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**JORDAN, ANN TURNER**  
**A COMPARATIVE STUDY OF THE SETTLEMENT**  
**PATTERNS OF HUNTING AND GATHERING GROUPS.**  
**THE UNIVERSITY OF OKLAHOMA, PH.D., 1979**

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THE UNIVERSITY OF OKLAHOMA  
GRADUATE COLLEGE

A COMPARATIVE STUDY OF THE  
SETTLEMENT PATTERNS OF  
HUNTING AND GATHERING GROUPS

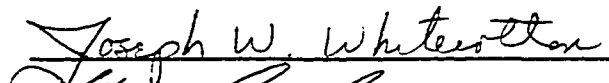

A DISSERTATION  
SUBMITTED TO THE GRADUATE FACULTY  
in partial fulfillment of the requirements for the  
degree of  
DOCTOR OF PHILOSOPHY

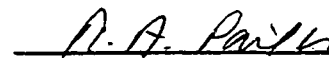
BY  
ANN T. JORDAN  
Norman, Oklahoma  
1979

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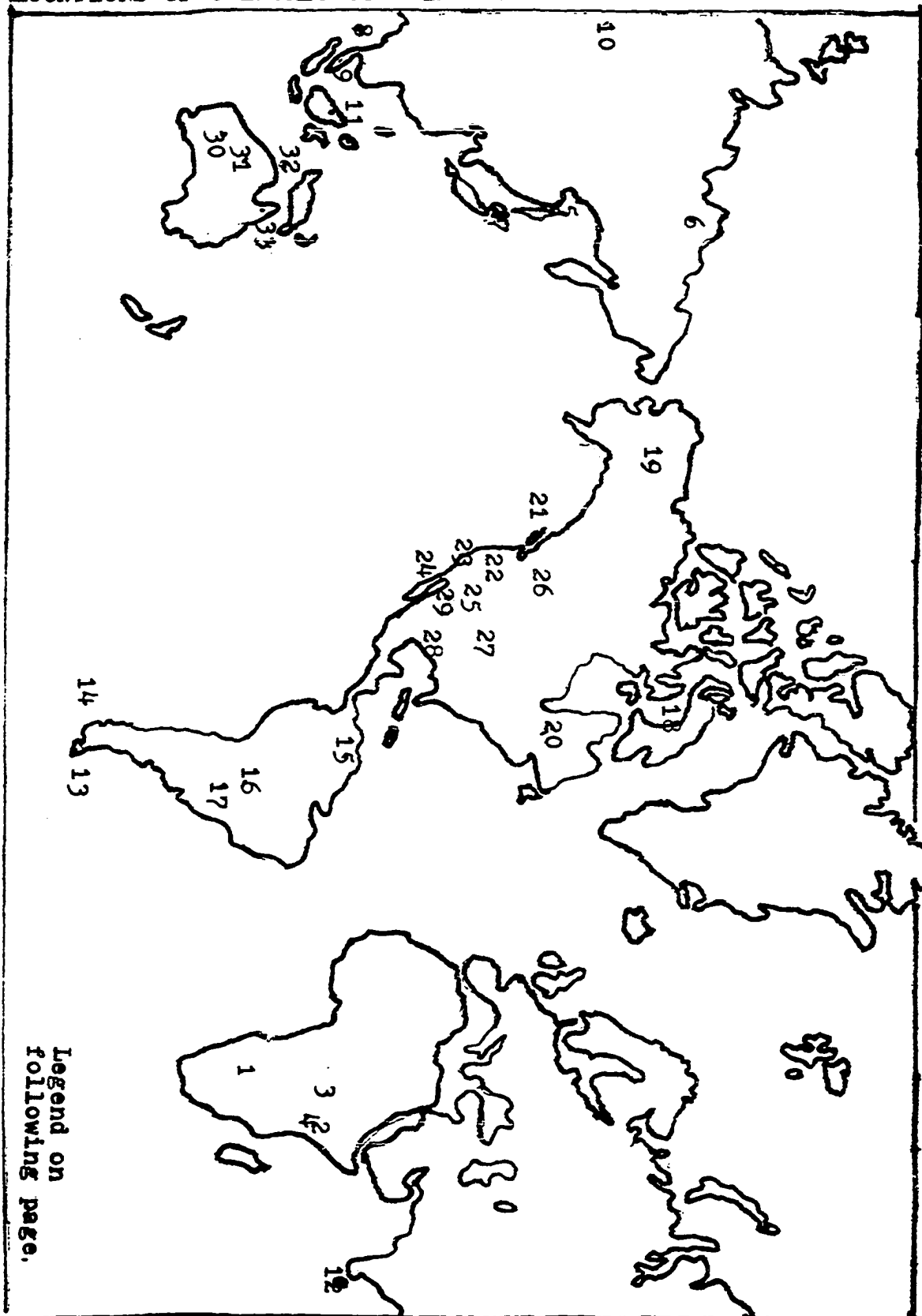




DISSERTATION COMMITTEE

LOCATIONS OF CULTURES USED IN THIS STUDY



## Legend

1. !Kung
2. Dorobo
3. Mbuti
4. Hadza
5. Gilyak
6. Yukaghir
7. Ainu
8. Andamanese
9. Semang
10. Ket
11. Punam
12. Vedda
13. Yahgan
14. Ona
15. Yaruro
16. Guato
17. Aché
18. Iglulik
19. Ten'a
20. Cree
21. Neotka
22. Hupa
23. Yokuts
24. Kilwa
25. Owens Valley Paiute
26. Kutenai
27. Arapaho
28. Coahuilteco
29. Chiricahua
30. Ngadadjara
31. Walbiri
32. Tiwi
33. Wikmunkin

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## CHAPTER I           INTRODUCTION

It is a sign of health in the field of anthropology that the volume of scholarly literature is growing. Anthropologists are actively developing new theories and exploring new lines of research. As new areas of endeavor take hold and develop a following among anthropologists, it is important to look back and coordinate these new fields with the old.

In the 1960s largely as a result of the enthusiasm over the growing field of ecological anthropology, field studies on hunter-gatherers showed a shift in interest. They became more interested in subsistence patterns, settlement patterns and the detailed collection of items like hours worked, distance traveled and caloric intake. The Man the Hunter Symposium in 1966 was the single event most responsible for bringing this new trend in hunter-gatherer field studies to the attention of other anthropologists. Unfortunately, field research among hunters and gatherers is a dying academic area as the forager lifestyle is vanishing from the earth. (Murdock, 1968 , surveys the groups still in existence at that time.) The number of hunting-gathering cultures now available for study by those interested in this new trend in research is small indeed. As a result, most of the



theory currently being built regarding subsistence and settlement patterns of foragers, the origins of agriculture and spatial archaeology is based, where ethnographic analogy of hunters-gatherers is needed, on the few recent studies that are able to give the kind of detail desired. In fact, it might be fair to say that such research is based largely on the excellent and voluminous work done recently with one hunting and gathering group, the !Kung Bushmen in the Kalahari Desert of South Africa.

It is the contention of this paper that, while the data in recent studies is superb, it is very dangerous to generalize about all hunters and gatherers from the few groups that have been available for study during the last 20 years. There is a wealth of data in the ethnographic literature of the last 100 years or so about hunters and gatherers, and much of it was collected by professional anthropologists. While this earlier research rarely included the detail on caloric input and output and time expenditure that is so in vogue today, it does include a great amount of data that could be of use in current theory development regarding settlement and subsistence patterns. The purpose of this work, then, will be to present a survey of this literature. It will be a comparative study of the settlement patterns of hunting gathering groups recorded in the ethnographic literature. It is felt that these earlier data can throw much light on the variety of and trends in settlement patterns among foragers and that it is preferable

to base any theory building regarding these cultures on all the data available instead of just on a small but current section of them.

In the process of doing this I hope to show that indeed generalizations from just a small section of these data can be faulty and dangerous and that a comprehensive survey of all the data available on forager settlement patterns is long overdue. Indeed, the survey to be presented here will reveal hunters and gatherers living in a variety of environments and using a variety of settlement patterns.

The remainder of this chapter will be a more thorough look at the current state of anthropological thinking regarding hunters and gatherers in an effort to show the usefulness of this comparative study. There are three areas of recent anthropological research where a more thorough look at the ethnographic data is sorely needed. They are the band controversy, population studies and spatial archaeology.

#### THE BAND CONTROVERSY

Lee and Devore (1968:7) in the introduction to Man the Hunter, briefly outline the history of band theory by reference to Radcliffe-Brown, Steward and Service. They refer to Radcliffe-Brown's "horde", which was patrilineal, patrilocal, territorial and exogamous. Steward, they say, recognized three types of forager group structure, the horde or patrilineal band, the composite band and the family band. Service then simplified Steward's three-fold typology

by insisting that the patrilocal band was the characteristic form of local organization among all hunters and gatherers in the past and that the composite and family bands were the result of acculturation and breakdown. By contrast the symposium found that

Fluidity of band composition appeared to be the most characteristic feature of modern hunters, but participants disagreed on whether this flexibility was basic to the hunting way of life or whether it was a product of recent acculturation....On the basis of present evidence, it appears that the patrilocal band is certainly not the universal form of hunter group structure that Service thought it was (ibid:7-8).

In actuality the symposium brought together two lines of thought concerning the band: a) that of the anthropologists working in Australia who had long been finding inadequacies in Radcliff-Brown's formulation and b) that of ecological anthropologists who had been working with and refining the theory of Steward, of which the patrilineal band was but one aspect.

The ecological explanation for fluid bands that resulted from the symposium is in line with Steward's earlier thought. His band theory was, after all, based on the relation between man and his resources. In his work on the Great Basin Shoshoni, he in fact postulates the type of fluid group being suggested by the dominant voices at the Symposium. Among the Western Shoshoni (1938:232) the basic unit was the family, but these families fused or separated

depending on the availability of resources. While Steward did not characterize this unit of social organization as fluid camp or band as the Symposium has done, it is virtually the same sort of organization they proposed and he explained it in much the same way (ecological adjustment to varied resources). The difference is that Steward overestimated the importance of non-migratory small game in the diet of most hunters and gatherers. Because he felt it to be the food of dominant economic importance for most groups, he felt the patrilineal band was a more common form of social organization than the fluid group of nuclear families. Thus, he stressed it more in his writings. Consequently, the form of organization advocated by the symposium is not new in the literature regarding social organization of foragers; it had simply received little attention in the past.

Since the Man the Hunter Symposium, a great interest in the question of flexible social organization among hunters and gatherers has developed. For example, Wilmsen (1973) has developed an elaborate model for examining the systemic relations among resources, location, population and space in the fluid organization of foragers. Basehart (1970) has speculated on the problems of leadership in a band subject to continuing change in size and membership. Burch (1971), while recognizing the importance of factors in the physical environment in determining movements of foragers, has concluded that there are non-empirical factors (ghosts,

sacred places, etc.) in the environment that effect those movements as well.

Paterson (1970) presents an interesting argument regarding Australian Aboriginal organization. He comments on the absurdity of the situation in band theory because, on ecological grounds, a case can and has been made for any type of social organization among the aborigines. He attempts to show that in Australia the pivotal relationship in the mixed groups is the relationship between a married couple and the wife's parents.

The following comments of Steward's are apropos here:

I suggest that minimal importance should be ascribed to a search for criteria of bands.... I think the only useful heuristic diagnostic and delimiting criteria of bands are that these societies shall have, first, a fairly wide-ranging nomadism (which may or may not involve territoriality) and second, permanent membership, even though the society fragments into smaller groups during certain portions of the year (1969:187).

Steward felt it was time to put a halt to the growing tendency to reify the band concept. One of the goals of this paper is to show the variety of settlement patterns used by hunters and gatherers as well as the conditions under which each is common.

#### POPULATION STUDIES

The work of Boserup (1965) and others has renewed the interest of many anthropologists in the origins of agriculture and its relation to population increase. This combined

with the new ecological studies of hunters and gatherers has led to a number of demographic studies of the forager situation, past and present. Hayden (1972) presents a model for population control among hunters-gatherers that is a static system of social control in which the population is controlled largely by cultural methods imposed on the females of reproductive age. He cites little specific ethnographic data to support his theoretical model and seems to assume not only that foragers are nomadic but that the picture of them that emerges in Man the Hunter is typical. He quotes from Lee and Devore and then states "that seemed to be the consensus of opinion regarding the lifeways of generalized hunter-gatherers as held by researchers most involved with this cultural level in 1969" (p. 205). In fairness to him he does say that there is "scant data to the contrary" but then cites only a few of the many other authorities in the area. Thus his work is based on the assumption that all foragers live lifestyles similar to the !Kung.

Denham (1974) has written on the incidence of infanticide among Pleistocene foragers and came to the conclusion that infanticide was atypical among Pleistocene populations just as it is among modern populations other than the Eskimo and the Australian Aborigines. He cites little specific ethnographic data in discussing modern foragers except his own data from the Alyawara.

