and kangaroos (McConnel 1953, pp.25-6), and also in central Australia (Spencer and Gillen 1938, pp.575-8). Thus the one spear design had several uses and it is difficult to depict this design as being developed in response to the need for a fish spear.

The use of the brush-fence is a similar case in point. It was used both in hunting and fishing. In fishing it was adapted to several situations; on the rivers it trapped the fish moving with the seasonal fluctuations in river level, in coastal areas it was adapted to utilise the daily tidal fluctuations in the tidal creeks. Roth (1901, pp.24-5) even records its use, in association with

a slatted roller blind, to trap crocodiles in tidal creeks. In hunting economies the brush-fence was combined with ambushes, pitfalls and nets (where these were known) to trap emus, wallabies and kangaroos.

The technique of poisoning was also used in both fishing and hunting. The Aborigines on the coast used various plant poisons to stupefy or kill the fish in pools. On the rivers when the water level was low and the fish were concentrated in pools similar methods were used. The Aborigines in central Australia poisoned waterholes with pituri in order to stupefy the emus coming to drink there.

The geographic distribution of those features not common to all economies frequently supports the hypothesis that these culture traits had their origin in diffusion from outside culture. Following Davidson's (1933, 1934, 1936, 1937) studies on the distribution of particular implements in Australia, McCarthy (1940a, p.250) states that:

> In Australia, from north to south, north-eastward to south-westward, north-west to east and south-east, there is a succession of techniques separated spatially only by the length of time each has been diffusing, a process which has produced a striking dissimilarity in the material culture of neighbouring and widely separated areas.

The influence of diffusion is perhaps most easily demonstrated in the coastal areas where the presence of outrigger canoes, harpoons and various types of hooks makes it possible to demonstrate fairly obvious historical associations with the cultures to the north. Similar diffusions, probably earlier in time, might account for the limited distribution of various snare-types, the use of 'bird-lime' and the knowledge of netting techniques.

The question of the use of nets in fishing and hunting is not so easily answered. The distribution of the netting technique (Davidson 1933, Fig. 9) and its use in hunting or fishing is not co-terminate. The Aborigines in central Australia evidently had knowledge of knotted netting but did not apply it to hunting. Those on the Murray River employed nets in hunting, fishing and in catching waterfowl. At Sydney netting was used in making bags, but neither in hunting nor fishing. In Cape York the nets were used in fishing and hunting and at Georgina River they were used in trapping birds (Roth 1901, p.29), in a manner similar to that used on the Murray River. This evidence prompts several explanations. It is possible that nets were used in hunting and fishing at Sydney and in hunting in central Australia, but that this was not recorded. This is doubtful. It could be suggested that the people had a knowledge of these techniques, but because of some peculiarity in the local environment, the method could not be gainfully employed. In relation to the situation at Sydney, this is equally doubtful. The possibility of local invention of these techniques, but not necessarily the netting itself, can be dismissed because they were recorded in several areas. It is possible that the knowledge of hunting techniques involving the use of nets also had its origin outside Australia and diffused at a time after the initial spread of the knowledge of netting techniques.

Given that some weapons were common to all groups and others occurred over very wide areas, the question now arises as to what extent local variation was evident in the design of the weapon and to what extent this could be

attributed to adaptation to local materials and to the game in the local area.

Spears were undoubtedly the most important hunting weapon in use in Australia and a considerable variation in design was evident. Of this Davidson (1934, p.160) makes the following statement:

> There is nothing to show that even the variations are the results of attempts to meet certain needs, real or fancied. Rather, they seem to be the results of accidental combination or of experimentation which, to the mind of, or in the experience of the native demonstrated certain superiorities for various purposes to which he applied them and which we now designate as needs. But since native opinion seems to vary considerably as to the respective merits of the different spear-traits, functionally considered, it seems that native testimony must be regarded as reliable not in fact but only in opinion.