Hassan (1975) presents an elaborate discussion of population density, size and growth among hunters-gatherers. Most of his specific ethnographic examples are from Man the Hunter and especially from Lee's work with the !Kung (see pp. 34-39, 48 for examples). Hassan includes a chart (p. 29) that gives a specific population density in persons per square mile for a number of groups, including the "Australian Aborigines", and "Tierra del Fuego". These two categories of hunters-gatherers, to my mind, each include several groups with different settlement patterns, subsistence patterns and populations densities and to discuss a single density for them is useless. In his discussion of consumption, he states that the caloric intake of the Australian Aborigines is similar to that of the !Kung (about 2, 140 kilocalories per day) and that the caloric intake of the Eskimos is 3,102. Again, a general figure giving the specific caloric intake of Australian Aborigines or Eskimos seems worthless in that in each of those groups there are individual cultures presenting a variety of lifestyles and subsistence patterns. Thus it seems to this reader that while Hassan's theory may be noble, his basis in ethnographic data is weak and a more thorough look at the literature would have made his argument more convincing.

Cohen (1977), in his book The Food Crisis in Prehistory, writes

In recent years there have been a number of major practical and theoretical advances in our study of agricultural origins....In the realm of theory, the breakthroughs that might be considered most important have occurred outside archaeology. The work of Richard Lee and others....has helped to break up old stereotypes of hunting and gathering groups while providing an accurate picture of hunting and gathering economies against which the emergence of agriculture can be measured (1977:3-4).

Here as in the works cited above, Lee and his school are hailed as giving us the accurate picture of hunter-gatherer life. The picture they present is, however, that of only one hunter-gatherer culture and should not be considered representative of all such cultures.

#### SPATIAL ARCHAEOLOGY

The excitement caused by the new trend in forager studies manifested itself in another anthropological area, that of spatial archaeology. The detail in these new field studies is the kind of ethnographic analogy that spatial archaeologists have hungered for, and thus they have jumped at the chance to put it to use. This bond between archaeology and ethnography has been generally discussed in an article by Stiles (1977). Gould (1969) refers to his field work with the Western Desert Australian Aborigines as "living archaeology" as these aborigines provide the arena for first hand testing and use of archaeological principles.

Jochim (1976) developed a model of hunter-gatherer subsistence and settlement based on ethnographic data



that he then used to predict subsistence and settlement in archaeological situations. While some of his logic seems questionable, my quarrel here is with his use of ethnographic data. Unlike most of the other cases cited in this chapter, he cannot be accused of overemphasizing the !Kung although he does refer to them and to other studies from the 1966 symposium. On the contrary, he takes most of his examples from hunters and gatherers living in northern latitudes and thus overemphasizes their lifestyle so that his theory is oriented toward groups in which meat is more important than vegetables. This dependence is built into his theories and makes them less useful in areas closer to the equator.

Two recent books present elaborate theory development in spatial archaeology. They are Spatial Archaeology by David Clarke (1977) and Spatial Analysis in Archaeology by Ian Hodden and Clive Orton (1976). Both make use of the data developing out of the Man the Hunter Symposium. Indeed, the kind of detail required to do the kind of analysis they wish can only be found, with very few exceptions, in these recent field studies. While spatial archaeologists may not have the choice of using earlier ethnographic data because it does not provide the information they seek, it remains true that it is dangerous to use as examples only the few groups left in the field in the 1960's and 1970's.

Thus far, I have attempted to show that recent use of ethnographic data has been largely the use only of the most

recent of those data. While those data may be excellent and, in the case of the !Kung, copious (Lee, 1968, Lee and Devore 1976, Yellon 1977), it does not present a well rounded picture of hunter-gatherer life as it is depicted in the treasury of anthropological literature. In fact, of the 33 groups to be discussed in this paper, only one other group lives in an environment and has a settlement pattern like that of the !Kung. Thus I suggest that a comprehensive survey of the specific kinds of settlement and subsistence patterns among hunters-gatherers found in the entire body of ethnographic literature is sorely needed at this point in time. As Steward stated: "Cross-cultural studies have the advantage that hunches or hypotheses concerning the processes and resulting social forms concerning single societies may be validated or revised by extended comparisons" (1969:190). Generalizations should be based on all the data available rather than a small part of them.

Lee and DeVore give a trial formulation of their views regarding hunters and gatherers in their introduction to the Man the Hunter volume (p. 11). They state that they are not trying to draw a general picture of hunters but to offer a formulation that may be used as a starting point for future research and discussion. They assume two points about hunters and gatherers--that they live in small groups and that they move around a great deal. The second of these does not seem to be a fair assumption. There is

evidence of a number of foraging groups that are not very mobile, e.g., the Northwest Coast groups, the Ainu, the Gilyak. The editors then describe a social system with five characteristics: 1) egalitarianism, because mobility requires a minimum of property 2) small living groups that vary in size according to resources 3) reciprocal access to food 4) food surplus not as important, as the environment is the storehouse for food 5) some movement due to resolution of social conflicts rather than to economic needs. Two erroneous assumptions are embedded in these characteristics. One is the lack of a need to accumulate a surplus since the environment is the storehouse. There is evidence that in many environments around the world, food cannot be found stored naturally on the ground all year round and thus a surplus and storage techniques become necessary. This is true of the Eskimo, the Northwest coast tribes, and some of the Great Basin Shoshoni groups. Also, the necessity of mobility does not imply the lack of property. The Eskimo, because of the nature of the environment in which they live, find it essential to use a number of material items in their food quest and have a very elaborate and extensive technology. The volume of their material inventory does not prevent them from being mobile, however; it simply requires that they follow roughly the same path of movement each year. They leave their winter hunting equipment in a designated spot and return to pick it up the next year.

The same situation prevails in regards to food. Since they must survive a season of scarcity, the rest of the year they build up a surplus of stored food that is left at designated spots in the wild and then return to collect it before the onset of the long winter season.

Lee and DeVore stated that in this trial formulation they were not trying to draw a general picture of hunters and gatherers; thus they cannot be criticized if their formulation does not fit all such groups. However, if, as they desire, it is to be used as a starting point for future research and discussion, it must be recognized that it implies a specific type of environment that is by no means characteristic of the habitats of extant foragers and would be even less useful in developing an understanding of prehistoric foragers who ranged over an even wider variety of habitats. The environment they envision is one in which resources are scattered but attainable throughout the year. In some habitats the resources are so close at hand that movement is not necessary for economic reasons and in others they are not attainable throughout the year and thus some surplus must be built up. One unfortunate result of the popularity of the notion of a flexible, fluid living group among hunters and gatherers is that it implies a great deal of movement on their part. This mobility should not be assumed; rather it is a notion to be tested against the existing data. If it is found lacking in some cases then new more insightful concepts can be developed.

## CHAPTER II      METHODOLOGY

The following specific procedure was used in choosing the societies included in this study. First a list was made of all fully hunting and gathering societies listed in George Peter Murdock's Ethnographic Atlas (1967). That entailed listing all societies in the Atlas that had zeros as the last two digits of the five digit number in column seven. Zeros in these columns indicate that the society has no more than 5% dependence on animal husbandry or agriculture. Conversely it means that at least 95% of the society's food is obtained from "the gathering of wild plants and small land fauna...hunting, including trapping and fowling...fishing, including shellfishing and the pursuit of large aquatic animals (p. 46)". The Atlas listed 31 such societies in the world excluding North America and 163 societies in North America.

It seemed that to study all the societies listed would strongly bias the study in favor of North America since Murdock was much more thorough in his North American sample. Therefore I decided to use one society from each of Murdock's "World Sampling Provinces" (1968). This resulted in including almost all of the societies listed in the Atlas for every continent except North America and Australia. There were only three instances in which

societies from other continents had to be dropped. In Africa, province no. 2 "Bushmen" contained the !Kung and the Naron and the Naron were dropped. In South America, province no. 199 "Patagonians" contained the Ona and the Tehuelche and province no. 200 "Fuegians" contained the Yahgan and the Alacaluf. The Ona and the Yahgan were chosen. In these three cases, the societies chosen were the ones for which the most ethnographic data was available.

The North American sample was divided into 36 provinces and the Australian sample into 2 provinces. It was felt that in the case of North American, Murdock was still too detailed and in the case of Australia, that he was not detailed enough. For example, Murdock had the Northwest Coast societies of North America divided into three provinces, while all of Australia was divided into only two. Therefore to further amalgamate the North American sample, I used his culture areas in the Ethnographic Bibliography of North America (Murdock and O'Leary 1975) which places the North American societies in 15 areas. In North America, many societies were adequately reported upon and the ones studied were chosen randomly using a table of random numbers. Some of the societies so chosen had not been sufficiently studied, and in these cases a second choice based on the random numbers table was made.

I felt it was necessary to increase the Australian sample because to divide the hundreds of societies on the

continent into 2 provinces seemed to me to be inadequate representation. Several attempts have been made by Australian area specialists to divide that continent into sections for ethnographic study (Meggitt 1964, Stanner 1965, Capell 1963, Yengoyan 1968 and Lawrence 1969). The one chosen for this study was that adopted by the Australian Institute of Aboriginal Studies which was originally proposed by Capell. It divides Australia into 11 subdivisions. The societies chosen within these 11 subdivisions were so chosen largely because there was sufficient subsistence and settlement pattern data. There is a massive amount of data on social organization in Australia but less on subsistence and settlement patterns.

In actuality, not every area of the world containing a recorded hunting and gathering society is represented in this study as in some instances the preagricultural data were not complete enough. At the end of this chapter is a list of the societies included in the study.

After the societies had been chosen, the pertinent data derived from the major ethnographic sources were recorded on a data sheet. A sample data sheet is found in Appendix A. Each society was typed according to its environment and its settlement pattern. The environmental types used are those found in Cloudsley-Thompson (1975) which seem to correspond on the whole with environmental types listed by a number of climatologists and ecologists (e.g., Koppen, Odum, Thornthwaite, and Bumney). The environmental types used here are

tropical forest (evergreen and semidecidious), tropical savannah, desert, mid-latitude grassland, mid-latitude forest, boreal forest and tundra. It was felt that the best way to order the entire comparative study was to group the societies according to environmental type and discuss the different subsistence strategies used within each environment. Thus the body of the paper is composed of chapters each devoted to a single environment and the societies found in it. Each environmental type is discussed in detail at the beginning of the chapter devoted to it.

It is my contention that, first of all, a wide variety of settlement and subsistence patterns have been used by hunters and gatherers and are recorded in the literature. Secondly I suggest that within each environmental type there are a variety of subsistence strategies hunters and gatherers can use to exploit the environment and that many of these are recorded in the literature. The subsistence strategies then determine the settlement pattern used in the exploitation.

Thus I aim first and foremost to present the ethnographic data necessary to show the variety of patterns used by extant hunters and gatherers and then to make some order out of this variety by analyzing trends that appear. Below is a discussion of the settlement patterns I have devised to use in this study. These patterns are based on degree of mobility, which involves the ease of availability of water



and food and the presence or absence of food preservation. The patterns below refer to groups whose means of transportation is humanpower, dogpower or horsepower.

Usually the presence of a seasonal cycle affects the pattern. Of the 6 patterns listed below, the first and second do not acknowledge the presence of seasons while the third, fourth, and fifth reflect an adaptation to a seasonal cycle. The sixth pattern seems to be a special situation in which the group involved has developed an exploitation of a maritime or riverine environment.

#### 1. Restricted Nomadism

This form is practiced by people who wander with no fixed path over a restricted area. Extant hunters-gatherers have some feeling of a territorial area within which they feel at home. Boundaries of some sort have been forced upon them by their neighbors. In this first form, the only restriction to movement is the difficulty presented by moving outside one's home area. This differs from Beardsley's (Beardsley et al.: 1956) "restricted wandering" in that it does not include groups following a seasonal round.

#### Examples:

The Ona appear to live in this manner according to the ethnographic accounts.

## 2. Highway Nomadism

For some groups, it is necessary to move fairly often, yet they may travel only along certain prescribed "highways". Thus, they may leave much of their area unexploited because it does not lie along these highways.

### Examples:

The Yahgan of Tierra del Fuego travel by boat and only explore the coasts of their area. They rarely venture into the interior. Thus the water ways are "highways" they follow in their wanderings.

The Aché of the tropical forests of Paraguay follow a similar, though freer, pattern. Part of their subsistence endeavor is the encouragement of reproduction of larvae of the coleoptera. The men cut down pindo palm trees, cut the trunks into sections and leave them to rot in order to provide the insects with a place to lay their eggs. In the course of their food search, they return to these spots to gather the larvae that will grow there. Each group has a number of places they return to to gather the larvae. This, in effect, means they travel in a circle. Their settlement pattern is less restrictive than that of the Western Desert Australians or the Yahgan because they are not tied to their highways. They may venture off them if their food search leads them in another direction.

## 3. Variable Semi-Sedentariness

For these people a seasonal cycle is important in determining their settlement pattern. They spend part of every year

in one or more of the several predetermined spots. However, from year to year they may not settle in the same spot and in any given year, during this season, they may move back and forth among the spots. This is similar to Beardsley's (Beardsley et al.: 1956) "central based wandering" although his definition implies only one base during the year.