Several general observations are prompted by the spear types represented in the areas studied. As many as eight different spear types may have been made in the one area, but only a few were used in hunting. The other spears, which were often of more elaborate and complicated design were used in warfare. The most common hunting spear in northern and eastern Australia consisted of a single pronged spear with a bone barb lashed to the point. In central Australia the spear had a mulga wood blade as a head. Generally, the heavier spears were used in hunting large game, and the smaller, lighter ones for smaller animals and birds. It was noted previously that the multi-pronged 'fish spear' was used extensively, but not exclusively, in fishing. Other spear types were also used in fishing.

While Davidson's (1934, p.160) conclusions suggest that it would be difficult to explain the differences in spear design in terms of adaptation to a particular environment, the habitat did have some influence on minor details of spear manufacture. In central Australia the spear shafts often consisted of several lengths of tecoma wood scarf-jointed and lashed together. The end piece did not constitute a counter-shaft and Stirling (1896, p.87) attributes this modification to the lack of suitably long pieces of wood. A similar difficulty confronted the Bindubi and encouraged them to make use of the lateral roots of acacias. Thomson (1962, p.14) equates the paucity of barbed spears among the Bindubi to the scarcity of large game as a source of sinew for binding. The rarity of large game might in turn lessen the need for barbed spears.

The importance of this type of local variation should not be overstressed. Its presence is most easily demonstrated in coastal areas where shell and bone implements were frequently used instead of the stone flake implements used in other areas. However, this does not represent a straight substitution of bone and shell for stone. The alternative implements were of a legitimate and recognisable design and were used in some areas where stone was also available. Trade tended to lessen the importance of local variation related to differences in raw materials and also aid the diffusion of new designs. McCarthy (1939) gives various instances of extensive trade in spears, stone axes, spear-throwers, boomerangs, grindstones and many other weapons and ornaments. Mulvaney (1961, p.87) cites the example of trade in axe blanks from the Mt William quarry where natives came from

at least 100 miles around to trade rugs, weapons and ornaments for axe blanks.

McCarthy (1957, p.94) attributes the generalised design and multiple uses of the spear-thrower used in central Australia to the creative efforts of the people in the area and implies that its development was an adaptation to their environment. He describes its various uses as being a spear-thrower, a parrying weapon, an adze-handle, a vessel, a musical instrument and a fire saw. Davidson and McCarthy (1957, p.406) believe that the adze was an invention indigenous to Australia. Despite this, it is difficult to accept McCarthy's initial premise, because similar spear-throwers were found in eastern Australia where life was not so rigorous and the need for a multiple purpose weapon was presumably not so great. If the design originated in central Australia it is surprising that it did not replace the stick spear-thrower used by the Waramanga, and who would also have benefited from the multiple uses of the former design. The multi-purpose implement is obviously an adaptation to a mobile way of life, but given the design's distribution in Australia it would be difficult to attribute it to adaptation to a particular habitat.

No Aboriginal implement has caught the public imagination to the same degree as the boomerang and it is for this reason, rather than for its importance as a hunting weapon, that it is included here. Boomerangs were possessed by the Aborigines in central and southeastern Australia and the literature contains frequent references to their use in hunting and it also provides detailed descriptions of their different designs. The writer found

no authentic description of its use in hunting in any of the areas studied. Throwing sticks, the presumed forerunner of the boomerang, were used in several areas including eastern Cape York where the boomerang was lacking. The Bindubi owned boomerangs but regarded them almost as ceremonial items and did not use them in hunting. In this respect it would be premature to suggest that the variation in design was related to a desire to alter its performance as a hunting implement. It also suggests that the boomerang belonged to the same category of equipment as fighting spears and clubs, shields, parrying sticks and swords, which had no direct economic use but still formed an important part of the material culture.

The hypothesised diffusion of new designs, or design modifications, from outside was probably one of the most important factors affecting the character of weapons. Massola (1956) attributes the origin of both crescentic, shell fish hooks and composite wood and bone hooks to outside influences different in time. The wooden hook was a later introduction and displaced the shell hook in some parts of northern Cape York. Similar causes could be evoked to explain the distribution of single and double outrigger canoes.