Examples:

The Kung Bushmen are an example as in the dry season they must restrict their movements to the areas around the eight permanent waterholes within their area. In any single dry season, a bushman family may visit several of these water holes and from year to year they may not return to the same holes.

#### 4. Fixed semi-Sedentariness

Here again, the seasonal cycle is important in determining the settlement pattern. Foragers in this group spread out during a specific season of the year; however, they settle in one spot, returning to the same spot year after year.

The Semang of the Malayan Peninsula spend most of their time foraging wherever the search leads them. However, during the durian harvest, they return to specific durian trees to harvest the crop. The crop is dependable from year to year and the trees are "owned" by specific individuals who return to them each year.

## 5. Multiple Base Sedentariness

Groups following this pattern follow an annual seasonal round settling at fixed points. They live in two or three specific places during the year.

### Examples:

The Owens Valley Paiute have a summer and a winter home and migrate between the two. Other than those twice annual migrations, they live a settled life.

## 6. Single Base Sedentariness

There are a few hunter-gatherer groups that can truly be called sedentary as they have permanent villages in which they live year round. All of them depend heavily on maritime or riverine food resources.

### Examples:

The Gilyak have different winter and summer houses because of the difference in climate and their desire to be comfortable in all seasons. The distance between the houses is minimal, however, as the Gilyak need to be near their storehouses of preserved resources all year long.

Before beginning my presentation on the cultures themselves, I should like to point out that all the societies included in this study had experienced some contact with more technologically advanced societies. There simply are not many, if any, pristine hunter-gatherer societies left in the world. I discuss the specific contact situation in my presentation of each culture in order that the

reader may be aware of the situation at the time data was collected. However, the subsistence and settlement pattern material then presented refers to that time when hunting and gathering was judged to be the primary source of food and any other food sources were superfluous to the basic subsistence need. In many instances these groups were no longer living such a foraging lifestyle, however, the ethnographer was able to reconstruct it.

Another problem arose in regard to this issue. It was often difficult to determine to what extent the foraging lifestyle had been altered by contact. In most cases I did not feel it wise to second guess the ethnographer and estimate the degree of alteration due to culture change. In some instances the degree of change was known and thus I could take it into account. When this occurred I have discussed the change in the presentation of data on that culture.

Ultimately, however, the decision whether or not a group was too "contaminated" by contact with technologically superior cultures to be of use in this study was a judgment made by me. I acknowledge that mistakes have probably been made in this regard.

## Hunter-Gatherer Cultures in Sample

AfricaG.P. Murdock's World Sampling Provinces

!Kung	No. 2 Bushmen
Dorobo	38 Southern Nilotes
Mbuti	15 Pygmies
Hadsa	10 Rift

AsiaG.P. Murdock's World Sampling Provinces

Gilyak	No. 77 Gilyak
Yakaghir	75 Yukaghir
Ainu	78 Ainu
Andamanese	92 Andaman Islanders
Semang	94 Semang-Sakai
Ket	
Punam	

South AmericaG.P. Murdock's World Sampling Provinces

Yahgan	No. 200 Fuegians
Ona	199 Patagonians
Yaruro	
Guato	
Aché	

North AmericaMurdock and O'Leary's Culture Areas

Iglulik	Arctic Coast
Ten'a	Mackenzie-Yukon
Cree	Eastern Canada
Nootka	Northwest Coast
Hupa	Oregon Seaboard
Yokuts	California
Kiliwa	Peninsula
Owens Valley Paiute	Basin
Kutenai	Plateau
Arapaho	Plains
Coahuilteco	Gulf
Chiricahua	Southwest

AustraliaAustralian Institute of Aboriginal  
Studies' Tribal Subdivisions

Ngadadjara  
Walbiri  
Tiwi  
Wikmunkin

Subdivision A  
C  
N  
Y

## Number of Cultures by Continent

Africa	4
Asia	8
North America	12
South America	5
Australia	<u>4</u>
Total	33

### CHAPTER III CULTURES OF THE EVERGREEN TROPICAL FOREST

Although much of the original vegetation has been destroyed, much rain forest still exists in the tropics. The largest single area of tropical forest is located in South America centering on the Amazon basin. It is found west to the slopes of the Andes and east to French Guiana, south to the Gran Chaco and north into southern Mexico. In Africa, the evergreen forest runs from the Congo basin through equatorial west and central Africa, although it is periodically broken by savannah. Some rain forest is found in Zambesi and on the islands in the Indian Ocean. It is also found from Ceylon and western India to Thailand, Burma, Malaysia, Indonesia, New Guinea and the north coast of Australia (Cloudsley-Thompson 1975:30).

Evergreen tropical forest occurs in areas where the mean temperature is about 80°F and usually does not move out of the range of 70°F to 90°F. Moisture is caused by rain falling fairly evenly throughout the year. The annual rainfall should be at least 60 inches. It is important that, if there is a dry period, it is not more than two or three months long. If it is any longer the leaves will fall from deciduous trees giving the forest entirely different characteristics.

Climate in an evergreen tropical forest is fairly uniform and monotonous. The average daily temperature range



is several times the difference between the warmest and coolest months of the year. The thick cover of clouds and vegetation prevents the temperatures from getting extremely high as they tend to do in tropical deserts (Cloudsley-Thompson 1975:31).

Evergreen tropical forests contain an extraordinary number of plant species. They are likely to have 400-500 tree species and 800 woody plant species. In contrast, a temperate mixed forest is likely to have 10 to 15 tree species. Almost all the trees in an evergreen tropical forest are evergreens. The few deciduous ones lose their leaves at irregular intervals.

There are several layers of trees in the forest. The tallest are those scattered ones whose crowns form a canopy over the forest. Below this is one or more layers of smaller trees whose tops do not reach the canopy. Below this is a layer of woody and herbaceous shrubs and near the ground a layer of non-woody herbs and tree seedlings which get very little light. The average canopy height is about 120 ft., the shrub layer 6-15 ft., and the herb layer 2 ft. In addition the forest is full of climbing plants. Some varieties reach all the way to the forest ceiling while other never get far off the ground. Climbers are especially abundant along river banks where the tree cover is less dense. Another group of plants regularly found in the evergreen forest are the stranglers which begin by growing on other plants but eventually send roots down to the soil and kill

the plant they are attached to. Another group is the epiphytes which grow on the trunks, branches and leaves of trees and shrubs and do not have roots in the soil. They provide a habitat for variety of insects, tree-frogs, lizards and snakes. The forest also contains saprophytes (bacteria, fungi, orchids, etc.) and parasites (either terrestrial root-parasites or arboreal epiphytes) (Cloudsley-Thompson 1975:33, 35).

Most animal life in the evergreen rain forest is adapted either for tree climbing or for pushing through dense undergrowth. There are a large number of flying insects as there is so much lush vegetation to support them. Bumblebees are perennial in the absence of a seasonal climate. While the numbers of species (both plant and animal) is high in the forest, the number of individuals within each species is low and stays fairly stable. According to Cloudsley-Thompson (1975:37), the rain forest has the "greatest natural inherent stability of any region in the world".

The size and abundance of larger animals is limited and the ones that do live in the forest tend to range widely for food. It is possible that this is because with a great number of species but few individuals within each species, large animals have few single constant sources of food to depend upon other than ants and termites. For example, chimpanzees (*Pan troglodytes*) in Uganda's Budongo

forest move from one section of the forest to another as fruit trees ripen and have a flexible social organization in that at certain times they are scattered over the forest and at others concentrated in one spot (Reynolds, 1965). Lowland gorillas (*Gorilla gorilla*) live on pithy stems and roots that are plentiful anywhere, and they travel slowly in compact groups (Cloudsley-Thompson 1975:37).

Since rainfall is fairly evenly distributed in evergreen tropical forests, there is not much seasonal change of climate. Therefore breeding among animals need not be confined to a single season as it is in temperate climates. In evergreen forests, birds breed in most months of the year and often have two clutches in a single year. In temperate climates the breeding cycles of birds are controlled by seasonal changes in the length of daylight so that the birds all breed when daylight is of a particular length. Such seasonal changes do not occur in the tropical evergreen forest. The breeding habits of mammals in evergreen forests has not been as thoroughly studied as that of birds; however, it appears that many species of mammal have breeding seasons although they differ with the species (Cloudsley-Thompson 1975:39-40).

Many species in the rain forest are arboreal. There is scant vegetation on the ground but the trees are full of fruit and termites. Since there are no seasons and fruit is thus available throughout the year, parrots, fruit-pigeons,

fruit-bats and chimpanzees are able to live mainly on fruit, a subsistence situation they could not find in any other climate of the world (Cloudsley-Thompson 1975:44).

An example of the variety of evergreen forest fauna can be found in Harrison (1962). The mammals of the forest of Malaya and of Australia can be divided into the following groups: 1) the upper air community composed of bats and birds which hunt above the canopy, 2) the canopy community of birds, bats and other mammals eating mainly leaves, fruit and nectar, 3) the middle-zone flying animals made of predominantly insectivorous birds and bats, 4) the middle-zone scansorial animals which are mammals that move up and down the tree trunks utilizing both the canopy and the ground and are mixed feeders, 5) the large ground animals which are large mammals and some birds who live on the ground and cannot climb but have a great range either because they can reach up into the trees or because they cover a large area of the forest ground, 6) the small ground animals, both mammals and birds who do some climbing and live on food found on the ground or the lower parts of the trees. They are mostly insectivorous or mixed feeders but some are vegetarians and some carnivores.

Thus in evergreen tropical forests, there are no seasons and plants and animals alike breed throughout the year, though any one species may tend to breed at the same time each

year. Also, the forest has a large variety of species of plant and animal life, but each species is represented by relatively few individuals. Three of the cultures included in this survey live in an evergreen tropical forest. They are the Mbuti of Africa, the Punam of Borneo and the Semang of the Malay Peninsula.

#### THE MBUTI

The Mbuti live in the Ituri Forest in the Oriental Province of the Congo. They are pygmies, and pygmies are found only in Asia and Africa. Aside from the bushmen, there are three main groups of pygmies in Africa, the Mbuti of the Ituri Forest, the Tswa of the western Congo and west Africa and the Twa between Lake Kivu and Lake Tanganyika. More specifically, the Mbuti are located at 20°-30° east longitude and several degrees north and south of the equator. The northern frontier of the area is the Bomokandi River, the eastern one the forest edge, the southern one a line from Ruwenzori through Beni to Bafwasende and the western boundary a line north from Bafwasende to Panga and to the confluence of the Bomokandi and Uele (Turnbull 1965:159).

#### Environment

The area defined above is rain forest with many rivers and streams and a gently undulating terrain. In fact, perennial streams are never over a few miles apart and the Pygmies rarely have to go over 100 yards to find water (Putnam 1948:322). Typical of an evergreen tropical forest,

there is little seasonal change and different vegetation flourishes at different times of the year. The game is not migratory except within a very small area. The temperature throughout the year varies only from the low 70s at night to a high of 80° during the day. It rains late in the afternoon about 180 days of the year with annual rainfall being about 60 inches. There is a mild dry season in January and February (Putnam 1948:322; Turnbull 1965:164).

### Culture Contact

We know little about the origin and history of the Pgyimies. They have been in the forest for thousands of years and for the last several hundred have had contact with Bantu and Sudanic agriculturalists. They trade with the agriculturalists and periodically move into their villages. They tend to move into the villages when they want to change or when a celebration is to take place. The decision does not seem to be based on subsistence needs, therefore, it is their movement in the forest that will be discussed here.

### Subsistence

Schebesta (1952:153) divides the Mbuti into three major groups: the Aka on the north, the Sua (net hunters) on the South and the Efe (bow and arrow hunters) on the east. Fauna eaten include elephant, pig, monkey, snails, grubs, termites, ants, larvae and snakes. At all times of the year game, as well as mushrooms, fruits, nuts, berries and roots

are available. Honey is found two months of the year (Trunbull 1962:263). Transportation is by foot.

### Settlement Pattern

The Mbuti follow the "restricted nomadism" settlement pattern. Putnam (1948:335,336) estimates that the net hunters move camp every month or two while Schebesta (1952:148-9) indicates the archers' camps are more variable in size and duration. In both instances they wander through the forest setting up only temporary camps and have no reason to return to special sites. The seasonless environment means that fresh food is always available although no single food is available in large quantities. As might be expected, the Mbuti do not preserve food as they have no season of scarcity when preserved food is required. When they have acquired a large amount of meat, they do preserve some of it to take to the villagers for trade but not for their own personal use.

The archers' diet consists of about 30% meat and the rest vegetable food. They depend on the villagers for some of this as they trade meat or service for plantains, sweet potatoes and peanuts (Schebesta 1952:174). The optimum group size for hunting with bow and arrow is 3 men. The archers travel in groups ranging from 2 to 12 huts with 6 huts being average. A single hut usually contains a husband, wife and their unmarried children (Schebesta 1952:202;

Putnam 1948:160). The average number of children born per woman among the archers is 3 with 2 of them surviving (Turnbull 1965:160-161). Thus the average number traveling together might be 24. During the 2 months of the year when honey is available, the archers merge into larger groups to gather it.

The net hunters find that a minimum of 6 families and a maximum of 30 is necessary for their method of hunting. Each family must have its own net which may be up to 300 feet long. The men hold the nets strung out end to end and the women and children chase the animals into the nets (Turnbull 1962:95; 1968:135). The net hunters split into small groups during the honey season. Putnam (1948) states that 20-40 hunters is the optimum size for an economic unit among the net hunters with 25 huts (150 people, 20-40 adult males) being average. Turnbull (1965) found 15 huts to be average and 30 huts to be the largest unit size. This difference of opinion cannot be reconciled now although Putnam certainly had the longer association with the Mbuti. The dry season (January and February) is a period of seasonal feasting in which "ibambi" is the most important fruit and "baselli" the most important nut in the diet. When the first heavy rains begin after the dry season, termites become available. The honey season is toward the middle of the year (Putnam 1948:333).



Schebesta (1952) indicates that the hunting groups are patrilineal. Turnbull (1965:183) and Putnam (1948:335) both disagree. They feel that the Mbuti tend toward a patrilineal descent system and patrilocality; however, in reality camps are often composed of unrelated people as the pygmies like to visit among their neighbors (Putnam 1948:335). Thus no pattern can be seen in the relationships of actual camp members indicating that these groups are of the loose association described by Lee for the !Kung. The solution to this contradiction may lie in the fact that Schebesta worked with the archers and Putnam and Turnbull with the net hunters. Possibly the archers exhibited a stronger patrilineal tendency. It is also possible that Schebesta is recording the ideal situation rather than the real one and that the camps in both groups are composed of both related and unrelated families.

At any rate, the Mbuti are hunters and gatherers living in an evergreen tropical forest who follow the "restricted nomadism" pattern. They have no particular staple foods but instead depend upon utilizing a variety of foods. These characteristics of the Mbuti are understandable in terms of their environment. The restricted nomadism pattern lends itself to a seasonless environment. Since fruits and vegetables ripen at different times throughout the year, one can travel around picking what is ripe at the time.

There is no single season for abundant harvest and none of extreme scarcity. Many hunter-gatherer groups do depend on a few staple foods for the bulk of their diet. Understandably the Mbuti are not one of these groups. Evergreen forests do not provide large numbers of individuals within a species. Thus the supply of any one species is not large. Rather, the forest contains a large number of species making it more convenient for a group to eat a variety of foods but none of them in great quantities. This is what the Mbuti do.

#### THE PUNAM

The Punam live in the rain forest in the interior of Borneo at the source of the Sarawak and Kalimantan rivers. Their location is  $2^{\circ}$ - $4^{\circ}$ N,  $113^{\circ}$ - $115^{\circ}$ E.

#### Environment

Borneo, with an area of 290,000 square miles, is one of the largest islands in the world. It contains several massive mountain chains with peaks 10,000 feet above sea level. The rain is copious at all times though it is heaviest in October and least in April and May. In February the northeast monsoon arrives. In Kuching during the thirty years prior to 1912, the average yearly rainfall was 160 inches. The maximum in a single year was 225 inches while the minimum was 102 inches. The maximum monthly rainfall recorded was 69 inches and the minimum was .66 inches.

Temperature normally ranges from 70° to 90°F. In 1906 the highest reading was 94°F. and the lowest was 69°F. The forest contains 500 species of trees including mango, durian, mangosteen, rambutan, jack fruit, trap, lansat, and many varieties of banana. It contains a variety of palms. Caladium is the major edible root. Wild sago is found at lower levels and in pockets in the mountains. There are 450 species of birds, some of which are peculiar to Borneo. There are also several species of mammals (one of monkey, two of apes, a civet cat, etc.) which are unique to Borneo. The forest also contains pigs, deer, shrews, snakes, anteaters, etc. There are numerous streams and rivers which are populated with fish (Hose and McDougall 1966:1-3).

#### Culture Contact

The Punam are slowly becoming acculturated. In the late nineteenth century when Hose and McDougall encountered them, many still lived in and of the forest. By the 1950's when Needham studied them, many were sedentary, having been greatly effected by a neighboring, riverine, agricultural tribe, the Dayaks. Those Punam that still lived in the forest traded with the Dayak (Needham 1972:177). While their economy was altered by this trade, the majority of foods eaten were still acquired from the wild. The rice and other foods received from the Dayak were of minimal importance in the diet.

### Subsistence

The staple food of the Punam is the wild sago palm which they eat throughout the year. The pig is the most prized game animal although the monkey is the most common kill. Small birds are also a common source of meat. Other vegetable foods eaten often are caladium root, canna and uncurled fern fonds. Edible swallows nests are gathered and traded to the Dayak for rice and other foods. The weapon commonly used to kill game is the blow pipe with poison darts though spears are used as well (Needham 1972:178; Hose and McDougall 1966:36; Furness 1902:175).

### Settlement Pattern

The Punam settlement pattern is one of the "restricted nomadism" type. Each group generally stays in one area, such as the basin of one of the upper tributaries of a large river. Within their home area they wander in small groups of 20 to 30 people, spending a few weeks or months in one spot, usually attracted to it by the presence of wild sago palm, and then move on (Hose and McDougall 1966:36; Furness 1902:175). Kinship is reckoned cognatically with a patrilineal emphasis which can be seen in the composition of the economic groups (Hose and McDougall).

Thus again we have a situation where a relatively seasonal environment is exploited by use of the "restricted nomadism" settlement pattern, a pattern that does not make use of seasons.

## THE SEMANG

The Semang live in the Malay Peninsula. The term "semang" is used to describe the nomadic hunting and gathering Malayan aborigines, which includes the Kensiu, Jahai, Lanoh, Mendriq, Temoq, Bateq, Kintaq, Pangan, Semaq, Samang and Semoq Beri. Their agricultural aboriginal neighbors are the Senoi who together with the Semang are supposedly remnants of a once much more wide spread population that elsewhere was replaced by a more powerful people. The Semang and Senoi were thus forced into the hills by Malays who were technologically superior (Dentan 1968:2).

## Environment

The Malay Peninsula is in the core of the Asian evergreen rain forest. The daily temperatures range from 85° to 95°F. with the nights about 20° cooler. It rains 200 days of the year with the wettest months being April, October and November and the driest being February and July (Dentan 1968:15). The Malayan animal kingdom belongs to what zoogeographers call the "Malaysian subregion" which includes Borneo and Indonesia west of Bali, as well as Malay. The fauna are varied. There are 129 species of snakes and 70 species of bats in Malaya. There are, however, few individuals in any species, and mammals tend to be solitary or move in small groups. There are sharp differences between the lowland fauna and those found above 300 feet. The

elephant is the largest Malayan animal; tapirs are common but shy. Also found are rhinoceros, barking deer, wild pig, tiger, leopard, civet cat, many species of rats and mice, three gibbons, three of leaf monkeys, two of macaques, pangolin or "scaly anteater", mouse-deer and many birds. The species of fish include carp and catfish (Dentan 1968:25).

Just as in Borneo, the mountainous sections of the central equatorial rainforest of the Malay peninsula show a gradual change in the structure and composition of the vegetation. While it continues to be evergreen, the large diptocarps disappear, trees become smaller, giant ferns bracken, and lichens proliferate. The forest thus becomes subtropical at elevations of from 1500 to 5000 feet (averaging 4000 feet). Between 3000 and 6000 feet the more typical tropical trees change to mid-latitude varieties like oaks, magnolias, laurels and maples, and the forest becomes a tropical moss or mist forest full of damp ferns, liverworts, and mosses (Rumney 1968:562).

#### Culture Contact

The chronicle of their ever decreasing population tells the story of culture contact among the Semang. Although population figures for such a nomadic group are probably not reliable, the list of Malayan districts from which they have slowly disappeared does indicate a reduction in numbers and a movement into the hills. As already mentioned, they were pushed into the interior by the Malays centuries ago. Ivor

H. N. Evans, 1913 to 1932, and Paul Schebesta, a Roman Catholic priest whose fieldwork from 1924 to 1926 and from 1938 to 1939 was financed by Pope Pius XI, report many districts earlier inhabited by Semang no longer had such residents. Disease, especially smallpox and the influenza epidemic of 1918, as well as the pressures from outsiders, has caused a population reduction and likely some amount of movement and amalgamation.

Schebesta reports that at the time of his fieldwork, many of the Semang were in a symbiotic relationship with either the Semoi or the Malays (Schebesta 1954:42, 1978). Evans and Schebesta present the most ethnographic data on these people. Evans worked with the Kenta'-Bog'n and Lanch groups of Semang, and Schebesta worked with the Kenta'-Bog'n, Jahay and Kensiu.

### Subsistence

The Semang depended primarily on plant foods. Women gathered in groups, though the food gathered was usually shared only with the nuclear family. They left camp about 9:00AM and returned in the afternoon. They gathered 20 varieties of tubers, 10 of rattan roots, 9 of palmaceous plants whose sprouts or pith were eaten, 4 of leaf plants and shrubs whose leaves or pith or both are eaten, the fresh sprouts of several varieties of bamboo and several varieties of

fungi. This list was reported by Schebesta, who was quick to point out that it was only a partial one, as he could not identify many plants. They also ate 21 varieties of fruit and recognized 6 harvest seasons based on 6 of these. The durian (*Durio Zibethinus*) was the most important in their eyes as durian stands were individually owned, and its ripening caused the Semang to break camp and move to the stands for collecting. They also collected honey. There were 3 types of stinging bees, from which honey could be harvested every 5 months, and the bumblebee.

Animal foods listed by Schebesta were larvae, frogs, and 6 species of monkey, bamboo or tree rats, tree cats, 2 varieties of mice, squirrels, 2 types of wild cats, 2 of wild pig, deer antelope, musk deer, 2 types of porcupines, tapir, elephant, rhinoceros, Malayan bear and flying fox. Schebesta stated, however, that some groups admitted to not eating any animals as large as the pig or larger. Also in Semang camps he never saw any game bigger than a wild pig killed. In one 2 week period he spent in a Kenta' camp, the only meat killed was one monkey. The men hunted alone or in pairs and used blow guns and poison darts. It appears doubtful that they ever killed the large animals listed. Monkeys, tree rats, tree cats, larvae and frogs were the usual animal foods. The Semang fished as well, using baskets, hook and line and spears. The predominant



catches from the streams, however, was mussels, turtles and frogs (Schebesta 1954:49,109).

Some groups learned to make clearings in the jungle and plant crops. Tubers and sugar cane were the most common crops. They then moved on and the untended crops were often eaten by wild animals. The amount of cultivated produce successfully harvested was small and made a minimal contribution to the diet. However, the cultivation of crops did alter the settlement pattern as cleared areas became the focal points for the group's wanderings (Schebesta 1954:52).

#### Settlement Pattern

Skeat (Schebesta 1954:144) reported that the Semang remained in one place only 3 to 4 days; however, Schebesta found that 14 to 30 days was more common. When traveling to a distant site they moved about 6 miles a day, stopping to rest and gather food. The main reasons given for moving camp were: danger from predatory animals, lack of food, death, sickness, beginning of a special harvest like the durian, and opportunities for work with the Malays. Depending on the reason for moving camp, if the old camp were a good one in a clearing, some of the families, especially the old, might remain a while longer.

Semang usually erected windscreens as houses although sometimes they moved into caves, especially during particularly rainy weather. They preferred to settle near a brook or river but moved if tigers were seen repeatedly in the area.

The economic and residential unit, the local group, was loosely patrilocal with a group being recognized partially by its leader and partially by the area it usually inhabited. It was common after marriage, however, for the couple to live matrilocally at first and later to live patrilocally. Also it was common for unrelated people to live for a time with a group. Thus group composition was loose. Probably the most organizing factor was that durian and ipoh (sources of poison for arrows) trees were individually owned by adult males. Thus a male was likely to return to his own durian stand during the harvest season and to his ipoh trees when needed. However, it is important to note that anyone could pick up fruit that had fallen from the durian trees. It was only to climb the tree and remove fruit still attached that one needed the permission of the owner.

Schebesta listed the composition of 3 local groups seen in 1950. They had 16, 33 and 16 inhabitants respectively. The group with 33 was composed of 2 loosely patrilineally related families, while the other 2 were composed of one such family each. The last group of 16 was living in a total of 6 wind screens. Marriages were brittle, and divorce and remarriage common. Schebesta recorded accounts of men who had had as many as 8 wives (Schebesta 1954:194). He also reports in his later fieldwork an average of less than 3 births per woman although some women had 10. Earlier he

had reported an average of 3 births per woman with 2 living and 1 dead (Evans 1937:15). Children were nursed for over 2 years. Women preferred 3 year intervals between births as those born closer together were difficult to feed. Mothers kept both twins and attempted to nurse them. Schebesta saw one set of twins (Evans 1937:15, 246).