While the discussion so far tends to emphasise the relatively minor influence of the habitat on material culture and hunting techniques, detailed study of the application of particular hunting methods shows how closely the Aborigines observed and capitalised on the peculiar habits of the animals they trapped. The use of decoys to bring emus within spearing distance shows how they made use of the bird's inquisitive nature. The

Aborigines in central Australia knew that the euro would not leave the rocky ridges, thus enabling the Aborigines to drive the animals into ambushes at the ends of spurs. The tendency of animals to follow particular paths permitted the Aborigines to place ambushes, pitfalls and nets in strategic places. The alignment of pens in the stone fish traps on the coast showed that they had observed closely the longshore movements of the fish in the area. It would be possible to recount many instances of this type of adaptation, but since it does not appear to have produced radical modifications in the equiment or hunting methods, its importance was probably not great.

It is evident therefore, that the material culture and hunting equipment employed by the Aborigines consisted of several elements. The first of these was a basic range of equipment and techniques, apparently known to the Aborigines when they arrived, and which was subsequently adapted to a varying range of habitats. This range was, in some areas, modified by the adoption of additional techniques and equipment. The resulting difference was most marked between the hunting and fishing economies where the employment of nets, fish hooks, harpoons and canoes enabled the latter to exploit more fully their marine or aquatic environment. Since all of these traits were not present in every fishing economy, they can hardly be depicted as being 'caused' by a particular environment. Rather, the major differences in Aboriginal culture appear to have been due mainly to culture contact with more advanced technologies and the subsequent diffusion of these traits through part of Australia. The process was not one of passive acceptance on the part of the Aborigines.

They appear to have accepted only those developments which could be accommodated within their way of life and rejected those for which they had no use. In Cape York they accepted the harpoon and outrigger canoe but rejected gardening and sedentary life. The process of diffusion can be evoked to explain the presence in Australia of the knowledge of netting techniques and possibly its application to hunting and fishing, the use of the harpoon, outrigger canoes, fish hooks and several other features. It is possible to infer from the distribution of these features an historical relationship with outside cultures, but it is not possible, given the present state of knowledge to state from which area they originated, or the processes by which they were brought to Australia.

Within the range of equipment used in any area certain processes acted towards its modification. This was in part due to the effects of the local material on manufacture, but there was also a certain amount of elaboration of design. In most instances it is difficult to depict this as resulting from a conscious effort to meet the demands of the environment. In fact it is difficult to explain why some modifications took place at all without appealing to the spread of new and varied designs from neighbouring areas. It is difficult to depict the material culture of any one group as being a rational and distinctive response to life in a particular environment.

If the discussions were to be limited only to the consideration of these traits, the available evidence supports McCarthy's (1957, pp.94-5) view that the habitat did not produce technical developments of any consequence

in Australia, and that in the economic sphere it is clear that aboriginal culture was 'adaptable and subject to modification through the various pressures of habitat, invention, local variation and introduced ideas, but chiefly to diffusion from neighbouring outside people'.

This conclusion is relevant only to the origin of particular culture traits. It does not explain the actual employment of a particular technique or piece of equipment by the Aborigines living in a given area, and the seasonal changes in the hunting methods employed by them. Thomson's work (1939) shows that the decision to employ a certain technique at a particular time was related to the seasonal conditions in the habitat and that the economic life had a rhythm parallel to that of the seasons. Similarly, it would be impossible to explain the variation in fishing techniques employed in the Murray Valley without reference to the seasonal fluctuations in river height and flow. While it is possible to demonstrate that the habitat had little effect on the formal characteristics of the equipment employed, its effect on decisions as to which methods and equipment could be most profitably used, should not be under-estimated.

Conclusions

The relationship between the Aboriginal economy and the habitat is not a clear-cut one, and depending upon which aspect of culture is considered, it is possible to come to radically differing conclusions. The role of the environment was not such that it stimulated local invention of any radical nature, nor did it promote any great change in the nature of the economy. The Aborigines

came to Australia with a hunting and gathering economy and through the duration of their stay it remained so. The major changes in Aboriginal culture appear to have been related to diffusion from outside areas. Thus the habitat can hardly be depicted as having played a causative role in the development of Aboriginal culture. The process appears, in many instances, to have taken directly the opposite form. The adoption of new and different techniques led the Aborigines to re-evaluate the potential of their environment in terms of their enriched technology.