The settlement pattern of the Semang is confused by the effects of acculturation. Working for the Malays and cultivating in the jungle have obviously changed their pattern. The purely hunting and gathering pattern can be guessed at from the data found in these ethnographic sources. Apparently the Semang wandered, each local group roughly within its territorial area, taking advantage of the harvests of various fruits and vegetables. The only time of the year when they could predictably be found in a particular place was during the durian harvest when families were likely to move to areas where they owned trees. This is also reported to have been the season of feasting and celebrating. Though they wander most of the year, the durian harvest must be taken into account and thus they have been placed in the "fixed semi-sedentary" pattern.

### Conclusion

These three cultures live in remarkably similar environments and eat most of the same foods. All have experienced some culture contact, as has every hunting and gathering group

that will be discussed in this study. All three groups depend primarily on vegetable foods with parts of the palm, tubers and fruit being mentioned the most. Honey and larvae are also common foods. Of the animals killed, monkey seemed to be the most common although pigs were important as well. In most cases some use of streams was mentioned and frogs, mussels and snails were utilized.

Two settlement patterns were found. Two groups were restricted nomads taking advantage of the seasonless environment by wandering from one harvest to the next. The Semang were placed in the fixed semi-sedentary category but in essence lived a life style identical to the restricted nomads except that they predictably returned to the same durian stands for the harvest. It is interesting to note that all these groups lived in economic units ranging in size from 16 to 33 with 25 to 30 being the most common with the single exception of the Mbuti net hunters whose hunting activities required much larger groups. All groups were loosely patrilineal, having a tendency toward patrilineality that in reality did not necessarily show in group composition. For all three, it was common to stay in one camp 2 weeks to 2 months depending on food availability, disease, etc. For two of these three groups, statistics were found stating number of births per women and in both these were 3 per woman with 2 of these surviving.

In terms of settlement patterns, then, a trend can be seen in evergreen tropical forests. The patterns used do not involve seasonal change as in the evergreen forest there is no seasonal change. Kendeigh (1961:348) states that for fauna in the evergreen tropical forest:

There is no definite period of dormancy or migration. Movements are largely localized and in quest of ripening fruit or other food supplies. Away from the immediate vicinity of the equator and toward the periphery of the rain forest, where wet and dry seasons become important, the annual cycle of breeding, migration, and other activities becomes more pronounced and important.

This seems to apply to man as well.

## CHAPTER IV      CULTURES OF THE SEMIDECIDUOUS TROPICAL FOREST

The evergreen tropical forest often grades into the semideciduous forest. Here there is a definite dry season. It is usually one to five months long with less than 1 inch of rain per month. The climate thus has seasons, and the forest is characterized by deciduous trees. There are two layers of vegetation. They are the forest canopy, which is less dense than in the evergreen forest, and the undergrowth, which is thick and evergreen. The trees have thick bark but are relatively short compared to those of the evergreen forest. They are usually not over 115 feet high. Climbers are fewer in number and small in size, and epiphytes are found only in the tree tops. The undergrowth is composed mainly of shrubby thickets and tall grasses and is often quite luxurious (Cloudsley-Thompson 1975:35-6). The number of plant species in a given area is less than in the evergreen forest. A semideciduous forest is likely to have 70 to 80 species in an 8 to 9 square miles area while an evergreen forest would have 300 to 350 species in the same size area. 25 to 65% of the taller trees are deciduous and lose their leaves during the dry season (Rumney 1968:485). There is a

tendency for a few species of trees to dominate large areas.

Semideciduous forests occur in India, Burma, Indo-China and northern Australia as well as on the edges of the evergreen forests of Africa, Madagascar, Indonesia and central and South America (Cloudsley-Thompson 1975:36). Five of the cultures surveyed for this study are found primarily in semideciduous tropical forests. They are the Tiwi in Australia, the Andamanese and Vedda in Asia, the Ache in South America and the Dorobo in Africa.

#### THE TIWI

The Tiwi live on Melville and Bathurst Islands just north of the mainland of Australia.

#### Environment

Together these islands are 150 miles across from east to west. The country is flat; Melville Island is 500 feet above sea level. The interior of the islands is semideciduous forest composed of a 2 or 3 layered community of trees and shrubs rarely more than 50 feet high. The numerous species of eucalypts dominate. The coast line contains steep cliffs and sandy beaches. Along the northern coasts, salt water creeks cut into the interior and are lined with mangrove swamps (Rumney 1968:567).

### Culture Contact

Melville and Bathurst Islands are 25 miles from the mainland of Australia at the closest point. Contact with the mainland was minimal before the coming of the whites. Several characteristics of the mainland aborigines are not found among the aborigines on these islands. For example, the Tiwi do not use the spear thrower or the curved boomerang or practice circumcision or subincision. The mainland was considered by the Tiwi to be the home of the dead, and they were hostile to outsiders who landed on their islands (Hart and Pilling 1960:6). Thus contact with them was limited although, in general, the Tiwi display a typical Australian aborigine culture.

Pilling is of the opinion that in 1929 there were only two year-round settlements of outsiders that were of consequence to the Tiwi. These were the Bathurst Island Mission, whose priests worked hard to Christianize the ways of the aborigines, and a large camp of Japanese pearlers on the southern coast of Melville, whose inhabitants practiced unchristian sexual relationships with Tiwi women. During World War II the Tiwi, many of whom had come into contact with nonaborigines by this time, fled into the bush when Darwin and surrounding areas were bombed. After the war, however, many of them settled around the white settlements that had sprung up as they realized they



had become somewhat dependent on white food (Hart and Pilling 1960:105). The size of the Tiwi population has remained fairly stable during these periods of culture change. Basedow (1913:291) found the Tiwi relatively free of serious disease in 1911. The population in 1954 was estimated at about 950, which was only about 100 less than Hart's estimate of 1062 in 1928 (Hart and Pilling 1960:110). The move to white settlements has had many effects. One of these has been a change in lineal emphasis. Previously the Tiwi lived in bands with a patrilineal emphasis and possessed a clan organization with a strong matrilineal emphasis. As a result of moving away from their traditional home areas, the patrilineal emphasis died out since it was tied to home territories. The Tiwi became more strongly matrilineal because the clan organization remained (Hart and Pilling 1960:111). The field data to be discussed below comes largely from the work of C.W.M. Hart conducted in 1928 and 1929. Thus it is from a period prior to World War II and the changes that war brought. White influence, however, was already strongly felt. The Tiwi were drawn to the mission for social gatherings but it is impossible to determine the effect the mission's presence had on their aboriginal subsistence-getting movements. Since their food continued to come from the wild, we can hope that their settlement pattern was little affected.

### Subsistence

Vegetable foods were the staples of everyday life. Most of the year "kwoka," a porridge made from the nuts of a native plant, was the main staple. The wet season of January and February brought an abundance of "kolema," a yam. It was during this abundance that the Tiwi held their largest and most elaborate collective ceremonies as large numbers of people could be easily fed.

Men over the age of 45 did little hunting; therefore, most meat was provided by the men between the ages of 20 and 45. In the bush the major sources of meat were the wallaby and other marsupials and large lizards like the goanna. Along the coasts, fish, turtles and dugong were common foods. Wild geese were eaten in all areas.

### Settlement Pattern

The Tiwi have an unusual social organization for hunters and gatherers. They appear to have recognized the importance of vegetable food in their diet and felt that the bigger the household, the more food it could produce as it would contain more women who could gather food. Sometimes small households would attach themselves to large ones, and it was not uncommon for 40 or 50 people to camp together to carry out the daily subsistence chores. Hart and Philling (p. 35) "regard the development of their large multiple-wife

household as essentially their own evolutionary solution to the problem of finding the most efficient unit of food production." Compared to most other Australian aborigines who have maintained enough of their aboriginal culture to be studied in the twentieth century, the Tiwi lived in a rather rich environment. Most other aborigines in such environments were wiped out early by the Europeans and thus cannot be studied in detail. In the opinion of Hart and Pilling, it was due to the isolated nature of their island existence that this did not happen to the Tiwi.

Households camping together were usually spaced 20 to 30 yards apart. During the dry season of April to December travel was easy, and people traveled around to funerals for big men and to other collective events. During the wet season of November to March the grass and bush were high, travel was difficult, and the main phases of the male initiation ceremony were held bringing together large numbers of people for a few weeks at a time. Day to day living, however, was in smaller units thinly dispersed and moving every day or two. The bands were the largest recognized units. There were 9 of these with from 100 to 300 members each living in areas approximately 200 square miles in size. The general territory of a band was recognized by all, although, the borders were not specific. The membership of the band was subject to change as people moved around. Women especially were likely to change bands often.

The more wives a Tiwi man had, the more successful he was considered to be. Old successful men often had 20 wives, men under 30 had no wives, and men under 40 had only old women as wives. Young girls were married off to old successful men, and when their husbands died they remarried younger men. As a result a woman was married a number of times and moved into the band of her husband. Young men, on the other hand, were so anxious to acquire wives that they often moved into the band of a bestowed wife to protect their interests. Thus the membership of the bands was constantly in flux though the bands themselves had a strong patrilineal emphasis. Old Tiwi males with many wives had a vegetable food surplus which allowed them to make gifts to others and throw large parties providing all the food themselves.

The Tiwi had no permanent settlements. They wandered through their land camping temporarily at various places. Thus they must be put in the restricted wandering settlement pattern, which is quite unusual for a culture with a food surplus and prestige building mechanisms for distributing this surplus.

Hart recorded the movements of one senior Tiwi household head during the year 1928 to 1929. In early April, the end of the wet season, he left his home area where he had remained during most of the wet season to visit the mission

station and attend some funerals. The total attendance at the funerals was 50 or 60. The time gone from the home area was 5 days. At the end of April he again left his home area for a large funeral and was gone 2 weeks. From the middle of May to the end of June he lived in his home area. July 1st he returned to the mission for a few days and then returned to his home area for the remainder of July. The last week in July he took some of his wives and children to a funeral and stayed away from home 3 weeks. At the end of August he hosted a grass burning and kangaroo hunt which lasted 4 or 5 days. He then remained home until mid-October. The last 2 weeks of October were spent in traveling to a funeral and to the mission. The wet season began. He returned to his home area and stayed there until late January except for occasional short trips. The end of January the male initiation ceremony began, and 300 people camped together for almost 4 weeks. Afterwards he remained at his home base until the end of March. It must be remembered that an old successful male does not contribute directly to the subsistence effort as it is only the younger men who hunt. Thus, he is free to spend his time in other ways.

#### THE ANDAMANESE

### Environment

The Andaman Islands are a submerged mountain range containing 204 islands. The nearest mainland is Cape Negrais in Burma. The Andamans have an area of 2,508 square miles (Temple 1903:34). The inhabitants of these islands are Negrito like the Semang and some of the inhabitants of the Philippines. The Andaman Islands are composed of the Great Andaman, which is really four islands very close together, the Little Andaman and a number of small islands. The Great Andaman is nearly 160 miles long but no more than 20 miles wide at any point. The Little Andaman is 26 miles long and 16 miles wide (Radcliffe-Brown:1922:3). Thus the inhabitants are never more than 8 or 10 miles from the coast. Since the islands are a submerged mountain range, they are hilly with the highest elevation being 2,402 feet. There are virtually no streams. Water drains into tidal creeks that run into mangrove swamps. The shore is fringed with coral reefs which along with the creeks provide many fish and molluscs.

The only sizable mammals are the pig and a civet-cat. Otherwise there are some species of rats, bats and a tree-shrew. There are a number of species of birds and reptiles and a few of lizards.

The mean yearly temperature at Port Blair is 86°F. The average low temperature over a 7 year period was 66°F. and the

average high was 96°F. The average rainfall over a 7 year period was 138 inches with the average number of rainy days per year being 177 (Radcliffe-Brown 1922:4). The islands have three seasons. The cool season lasts from mid November through February and contains little or no rain. March through May is the hot season when there is still little rain but honey is abundant at the beginning and the major fruit trees bear throughout it. From the end of May into September is the rainy season when beetle larvae may be found (Many 1932:9).

#### Culture Contact

In 1858 a penal settlement was established on the Great Andaman and the Andamanese began to be exposed to Europeans on a regular basis. Population declined on the Great Andaman during the following 50 years, and in 1906 Radcliffe-Brown (1964:17) noted that few children were being born. Man had noted during his residence in the Andamans from 1869 to 1880 that families averaged 3 to 4 children and that barrenness and stillbirths were rare. He estimated the average life span to be 22 years as infant mortality was high and old age rare. There were never more than three generations alive at one time. There was a measles epidemic in 1877. Otherwise the most common diseases were malaria, caterrh, coughs, rheumatism,

phthisis, pneumonia and heart disease (Man 1932:11-15). At any rate, depopulation on Great Andaman caused communities to merge and customs and languages to mix. The population of Little Andaman was unaffected (Radcliffe-Brown 1964:17). While culture had changed for the Andamase, they were still hunters and gatherers and thus fit into this study.