In the functioning of the economies of individual groups it is possible to distinguish the effect of the environment and see its influence on the lives of the Aborigines. The supply of edible species and the seasonal variation in their abundance influenced dietary habits, social mobility and population size. The habitat also affected the Aborigine's decision to employ particular weapons and techniques. The frequency with which they were used by particular groups led to considerable variation in the character of the economic life and technology in different areas. The local environment did not demand that all the techniques known to the Aborigines be used uniformly. The decision to employ particular methods was made in reference to the conditions prevailing in the local environment.

While physical conditions entered intimately into the every-day life of the Aborigines, the part they played cannot explain the origin of the Aboriginal hunting and gathering economy, or many of the cultural changes which occurred within it. The habitat was, as Forde (1934, p.464) aptly pictures it, 'the raw material of cultural

elaboration'. Hence there is much to support McCarthy's (1957, p.95) contention that the 'Aborigines...imposed their way of life on the Australian habitat', and the stability and integration of Aboriginal society was a more important factor in maintaining their way of life, than any forces in the habitat moving to change it. The habitat meant one thing to the Aborigines in 1787, it was something entirely different to the Europeans in 1788 and its meaning has changed constantly with changes in economic and social life since then.

Sale,

DEAR SIR,

I am desirous of gathering together, as soon as possible, all the information which my correspondents can give me as to the Customs, Beliefs, Tribal, and Social Organization of the Australian Aborigines.

Permit me to ask whether you have been able to obtain any information on the subjects referred to in my former letters to you.

On the next page, I give a detailed list of the subjects to which my inquiries relate, and any additional information you can give me will be most acceptable.

I am, dear Sir,

Yours very truly,

A. W. HOWITT.

Appendix I A.W. Howitt's questionnaire. Reproduced with the permission of the Mitchell Library, Sydney.

1. What is the name of the tribe to which your answers refer; *i.e.*, its name as distinguishing it or its members from other tribes by which it is surrounded; its local organization in sub-tribes, clans, or lesser divisions; the boundaries of the country occupied by the tribe?

2. The class divisions of which the tribal community is composed, such as the well-known Kamilaroi classes, Ipai, Kumbo, Muri, Kubi, &c.?

3. The laws of marriage between the classes of the tribal community?

4. The laws governing descent in the classes?

5. The tribal government; whether in the hands of one head-man, or of several head-men, or of a council of elders, or of the elder men generally; whether such head-men hold their office by election or by right of descent; whether the tribal government is in the hands of the Wizards or Doctors?

6. The Tribal Council: its constitution and powers?

7. Offences against tribal law or custom, and the methods of punishing such; offences against the individual, and the means of redress for the same?

8. The offices of Herald and Messenger; the use of message sticks and emblems for calling together assemblies for festive, ceremonial, or deliberative purposes, or for declaring war or proclaiming peace?

9. The Wizards and Doctors of the tribe; their pretension to communication with spirits and to the possession of supernatural power; the practice of magic and the use of charms for producing or for curing disease?

10. Beliefs as to death and its causes; funeral ceremonies, and the after existence of the disembodied spirit?

11. The initiation ceremonies?

12. Rules regulating the distribution of game and of food, or prescribing the positions to be occupied by the respective huts in a camp?

13. Infanticide; how, and when practised, and the reasons assigned for it?

14. Cannibalism; when and where practised, and by whom of the tribe, and upon whom; the reasons assigned for it?

15. Gesture-language; signs and signals by smoke or otherwise?

16. Beliefs* as to the structure of the world; the nature of the sky, the sun, moon, stars, and other heavenly bodies, and generally of natural phenomena?

17. The folklore of the tribe; the fables, tales, and legends told of animals, men, and supernatural beings?

18. *Vocabularies.*—Give the native words corresponding to the English—

(1) man,	(15) water,
(2) woman,	(16) sun,
(3) head,	(17) moon,
(4) hair of head,	(18) my,
(5) eye,	(19) thy,
(6) nose,	(20) his,
(7) tongue,	(21) my foot,
(8) ear,	(22) one,
(9) hand,	(23) two,
(10) thumb,	(24) three,
(11) foot,	(25) four,
(12) blood,	(26) five,
(13) bone,	(27) ten,
(14) fire,	(28) twenty.

In writing native words, observe that *a* is sounded like a as in *father*, *e* like eh, *i* like ee, *u* like oo, *ai* like eye, *au* like ow as in now.

* *Note* 1. The above queries refer solely to the beliefs existing at the time of the settlement of the country by the whites—and not to any beliefs or customs acquired from them.

Note 2. In answering, please prefix to your answer only the number of the questions to which the answer refers.

APPENDIX II

TRIBAL NAMES ADOPTED BY THE AUSTRALIAN INSTITUTE OF ABORIGINAL STUDIES

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
AREA C		
C.1	Wirangu	
C.2	Ngalia	
C.3	Gugada	
C.4	Jan-gundjara	
C.5	Andagirinja	
C.6	Bidjandjadjara	Wongapitcha (Basedow 1925), Pitjanzara (Tindale and Hacket 1933), Pitjanjara (Cleland and Johnston 1938), Pitjendara (Mountford 1941), Pitjandjara (Tindale 1953).
C.7	Gugadja	Kukatja (Cleland and Tindale 1959).
C.7.1	Luridja	Aluridja (Basedow 1925), Luritcha (Spencer and Gillen 1927).
C.8	Aranda	Arunndta (Basedow 1925), Arunta (Spencer and Gillen 1927).
C.9	Wanggamala	
C.10	Bindubi	Pintubi (Cleland and Tindale 1954), Bindibu (Thomson 1962).

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
C.11	Jumu	
C.12	Andagerebina	
C.13	Gaididj	
C.14	Alja:wara	
C.15	Waljbiri	Walpari (Spencer and Gillen 1927), Ilpirra (Spencer and Gillen 1927), Wilpirri (Cleland and Johnston 1939), Wailbiri (Sweeney 1947), Walbiri (Meggitt 1962).
C.16	Wagaja	
C.17	Walmanba	
C.18	Waramanga	Warramunga (Spencer and Gillen 1927).
C.19	Wambaja	Wambia (Spencer and Gillen 1927).
C.20	Gurindji	
C.21	Bin-gongina	Bingongina (Spencer and Gillen 1927).
C.22	Djingili	Chingalli (Spencer and Gillen 1927).
C.28	Gunindiri	
C.24	Manu	
C.25	Mudbura	
C.26	Gudandji	
C.27	Ngarinman	
AREA D		
D.1	Wamba-wamba	
D.2	Joda-joda	
D.3	Ngunawal	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
D.4	Wadi-wadi	Watty Watty (Beveridge 1883).
D.5	Baraba-barba	Baraba Baraba (Beveridge 1883).
D.6	Mara:wara	
D.6.1	Gure:ndji	
D.7	Jida-jida	
D.8	Mudhi-mudhi	
D.9	Nari-nari	
D.10	Wiradhuri	Woradgery (Mitchell 1842-1923).
D.11	Bolali	
D.12	Ba:gundji	Bungyarlee, Parkungi (Bonney 1883-4), Bahkunjy (Teulon in Curr 1886), Parkengee (Newland 1890).
D.13	Wiljali	
D.14	Danggali	
D.15	Gunjbarai (poss. part of Waljwan)	
D.16	Wiljagali	
D.17	Bandjagali	
D.18	Wongaibon	'Wompangee' of Newland (1920-1) is Wombugee section of this tribe.
D.19	Nawalgu	
D.20	Waljwan	
D.21	Wanjwalgu	
D.22	Ngjamba (poss. part of Waljwan)	Ngēumba (Mathews 1903), Ngemba (Dunbar 1943-4).