### Subsistence

The Andamanese distinguished between coast ("aryo'to-") and forest ("e remta ga-") dwellers. Man (1932:123) stated that "both aryoto and eremtaga find ample provisions for their simple wants in their immediate surroundings, without exerting themselves to any great extent." He estimated that one-third of the daily food was composed of edible roots, fruits and honey while two-thirds was meat, usually pig, paradoxurus, iguana, turtle, fish and molluscs. Pigeons, jungle fowls, flying foxes, bats, rats, sea snakes and larvae were also eaten. The average amount of food eaten daily per person was 3 to 4 pounds. When feasting and dancing, one person might eat over 10 pounds of pork or turtle in a single day. The Andamanese drink only water. During the dry season, fresh water fish, shell fish, green turtle eggs, honey, bee larvae, yams and fruits were common foods. During the rainy season, the preserved seeds of the



Artocarpus shaplasha, Semecarpus, the fallen seeds of the Entada pursoetha, three kinds of grubs, the Great Capricorn beetle larvae and certain fruits were common. Man lists 21 rainy season fruits and 22 dry and cool season fruits eaten by the Andamanese though some were available in both seasons. Meat was preserved for several days by steaming it in a bamboo container. Seeds were preserved by a process that involved both drying and baking. Honey was available after the monsoons when the flowers bloomed. The small combs of white and black honey were available until September or as long as Dipterocarpus loevis and Pterocarpus dalbergioides and a few others were blooming (Man 1932:123-131). Bow and arrow were used for hunting. Harpoons were used to kill turtles and large fish.

#### Settlement Pattern

The Andamanese lived in scattered local groups that were independent and autonomous. They were loosely united into tribes which the natives recognized as having a general territory and a name. There were nine such tribes. Their territorial boundaries were vague. Radcliffe-Brown estimated the average territorial size at 165 square miles with the largest being about 300 square miles and the smallest about 100 square miles. The average number of local groups to a tribe was about 10 with the average size of a local group being 40-50 people and occupying an average area of 16 square miles. The local groups did not

have distinct names, and a person was born into one of them; however, he was free to move around though he must ask permission to hunt in another group's area. In each local area there were recognized camping places some of which had been used for centuries. Neighboring local groups feasted as well as quarreled with each other. Groups separated by distances of 50 miles or even less would probably have no direct relations with one another (Radcliffe-Brown 1964:11, 28). It must be remembered that Radcliffe-Brown's population figures are estimates as his fieldwork was done at a time when the population had greatly decreased and the tribes amalgamated. He was estimating what the populations would have been prior to that decimation of population. Man (1932:30) simply stated that the island was divided into at least 9 tribes with a total population of about 4,000 people. Total population estimates for mobile populations like the Andamanese should usually be considered estimates.

The coastal people were seminomadic and rarely stayed in one camp for more than a few months. Reasons to move camp were a) death, b) change in seasons which made another area preferable because of better protection from the weather or better hunting and fishing or c) decaying animal matter near the old camp which simply made it unpleasant. Coastal people used canoes and moved from camp to camp in them. They

were not as influenced by the seasons as the forest people. They fished and collected molluscs all year round. In the rainy season they hunted pigs, fish and turtle and moved camp every month or two to find better hunting. During the cool and hot seasons, they visited neighbors. During good weather collective events were held and about 100 people might gather for a short time to hunt and fish together and feast (Radcliffe-Brown 1964:40). During these seasons also they moved every month or two.

The movements of the forest people were more closely related to the seasons. During the rainy season they lived at a main camp which had a communal hut. Animal food was plentiful, but vegetable food was scarce. At the end of the rainy season, vegetable foods began to be available though not in great quantities. As the cool season set in, larvae, fruits and roots became plentiful, and they left the main camp to visit friends. They might spend 2 or 3 months with another group. During this season, the men spent less time hunting and more time gathering vegetables like the women. The men visited the main camp every once in a while to check on it. During the hot season, honey became plentiful. As honey cannot be preserved because it ferments, the Andamanese virtually lived on it while it lasted supplementing their diet with fruit, roots and fish, if near a creek. Pigs were not hunted during this

time as they were in poor condition. At the end of the hot season, everyone returned to his local group for the harvest of *Artocarpus chaplasha* fruit. *Artocarpus* trees were privately owned and one could not pick the fruit without the owner's permission. The pulp was eaten and the seeds preserved for the rainy season. All then returned to the main camp to prepare for the rainy season (Radcliffe-Brown 1964:36).

The Andaman Islanders thus used two types of settlement patterns. The coastal peoples were examples of "highway nomadism". They were not greatly affected by the seasons as their main diet came from fish and molluscs. They traveled by water, and thus they traveled by specific pathways, the waterways along the coast. The forest dwellers on the other hand were greatly affected by the seasons. They remained sedentary in permanent camps during the rainy season but wandered more freely during the other seasons. They thus are an example of the "fixed semi-sedentary" pattern.

#### THE ACHÉ

The Aché live in the forests of eastern Paraguay in the watershed between the Paraguay and Paraná Rivers at approximately lat. 26°S., long 55°W. They used to roam from the Monday River in the north to the edge of the forest in the south and west and to the Parana River in the east.

The creation of lumber camps and farms in this area has forced them to retreat into the mountains and hills of the Caaguazú ranges (Clastres 1972:139; Metraux and Baldus 1946:436).

### Environment

The Aché habitat is semideciduous forest. Temperature and rainfall statistics are available for one point in this area, Villarica, which has an altitude of 515 feet. The mean annual precipitation is 58.4 inches with the greatest amounts of rain occurring in the months of March and October. Each of these recorded 34 inches of rain respectively. The smallest amount of rain falls in August with 7 inches being typical. The hot season occurs from October through March. The temperature is normally in the 80's in December through February. The months of April through September are cooler with the coldest weather occurring in June, July and August when temperatures are normally in the low 60's (Rumney 1968:524). It is during the cool months that the Aché experience a shortage of some of their favorite foods.

### Culture Contact

The Aché have previously been referred to in the literature as the Guayaki, which means "ferocious rat" in the language of their neighbors, the Mbya, and which gives an indication of their past relationship with outsiders. The

Aché were mentioned in print for the first time by Pedro Lozano in 1873. The Jesuit missionaries attempted in vain in the eighteenth century to convert them. Most contact the Aché had with outsiders was hostile as the Indians came to the Paraguayan settlements to steal iron tools and sometimes food. The Paraguayans reacted violently. Consequently the Aché have avoided and resisted contact with others. Some data on them were gathered by F. C. Mayntzhusen, a German settler who persuaded some Aché to live on his plantation. Vellard (1939) spent months trying to get in touch with them and gave it up after a skirmish with one of their bands. Bertoni (1941) adopted an Aché and learned much from him about the culture. An influenza epidemic in 1920 is suspected to have killed as much as half the population (Metrax and Baldus 1946:436). The small number of Aché remaining confined themselves to the least penetrable part of their forest. The Aché territory is in the middle of the traditional territory of the sedentary agriculturalists, the Guarani, with whom the Aché had a very hostile relationship. It was not until 1962 that the majority of the Aché came out of the forest and established permanent contact with outsiders (Clastres 1972:144).

### Subsistence

The animals most often eaten by the Aché are wild pigs, deer, coatis, armadillos, iguanas, capivaras, agoutis, jaguars

and monkeys. They also kill rats, serpents, lizards and many varieties of birds. A long bow and arrows are used for most kills although some Ache possess spears to use on jaguars and capivaras. Clastres argues that hunting is the most important subsistence activity among the Aché, but his argument is not very convincing in light of the data he himself presents, which indicate the importance of honey, larvae and the pindo palm, and in light of the fact that Vellard and Baldus stress the greater importance of gathering.

The most important vegetable source of food is the pindo palm (*Cocos romanzoffiana*). The Aché eat the terminal shoots (palm cabbage) either raw or roasted and make a flour out of the trunks by smashing the wood fiber with the back of a stone ax. The marrow and fiber of these palms are food sources available year round while the Ache's favorite fruits (*Chrysephyllum licimifolium* and *Myrciaria baporeti* and oranges planted years ago by the Jesuits) are seasonal. Honey can be found year round although it is less abundant in the winter. They "cultivate" the larvae of the Bassalid beetle by creating an environment suitable for their growth. To do this, they fell and notch pindo palm trees as decayed pindo palm is a favorite egg-laying place for these beetles (Clastres 1972:154).

### Settlement Pattern

The Aché are split into 3 or 4 sociopological divisions, each of which has a generally recognized territory and is hostile to intrusions from outsiders, even if they are fellow Aché. The basic economic unit is the local group of 4 or 5 families (a total of about 20 people) who travel and hunt and gather together. This group of some 20 people occupies a surface area of at least 300 square miles (Clastres 1972:165).

Movements during the hot months from September to February are regulated by the gathering of plant foods and the cultivation of larvae. Several fruits are available; honey is more plentiful, birds lay their eggs and the fish go up the Parana River to the streams to spawn. In late summer and winter they visit the palms, collecting the marrow and terminal buds and then preparing them for larvae growth. In the winter the summer food sources are less abundant, and the Aché rely more heavily on hunting and on the pindo palm. The larvae is harvested from the prepared palms in the summer although it is eaten year round. Thus they follow a circular pattern of movement visiting each palm area twice (Metraux and Baldus 1946:437); (Clastres 1972:161).

Travel is by foot, and they ordinarily spend only 2 or 3 days in any single camp. Camp sites are chosen because



they are close to a spring or brook but far enough away to avoid mosquitoes and to prevent the noise of the water from hiding the approach of a jaguar or other enemy and because the vegetation consists mostly of ferns and trees that are not too tall which prevents the dangers of lightning. Ideally such a site is also near some pindo palms (Clastres 1972:151).

Their settlement pattern is here termed "highway nomadism". They are basically wanderers staying a few days each at temporary camps; however, their movements have definite direction during any one year as they move among stands of pindo palm eating the fruits of that tree and then preparing it for larvae growth. Later the same year they return to gather the larvae. This circular pattern among a group with no other regulatory movements is best described as highway nomadism.

#### THE DOROBO

The Dorobo live in the northern part of the Tindiret Forest in the Rift Valley area of Kenya and Tanganyika in Africa. The area is just north of the equator at about lat.  $0^{\circ}12'$  and extending from long.  $35^{\circ}17'$  to  $36^{\circ}32'$ . Physically the Dorobo are not related to their neighbors, the Nandi, although they speak a Nandi dialect and have borrowed many cultural items from them.

### Environment

The area inhabited by the Dorobo is dense deciduous forest at an altitude of 8300 feet. The northern section is table land 8000 feet in altitude while in other areas it descends to levels of 7000 feet and below. The only sizable river is the Kipkurere which crosses the southern part of the Dorobo area through a valley almost 1000 feet in depth. Its tributaries provide the forest with water. The forest has been designated as an official forest reserve. The edge of the forest is defined by a belt of acacia thorn while the forest itself is composed of 100 feet high trees and a very dense undergrowth of 6 feet high thistles that make movement almost impossible except along paths. Even the Dorobo, experts at forest travel, find it necessary to travel on paths, for the most part, even though some of their paths would be almost impossible for a novice to detect. Some of the varieties of tree identified in the forest are ficus, acocanthera, tilia, ximenia mericana, and polygonum. Rain-fall statistics for the forest itself are unavailable. Those for Kapchorua Farm, 2 miles below the forest edge, indicate an average of 54.09 inches for the years 1929 to 1937 with a maximum of 66.17 inches and a minimum of 28.61 inches (Huntingford 1955:602).

### Culture Contact

The most useful ethnographic material on the Dorobo was written by Huntingford as a result of fieldwork done from

May, 1938 to November 1939. At that time, the government was forbidding the Dorobo to actually live in the forest; thus they were forced to live on its edge. Also they had established a symbiotic relationship with the Nandi, depending on them for iron tools adopting many elements of their culture, and aspiring to become cattle raisers like them. The Dorobo were no longer, infact, pure hunters and gatherers, but instead depended partially on agriculture and cattle raising.

Not only had the Dorobo been forced to move from their forest home but they were no longer allowed to roam as far hunting. The Dorobo of Eastern Mau, Mt. Kenya and Saleta used to descend to the floor of the Rift Valley and those of Kipkurerek went to the Uasin Gishu plateau. Both areas were inhabited only by a few Masai until the mid-nineteenth century. It was in 1937 that the Dorobo were moved out of the forest to Nandi, although some continued to live in the forest as squatters until 1940. When Huntingford did his fieldwork in 1938-1939, there were 226 surviving members of the Kip hord, and 67% lived in the forest or on nearby farms while the other 33% lived in the Nando area and had for years (Huntingford 1951:7).

### Subsistence

Foods eaten by the Dorobo in 1939 but placed in order of their traditional importance were meat from hunting and

trapping, honey, wild plants, salt, drink made from honey, cereals grown and bought, and milk (for those with cows). Kinds of meat eaten included 7 varieties of antelope, 4 of monkey, wild pig, giant pig, leopard, lion, buffalo and elephant. Vegetable foods were not discussed as thoroughly by Huntingford but he did list 4 kinds of fruit, one of leaves and the sap of wild banana. Intoxicating drink was made chiefly from honey. The importance of hunting has been drastically reduced because of European restrictions on this activity. Honey barrels or hives were made of slats or hollowed-out logs and placed in trees for bees to swarm in. A man owned the barrels and thus the swarm of bees inhabiting them, but if the swarm moved on to someone else's barrel, he could do nothing. Hunting parties were usually composed of 4 or 5 men though they might contain as many as 8. Half the group would walk along each side of a stream hunting and all gathered to divide the meat when a kill was made.