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
D.23	Gamilaroi	Kammee' larrai' (Richards 1903), Kamilaroi (Bucknell 1933).
D.24	Anaiwan	
D.25	Gu:rnu	
D.26	Baranbinja	
D.27	Juwalarai (poss. part of Waljwan)	
D.28	Wirajarai	Wirra'jerree' (Richards 1903).
D.29	Gambuwal (poss. same as Gujambal)	
D.30	Galali	
D.31	Badjari	
D.32	Marawari	Marraa Warree' (Richards 1903).
D.33	Guwamu	
D.34	Bigambul	
D.35	Gujambal see also Gambuwal	
D.36	Geinjan	
D.37	Gungari	
D.38	Gogai (poss. same as Gungari)	
D.39	Gawambarai	
D.40	Barunggama	
D.41	Giabal	
D.42	Marganj	
D.43	Gu:nja	
D.44	Mandandanji	
D.45	Wadjalang	
D.46	Nguri	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
AREA S		
S.1	Wargi	
S.2	Ramindjari (poss. part of Jaralde)	
S.3	Bordawulung	
S.4	Ngaralda	
S.5	Baramangg	
S.6	Ngangurugu	
S.7	Ngaiawang	
S.8	Jaralde see also Narrinjeri	
S.9	Ngargad	
S.10	Ngawadj	
S.11	Danganegald see also Narrinjeri	
S.12	Jirawirung	
S.13	Bungandidj	
S.14	Meindangg	
S.15	Bodaruwidj	
S.16	Mardidjali	
S.17	Wudjubalug	
S.18	Ngindadj	
S.19	Ju-ju	
S.20	'Gurndidj'mara	
S.21	Warga-warga	Waiky Waiky (Beveridge 1883).
S.21.1	Kulin (gen. name applied to tribes of West Victoria).	
S.22	Djadjala	
S.23	Ladji-ladji	
S.24	Jari-jari	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
S.25	Giraiwurung	
S.26	Djabwurung	
S.26.1	Ngengenwurung (poss. part of Djadjawurung)	
S.27	Jardwa	
S.28	Dadi-dadi	Darty Darty (Beveridge 1883)
S.29	Wada:wurung	
S.30	Golagngad	
S.31	Gurung	
S.31.1	Djadjawurung	
S.32	Lewurung (poss. part of Djadjawurung)	
S.33	Biangil	
S.35	Bunwurung	
S.36	Woiwurung	
S.37	Daungwurung	
S.38	Jabula-jabula (poss. part of Banjgaranj)	
S.39	Brada:wulung	
S.40	Banjgaranj	
S.41	Brajagawulung	
S.42	Dadungalung see also Gurnai	
S.43	Jadjmadang	
S.44	Duduruwa (poss. part of Jadjmadang)	
S.45	Brabirawilung	
S.46	Ngarigu	
S.47	Wolgal	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
S.48	Grawadungalung *see also* Gurnai	
S.49	Birdawal	
S.50	Gujangal	
S.51	Djiringanj (poss. part of Dhawa)	
S.52	Dhawa	
S.53	Dhu:rga	
S.54	Walbanga *see also* Juwin	
S.55	Wandandian *see also* Juwin	
S.56	Dharumba	
S.57	Gurungada	
S.58	Wadi-wadi (poss. part of Dharawa:1)	
S.59	Dharawa:1	
S.60	Gan'dangara	
S.61	Iora	
S.62	Gamaraigal (poss. part of Dharawa:1)	Cammerragal (Phillip H.R.N.S.W., I, ii), Cam-mer-ray-gal (Collins 1798).
S.63	Wonarua	Wonnarua (Miller *in* Curr 1886, III), Wonnah-Ruah (Fawcett 1898).
S.64	Dharug	
S.65	Darginjung	
S.66	Awabagal	Awabakal (Threlkeld 1826).
S.67	Juwin (Group of tribes including Dhawa, Gujangal, Walbanga, Wandandian, qq.v.)	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
S.68	Gurnai (Group of tribes including Brajagawulung, Brad:wulung, Brabirawilung, Dadngalung, Grawadungalung, qq.v.)	
S.69	Narrinjeri (Group of tribes including Bodaruwidj, Bordawulung, Danganegald, Jaralde, Wargi, qq.v.)	Narrinyeri (Taplin in Curr 1886 II), Narrin'yerree' (Richards 1903).
S.70	Buibadjali (Location unknown).	
AREA Y		
Y.1	Mabuiag	
Y.2	Muralag	
Y.3	Saibai	
Y.4	Tutu	
Y.5	Kaura'reg	
Y.6	Djagaraga	
Y.7	Anggamudi	
Y.8	Jadhaigana	Gudang, Goomkoding, Yadigan, Undooyamo of Jardine (1866) are sub-groups of this tribe. Similarly with Gudang, Kokoiliga, Ondaima and Yaldaigah of Creed (1878).
Y.10	Wudjadi (Wik-)	Wutati (Thomson 1934b).

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
Y.11	Ngu?rand	
Y.12	Ludigh	
Y.13	Unjadi	
Y.14	Djonggandji	Tjungundji (Thomson 1934a).
Y.15	Debidigh	Teppathiggi (Thomson 1934a).
Y.16	Ngadhugudi	
Y.17	Inadjana (idj-)	
Y.18	Ulwawadjana	
Y.19	Nggerigudi	Nggerikudi (Roth 1901). Yupungatti (Thomson 1934a).
Y.20	Angudimi	
Y.21	Njuwadhai	
Y.22	Ja?o (Koko-)	Koko Ya'o (Thomson 1934b).
Y.23	Wimarangga	
Y.24	Dainiguid	
Y.25	Mbalidjan	
Y.26	Lenngidigh	
Y.27	Ndru?angid	
Y.28	Ungawangadi	
Y.29	Jinwum	
Y.30	Ladamngid	
Y.31	Mamangidigh	
Y.32	Alngid	
Y.33	Gudjandju	
Y.34	Aridingidigh	
Y.35	Adidingidigh	
Y.36	Nggod	
Y.37	Do:dj	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
Y.38	Janggondju	
Y.39	Ndra?angid	
Y.40	Ndorndorin	
Y.41	Mbeiwum (Koko-)	
Y.42	Andjingid	
Y.43	Mumin (Wik-)	
Y.44	Gandju	Kanju (Thomson 1934b).
Y.45	Umbila	Ompela (Thomson 1934b).
Y.46	Adinda (Wik-)	
Y.47	Abodja	
Y.48	Ambama (Wik-)	
Y.49	Algan (Wik-)	Wik-Kalkin (McConnel 1953).
Y.50	Umbindhamu see also Gan-ganda	Koko Ompindamo (Thomson 1934b).
Y.51	Ngadara (Wik-)	
Y.52	Eba (Wik-)	
Y.53	Mejan (Wik-)	
Y.54	Ngaduna (Wik-)	
Y.55	Umbuigamu, see also Gan-ganda	
Y.56	Ngadanja (Wik-)	Wik-Natanya (McConnel 1957).
Y.57	Munggan (Wik-) (Tribe)	
Y.58	Lama-lama (Koko-)	Koko-lama-lama (Roth 1901), Kokolamalama (Hale and Tindale 1933-4).
Y.59	Ngandjara (Wik-)	
Y.60	Ajabadha	Koko Ai'ebadu (Thomson 1934b).
Y.61	Mbambylmu	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
Y.62	Walmbaria (poss. same as Walmbarddha)	
Y.63	Ju'gaiwadha	
Y.63.1	Mudumui (poss. same as Njegudi)	Mutumui (Hale and Tindale 1933-4).
Y.64	Baganu	
Y.65	Darnggele (Aku-)	
Y.66	Wurangung	
Y.67	Aji	
Y.68	Baraban see also Bindaga	
Y.69	Da:jor (Koko-)	Koko Tai'yuri (Thomson 1936).
Y.70	Juwula	
Y.71	Rarmul (Koko-) (poss. part of Jawa)	Koko-rarmul (Roth 1901).
Y.72	Mind'jana (Koko-)	
Y.73	Wulgulu (Koko-)	
Y.74	Jawa (Koko-)	
Y.75	A'ragu see also Waigur	
Y.76	Gwandera	
Y.77	'Jalandji (Koko-)	
Y.78	Je'landji (Koko-)	Koko-yellanji (Roth 1901).
Y.79	Njegudi see also Mudumui	
Y.80	Wara (Koko-)	Koko-wara (Roth 1901).
Y.81	Walandja (Koko-) (poss. same as 'Jalandji)	
Y.82	Jimidir (Koko-)	Koko-yimidir (Roth 1901).