#### Settlement Pattern

The strictly hunting and gathering pattern was of course no longer in existence at the time of Huntingford's field-work; therefore, it must be reconstructed. The Dorobo lived in small clearings or glades in the forest or on the edge of it. They lived in one spot a few months then abandoned it because the huts became foul and full of fleas. Usually the

nuclear family lived in close contact with one or more other families, these often being those of the husband's father or mother. It was useful for a young family to live near others as a mother could not take her baby gathering. The forest undergrowth was so dense she could not conveniently carry it on her back, and the forest was too dangerous to leave the child under a tree. Thus she preferred to leave it in camp with an older sibling or another female relative.

The small family group had a small territory in the forest that extended out to the clearer area at the forest edge. The forest area was used for trapping and for setting out honey barrels and for gathering. Huntingford found in 1939 that 4 of these family territories totalled not over 6 square miles and 2 others not over 4 square miles. He comments that in earlier times the territories may have been larger but that since the population was also larger, the family territories could not have been much bigger. One forest mile is extremely productive, however. The Dorobo wandered over a much greater area for hunting with their bow and arrow. They never confined themselves to that small forest area for this activity.

Aboriginal Dorobo movements were geared to the seasons. In the dry season, October through March, they wandered wide to hunt. In the wet season, April through September, they

stayed at home in their own territories to trap. Travel within the forest territories was largely confined to paths made by the Dorobo as the undergrowth was simply too dense. Honey barrels and traps were set along these paths (Huntingford 1955). The Dorobo have been placed in the "fixed semi-sedentary settlement pattern" as they wander widely during part of the year but live in prescribed areas the other part of it.

#### THE VEDDA

The Vedda inhabited the jungle of Ceylon at approximately lat.  $8^{\circ}$ N, long.  $81^{\circ}$ E. In 1907, the time of the most thorough study available on the Vedda, they were described as located in a triangular shaped area between the eastern slopes of the central mountain massif and the sea. It had an area of about 2,400 square miles and was bound on the west by Mahaweli Ganga beginning at the bend where the river changes course from east to north. A line from this bend, through Bibile village to the coast was the southern boundary of the Vedda area. The coast was the eastern boundary. Therefore, Vedda territory included the greater part of the Eastern Province, about one-fifth of Uva and a small portion of Tamankaduiva in the North Central Province. There was only one road through the Vedda area that was good enough for a wheeled vehicle to handle (Seligmann and Seligmann 1911:1).

### Environment

The Vedda area is tropical semideciduous forest. The area is flat, broken by a few low undulations and dotted irregularly with abrupt, mountainous masses of rock. Almost all the rainfall occurs during the northeast monsoon, while the southwest monsoon is extremely dry and is followed by torrential showers. Thus the greatest amount of rainfall occurs from October through January and again in April and May. In 1912 at Monaragala Hospital, altitude 700 feet, the annual rainfall was 60.99 inches in 110 days. The mean annual rainfall for a 15 year period at that location was 70.91 inches in 101 days.

### Culture Contact

The main ethnographic source on the Vedda is Seligmann and Seligmann (1911) whose fieldwork was done in 1907 and 1908 on a grant from the Ceylon government. At that time they encountered only 4 families and heard of only 2 more who were full-time hunters and gatherers. Vedda culture was dying out as a result of the influence of the Tamil and Sinhalese. Many of them dressed in traditional Sinhalese clothing, except when being interviewed by tourists when they would don traditional Vedda costumes. There has been, in fact, a debate whether the Vedda had not been settled long ago and the hunting and gathering

lifestyle adopted recently as a regression or retreat. Parker holds this view while Seligmann and Seligmann take the opposite one. They feel that the Vedda did generally live in a hunting and gathering state 70 or 80 years prior to their fieldwork. Bailey's data, collected while he was in charge of the district of Badulla in 1854 as part of his duties as Principal Assistant Colonial Secretary of Ceylon, corroborates the Seligmann's view. Whether or not the Vedda, who were after all living in a country that the Sinhalese had occupied for at least 2,000 years, had previously led more settled lives, they were primarily a hunting and gathering culture at one point, and it is their lifestyle during this time that will be reconstructed here.

### Subsistence

The Vedda hunted with bow and arrow and fished by poisoning the streams. Deer was an important animal food but they also ate elk, monkey, pig, iguana and pengolin. Meat was preserved by drying and smoking it and storing the dried meat in honey in a clay lined cavity in a tree. Honey was an important food and yams and fruit were the most important vegetables sources of food (Bailey 1863: 286; Seligmann and Seligmann 1911:107,327).



### Settlement Pattern

Settlement pattern data for hunter-gatherer Vedda is extremely scant. The one such group studied by the Seligmanns contained 19 people, which was 3 extended families of 9, 4 and 6 members each. This group lived in rock shelters in the hills and exploited the surrounding territory. They appeared to have matrilineal exogamous clans and live in loosely matrilineal groups exploiting recognized territories. One did not cross into another's territory unless chasing a wounded animal (Seligmann and Seligmann 1911:63).

It appears that a Vedda community was composed of 1 to 5 families who shared the hunting rites to a tract of land and gathered honey and fished on it and used its rock shelters. Probably the entire group did not live together but one family or small groups of 2 families lived together. In the hot, dry months the brooks and ponds dried up and the game collected in the low forests around the half dry river beds. The Vedda would move to these areas. During the rainy season, game was scattered, and they moved to the rocky hills to the caves as the forested lowlands were infested with malaria. At any time they might move for a week or a month to an area to gather fruit or honey. The honey of the bambara (*Apis indica*) was collected in June and July although small combs could

be taken at other times. Honey was stored for honeyless seasons (Seligmann and Seligmann 1911:81).

Thus the Vedda, to the best of our knowledge, followed a seasonal settlement pattern of the "variable" or "fixed semi-sedentary" type. We do not know enough about their lifestyle to determine whether they returned to the same caves each year, and thus it is really impossible to choose between these two patterns.

### Conclusion

Although all seven cultures discussed in this chapter rely mostly on semi-deciduous tropical forests for their subsistence, their environments differ in some respects. The Tiwi and the Andamaness both inhabit islands; however, they are quite different in that the Melville and Bathurst Islands are flat and covered with flora and fauna typical of and to a large extent peculiar to Australia while the Andamans are hilly and have typical flora and fauna. The Andamanese, Aché and Vedda are similar on the other hand in that they all live in hilly to mountainous forests. The Dorobo utilize forest and the savannah at its edge. These differences, however, do not seem to be directly related to the differences found in the cultures. All of these cultures are alike in that the aboriginal lifestyle was virtually gone at the time of ethnographic study. In each case, it has had to be reconstructed for this discussion.

The vegetable foods eaten by these groups are similar to those eaten by the evergreen forest groups. Yams, fruit, and palm products dominate as important or staple foods. Honey and larvae also continue to be common foods. It is in the kinds of fauna eaten that the most obvious change takes place from foods of the evergreen forest. Monkeys and pigs are still popular foods but larger animals like wallabies, deer and antelope have begun to appear in the discussions of commonly hunted animals.

A most interesting change appears in settlement pattern. Of the 6 groups listed, 3 are semi-sedentary and all 3 disperse during the dry season and remain in settled camps during the wet season. The reason given for the dispersal in several instances was that they ranged far and wide to hunt. During the wet season, however, travel was more difficult and they preferred to stay in a more restricted area.

Of the other 3 groups, 2 were restricted nomads. The coastal Andamanese represent a special adaptation to marine subsistence resources that will appear again in the course of this study. A coastal people who a) travel largely by boat and b) eat marine resources available year round and c) live in a climate where the seasons are not so severe as to hamper boat travel are likely to follow a pattern that is oblivious to seasonal change like that of

highway nomadism. In the case of the coastal Andamanese, the wet and dry seasons are present but they do not hamper boat travel. Their primary foods are molluscs and fish that are available year around. Thus the highway nomadism pattern is followed.

The other group of highway nomads are the Aché whose pattern is least explainable as well as being a little unusual. Like the Dorobo, they "cultivate" a nonplant. The Ache prepare habitats for larvae to grow in and the Dorobo prepare habitats for bees to make honey in. Each requires tending periodically. The Dorobo do this from a semisedentary pattern in which the cultivation takes place in the area of the sedentation. Larvae beds for the Aché, however, are scattered. The reason for this difference is that the Dorobo are able to chose the site of their cultivation. They place their barrels where they wish hoping the bees will come. The Aché however prepare larvae beds whre there are pindo palms. They cannot move the palms to a location of their choice. Thus, there is a difference in pattern.

The remaining group in this study is the Tiwi who have been placed in the restricted wandering category based on the ethnographic accounts. They were, at the time of study, so dependent on white settlements and their original settlement pattern and locations so disrupted by moves close to the mission station that it is difficult to feel

that we know the full story of their aboriginal ways. At any rate no sound explanation can be given for their difference in pattern other than that they simply represent an alternate method of exploiting a semi-deciduous forest.

Thus the trend in settlement patterns in semideciduous tropical forests seems to be toward a semisedentary pattern in which the dry season is spent dispersed and the wet season spent at a home base. The exceptions found were the special adaptations of the Aché with their larvae cultivation and the coastal Andamanese with their seasonless marine exploitation. The Tiwi represent another exception but one for which, frankly, no explanation could be found.

The term "savannah" is used to cover those transitional tropical environments between the forests and the deserts. Various terms and divisions for the types of environments this includes are used by ecologists and climatologist. Here the entire area will be called savannah. The rainfall is lighter and the dry season longer than in the closed forest. Trees are more widely scattered, except along rivers and streams and they are more drought resistant and usually leafless during the dry season. In many places they have been entirely replaced by grasses.

Various types of tropical savannah occur in central and eastern Africa, north and south of the equator, in arid parts of India and in South America, north and south of the Amazon forest. In many areas the grassland savannah is manmade as repeated burning has caused the original vegetation to be replaced by secondary grasses.

Savannahs are characterized by the variability in precipitation. The rainy seasons begins and ends with sub-humid or dry violent thunderstorms and wind squalls. These alternate with very hot sunshine. The dry season, on the other hand, is a true period of drought. The length and

amount of rainfall decreases as one approaches the poles. Fifty inches per year is common on the equatorial margin, 10 inches on the desert edge, and 20 to 40 inches in the transitional area between.

The flora in savannahs varies. In the woodlands it is open with many terrestrial herbs and grasses and few lianas and epiphytes. The trees are usually scattered and sufficiently short that rainy season grasses may grow taller than them. The seasons become much more prominent than in the semideciduous tropical forest. Vegetation grows rapidly during the wet season but is almost dormant during the dry one. The tree types in the savannah woodlands are not those of the forest. They are usually xerophilous, hard and thorny. They often have some device for adapting to variability in rainfall. Most are deciduous.

Thorn woodlands are more xerophilous. They are found where rainfall is about 15 to 35 inches per year and the mean temperature high is from 60<sup>o</sup> to 95<sup>o</sup>F. Tree foliage is deciduous and often reduced. Switch-plants with woody, photosynthetic stems are common and many of the plants store water for the dry season.

Grassland savannah is quite common. The trees are few and mostly deciduous. In some cases there are evergreens, like palms. Savannahs occur in areas with 20 inches annual rainfall and 7 to 8 months of drought to areas with 100 inches rainfall and negligible drought periods. When the rainfall is

less than 35 inches annually, short bunchgrass savannah predominates and when it is over 80 inches annually, sedge savannah is common. Savannah soils are usually characterized by poor drainage and intermittent parched water-tables so that there is alternation between water logging and severe drought.

One of the most important characteristics of savannah fauna is the large number of individuals in certain species, as opposed to the much smaller number of individuals per species in the tropical forest. The savannah is a less complex environment than the tropical forest as there is a much lower number of ecological niches. The fewer the niches in a prescribed area, the larger they are and the more individuals of the species adapted to them they are able to support.

Insects and reptiles are plentiful. Amphibians are rare except near permanent water sources where they can breed. Birds are plentiful as they are mobile enough to avoid temporarily bad conditions. Ground living birds like ostriches and emus and game birds are common as are scavengers like eagles and falcons. Both sedentary and migratory birds are found. Mammals are mostly large cursorial forms, like buffaloes, antelopes and horses, or small burrowing insectivores and rodents. It is not uncommon to find what seems like a large number of species of large vegetarian



mammals in the savannah. There are 40 such large species in Africa, not including the small antelopes. In one habitat, like the bushy grassland of Kenya or the wooded savannah of Tanzania, there may be 15 or 16 large game species living together but with sufficiently different demands on the environment that they do not compete excessively. These vegetarian mammals of the savannah include the world's largest terrestrial mammals. Some common characteristics they possess are camouflage coats and good vision. These are important for living in open country. We know less about the carnivorous mammals of the savannah as their predator relationship is very complex. At any rate, it is useful to note that there is a sharp dichotomy in most groups of animals and plants between forest and non-forest species.