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
Y.83	Gundjun (Koko-)	
Y.84	Laia (Aku-) (Koko-)	
Y.85	Bera (Koko-)	
Y.86	Bididji (Koko-)	
Y.87	Bujundji (Koko-)	
Y.88	Banambila	
Y.89	Djulngai (poss. part of Je'landji)	
Y.90	Njunggal (Koko-)	
Y.91	Gona'ni:n	
Y.92	Janju (Koko-)	
Y.93	Da:wa (Koko-)	
Y.94	Mini (Koko-)	
Y.95	Gudabal	
Y.96	Jan (Koko-)	
Y.97	Muluridji (Koko-)	
Y.98	Waldja (Koko-) see also Baldja	
Y.99	Jalunju (Koko-)	
Y.100	Gai-gai (Koko-)	
Y.101	Wanggara	
Y.102	Djabadja	
Y.103	Jalung (Koko-)	
Y.104	Wagara (Koko-)	
Y.106	Djabugai	
Y.107	'Araba	
Y.108	Wagaman	
Y.109	Djanggun (Koko)	
Y.110	Buluwandji	
Y.111	Jirgandji	
Y.112	Binggu	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
Y.113	Nargalundju	
Y.114	Gonggandji	Kungganji (Roth 1901).
Y.115	Barbaram	
Y.116	Djandjandji	
Y.117	Idindji	
Y.118	Wardibara (poss. part of Mamu)	
Y.119	Wanjuru	
Y.120	Njirma (poss. part of Djirbaldji)	
Y.121	Ngadjandji see also Mamu	
Y.122	Mamu (poss. same as Ngadjandji)	
Y.123	Djirbaldji	
Y.124	Djiru	
Y.125	Dagalag	
Y.126	Gulnggai	Mallanpara (Roth 1901).
Y.127	Giramaigan	
Y.128	Badun (Koko-)	
Y.129	'Nawagi	
Y.130	Bandjin	
Y.131	Janga:	
Y.132	Wa:min (Ak-) (poss. same as Wagaman)	
Y.133	Warungu	
Y.134	Waragumaigan	
Y.135	Wulgurgaba	
Y.136	Baganambia (Group of tribes, poss. same as Lama-lama).	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
Y.137	Bindago (Group of tribes including Baraban, Lama-lama, Mbambylmu, Mudumui).	
Y.138	Gan-ganda (Group of tribes including Umbuigamu, Umbindhamu).	Barunguan (Hale and Tindale 1933-4), Yintjingga (Thomson 1934b) - used for tribe at Port Stewart. Entjinga of Hale and Tindale (1933-4) refers to section of Barunguan.
Y.139	Gunggarbara	
Y.140	Lama-lama (Koko-) (Group of tribes including Gan-ganda, Wurangung, Baganambia).	
Y.141	Madhirdirl (Group of tribes including Bujundji, Muluridji).	
Y.142	Mbo?aru (Group of tribes including Gudjandju, Ja?o, Umbila).	
Y.143	Munggan (Wik-)(Group of tribes all using Wik- prefix).	Wik-Munkan (McConnel 1930), Wik Monkan (Thomson 1939).
Y.144	Ug'windjila (Group of tribes including Jawa, Mini, Wulgulu).	
Y.145	Waigur (Group of tribes including A'ragu, Rarmul, Juwula, Wara).	
Y.146	Wal'boram (Group of tribes including those of Bindaga, Ug'windjila, Waigur).	

Tribe No.	A.I.A.S. Spelling	Alternative Spellings
Y.147	Walmbarddha (Group of tribes including Gan-ganda, Lama-lama, Wurangung).	
Y.148	Wulbudji'bur (Group of tribes including Bujindji, Njunggal, Waldja).	

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