Seasonal rhythms are extremely important to savannah animals just as they are to the plants. Herbivores disperse and wander widely in search of food after the rains when food is abundant. In dry weather, however, they stay near rivers and lakes in order to find water and food. Many of them must migrate long distances to do this. In the Rift Valley in Tanzania, zebras and wildebeest migrate from distances over 40 miles away. The changes in day length and temperature that mark seasonal changes in temperate zones continue to be absent in this tropical environment.

Instead it is the divisions into wet and dry seasons that trigger breeding. The time of breeding varies with the species. It is common, for example, for many species of bird and small mammal to breed just prior to or during the rainy season. The seasons also change the eating habits of mammals as the flourishing vegetation during the rainy season affects the actions of the herbivores who in turn effect the carnivores.

Diurnal rhythms are more pronounced in the savannah than in the dark tropical forest yet they are less pronounced than in the desert. They are sufficiently pronounced to effect the movements of most savannah animals. Due to the openness of the savannah, herbivores use various means to protect themselves from predators. Some, like the elephant, are too large to attack. Others like the rodents burrow into the ground to escape. Many rely on their ability to out run their attacker. Many live in large herds as there is some measure of protection in numbers (Cloudsley-Thompson 1975:55).

Tropical savannahs, then, are transitional zones between the forests and the deserts. They are marked wet and dry seasons and all life must be able to adjust to the difference between the two. They usually contain fewer ecological niches per unit area than the forests as well as a larger number of individuals per species. Four cultures in this study were found to live in savannahs. They are the Yaruro,

and the Guato of South America, the Hadza of Africa and the Wik Munkan of Australia.

### THE YARURO

The Yaruro live along the Capanaparo River in Venezuela in an area that is south and east of the Venezuelan Andean Mountain spur at about  $5^{\circ}$  to  $6^{\circ}$  N. On the east they are bound by the Orinoco River and on the South by the Columbia.

### Environment

The Orinoco is the third largest river system in South America covering 360,000 square miles, which is about four-fifths of Venezuela and one-fourth of Columbia. It is 1,281 miles long and has its source in the Parima Mountains. Yaruro country is a low lying plain drained by the Orinoco river system and comprised of alluvial brought down by the Andean mountain torrents which soon become transformed into deep tranquil rivers. Temperatures are hot year round with trade winds. There are two distinct seasons. The dry season lasts from November through March and transposes the area into a veritable desert with scant vegetation except along the river banks and around the water holes. The rainy season extends from April to October and turns the area into an inland sea rich in life. This annual flooding occurs because the clay soils form impermeable layers that are just not able to absorb the great amounts of rainfall (Petrullo 1939:174; Dorst 1967:49).

Alluvial plains are poor habitats for tree growing, and thus the ground is covered with grass varieties whose growth is consonant with extreme drought part of the year. Forests and savannah woodlands do exist along the rivers. The trees are deciduous and of medium size. Palms like the palmas redondas (*Capernicia tectorum*) and the moriches (*Mauritia flexuosa*) are characteristically found along the river banks (Dorst 1967:52).

### Culture Contact

At the time of Petruccio's fieldwork, the Yaruro were facing extinction. They had been in touch with European-American culture for several hundred years, but Petruccio claims they had borrowed little of it. They had had a good deal of sporadic missionary contact, however. In light of the depopulation information reported by Petruccio, it is difficult to believe his claim that the Yaruro had been little affected by outsiders. The llanos had formerly been populated by a number of tribes but only the Yaruro and one other were left. Petruccio found 150 Yaruro in the Capanaparo region and on the island of Linda Bara in the mouth of the Capanaparo River. He was told of the bands on the Sinaruco River, but he did not contact them. Previously the Yaruro lifestyle had involved utilization of both the plains and the river; however, ranchers had taken over the plains and forced the natives to live along the rivers only. This, of course, would have an extensive effect on subsistence and

settlement patterns. Petrullo was also told that one month before his arrival, about 150 Yaruro were killed by local "Jefes Civiles". Whether this was accurate or not, it does indicate the hostile atmosphere in which the Yaruro lived.

Petrullo's fieldwork was done in 1933 and 1934 and lasted 3 months. He spent roughly 6 weeks traveling around to various camps. The last 6 weeks he was ill and unable to travel and convinced a group of Yaruro to settle in one spot with him. At the end of this time food could no longer be found in the immediate area, camp broke up, and he returned home.

#### Subsistence

The Yaruro were mainly fishermen and hunters of river animals. At the time of fieldwork they had almost stopped hunting land animals for fear of being accused of killing the ranchers' cattle. Much of the game the Yaruro would ordinarily eat had been killed by crocodile hunters. The main meat staple of the Yaruro was the *Crocodilus babu*, which they hunted daily, and the turtle. Fishing was resorted to when the above meat sources could not be found.

During the dry season, they gathered the eggs of the terracai, a small water turtle whose eggs were found in February, of another turtle whose eggs were found in March and April, of the galapago or tortoise whose eggs were available in December, of the cayman variety of crocodile

whose eggs were found in February and of the babu variety whose eggs appeared in December. Meats commonly eaten in the dry season were terracai, turtle, galapago, crocodile, deer, birds and iguana. Vegetables of the season were the changuango (a potato like root found in the savannah and the only food the Yaruro were able to preserve for a few days, burying it in the sand), barbaco (a root found in the forest mostly in May), guapo (another forest root), wild yam (savannah and forest), fruit of the macanilla palm, honey and hearts of palm (in April). In the rainy season the meats eaten remained the same. The favored vegetables were the moriche, chigua and barbaco. Chigua seeds could be stored by crushing, toasting and burying them in the sand in a spot high enough to stay dry (Petrullo 1939:200).

#### Settlement Pattern

The Yaruro traveled and hunted mostly by canoe as they feared overland travel might arouse the hostility of the ranchers. During the dry season camps were moved every few days. During the rainy season they were moved less often but were still moved frequently. Theoretically the camps were composed of matrilineal extended families, but in reality the members were much more loosely related. At the time of fieldwork, the population had been so decimated that the camps had no recognizable shape at all. Each family group had a territory to hunt and gather in. The

main rivers and streams were open to all to use. The Yaruro of each major river recognized a loose relationship so that those of the Capanaparo saw themselves as distinct from those of the Sinaruco (Petruccio 1939:199-216). Thus at the time of fieldwork, the Yaruro fell into the highway nomadism pattern. They moved every few days but confined themselves to camps along the waterways. Their dry season camps were located between the water and the treeline that indicated the wet season bank. Thus they utilized a number of econiches: the water itself, the banks which varied according to the season and in any case included a forested or treelined area that indicated the wet season bank, and the savannah beyond the trees. It is possible that in earlier times, their settlement pattern was different as they made greater use of the grassland savannah now exploited by the ranchers. However, they were hunters and gatherers at the time of study. They depended to some extent on trade but appear to have been able to subsist largely on their own even under the difficult conditions of the day. Thus they are included in this study as highway nomads.

#### THE HADZA

The Hadza live near Lake Eyasi just south of the equator in Tanzania. They are also known by the names Hadzapi, Tindiga, Kindiga and Kangeju. In the 1960s three groups of people who speak the Hadza language could be located. The

Eastern Hadza who live in the tsetse bush east of Lake Eyasi are hunters and gatherers. There are about 400 of them in a 1,000 square mile area. A second group of about 100 lives south of them and is composed of agriculturalists who have intermarried extensively with the Isanzu tribe. The third group of about 250 are mostly hunters and gatherers living to the west of Lake Eyasi in the area of Kimali.

### Environment

The area east of Lake Eyasi is a savannah dominated by thorn scrub and acacia, infested with tsetse flies. It is composed of rocky areas alternating with open grass plains. It is dry with an average annual rainfall of 22.61 inches. The rain falls from December to May with December and March having the greatest amount. The remainder of the year is quite dry. The area is unusually rich in game animals. Elephant, rhinoceros, buffalo, giraffe, eland, wildebeeste, waterbuck, impala, Thomson's gazelle, warthog, baboon, lion, leopard, hyena, anteater, porcupine, hare, hyrax, dik-dik, klipspringer, jackal and tortoise are all common (Woodburn 1968:49-50).

### Culture Contact

Bagshawe, at the time of his fieldwork in the early 1900s, characterized Hadza country as



an inhospitable wilderness, full of game but heavily infested with tsetse fly and very short of drinkable water....No roads pass through it (the area) and though it affords good shooting, no food is obtainable in it excepting the meat of game. During the rains much of it is almost impassable black muck and during the dry months, excepting for a few places, such as Jaida swamp, water is not only scarce but dangerous, for many of the springs and drinking places appear to be impregnated with something which causes a severe and persistent diarrhea. The Kangeju (Hadza) dislike the presence of strangers and are most unwilling guides, but no one else has a knowledge of more than a fringe of their country, so they must be used. They are lazy and prone to desert and if a large supply of meat becomes available, are quite capable of hiding until the departure of the traveller allows them to feast in peace upon the carcasses (Bagshaws 1925:117).

With such an attitude on the part of Europeans, it is no wonder that the Hadza have been left more or less to themselves so late in the twentieth century. Their land was not economically appealing enough to outsiders to even make it worth thorough exploration.

Up into the 1960's the East Hadza especially had retained their hunting and gathering existence. They traded with neighboring tribes for tobacco, cloth, beads and iron but did not depend on them in any substantial way. Since that time, however, many of them have been convinced by the Tanzanian government to become sedentary. We have excellent data on the aboriginal ways of the Hadza as their existence as hunters-gatherers into the 1960's has allowed collection of it first hand.

### Subsistence

Woodburn estimates that 80% of the Hadza's food by weight is composed of vegetable matter and the remaining 20% of meat and honey. The main vegetable foods eaten are the roots of the *Ipomoea transvaalensis*, *Coccinea aurantiaca*, *Vigna esculents* and the *Vigna macrorhyncha*, the berries of the *Cordia gharaf* and others. Women and children make daily trips in groups to gather vegetable food. The men are likely to gather some for their own immediately consumption when out hunting (Woodburn 1968:51).

Men and boys hunt individually with bow and arrow. They stalk their prey and if it is large use a poison arrow and then track the animal until it dies. Honey is gathered as it is useful in trade as well as for food. The Hadza eat most of the animals available in the area with the exceptions of civet, monitor lizard, snake and terrapin, which they seem to reject because of cultural bias, and elephant which is just too large for them to kill with their bow and arrows. In actuality, however, they do not kill very many animals, which is why four-fifths of their diet by weight is vegetable matter. The vegetable foods are much more reliable. The men, in truth, spend much of their time gambling, especially in the dry season; men over the age of 45 years rarely hunt at all (Woodburn 1968:52).

### Settlement Pattern

The Hadza live in loosely related camps with no clear cut identity. The only pattern that could vaguely be found in them was that mother and married daughters tend to travel together. These camps may vary in size from 1 to 100 people though the average one contains about 18 adults. One camp site is rarely inhabited for more than a few weeks and usually for less. People move in and out of them continuously. Basic reasons for moving camp were a) the convenience of moving to the site of a large kill rather than carrying the meat to the old camp b) presence of illness c) need to obtain raw materials, food or water in another location d) desire to realign the huts in camp due to a shift in camp composition and 3) prevention of developing conflicts with other camp members.

Although there are no territorial boundaries, the Hadza did recognize 4 large, vague divisions of their land. At any point in time each of these contain from 50 to 150 people moving within it. The old people tend to stay in one area more often than the young. Dry season camps are often larger than wet season ones, possibly because more large animals are killed in the dry season and people gather around the kill. Houses are beehive shaped huts built by the women in 1 to 2 hours. Often in the dry season they do not bother to build them, especially if

staying at a location for only a few days. During heavy rains of the wet season, rock shelters are sometimes used for camps (Woodburn 1968:105; Bleek 1931:274).

In the wet season, root gathering and small game like the hyrax are important in the diet while in the dry season berry gathering and large animals are utilized. The people disperse and live in relatively small camps during the wet season. In the dry season they congregate in large groups at the few reliable water sources. In each of the 4 areas, the Hadza would be concentrated in a few large camps within 2 to 3 miles or less of each other near the water and berries. The animals also take advantage of these water sources, which is probably one reason the Hadza are able to make more large kills during this time. Hadza camps were always within 3 to 4 miles of water and usually within 1 mile (Woodburn 1970:11). The Hadza are placed in the "variable semisedentary pattern". They live dispersed during the wet season and amalgamate during the dry one although no one family can be depended upon to return to the same spot each year. They thus follow the variable pattern.

#### THE WIK MUNKAN

The Wik Munkan tribe of Australia is located in the Cape York Peninsula in the extreme northeastern part of Queensland between the 17th and 10th parallels of latitude. They live on the upper tributaries of the Archer River in the central highlands and on the tidal reaches close to the Gulf of Carpentaria.

### Environment

This area of savannah has two well defined seasons. They are the northwest monsoon or the wet season which occurs from late November to March and the southeast monsoon or the dry season which occurs from April to November. Towards the end of the dry season, the temperatures become very hot, and many trees lose their leaves. Lightning begins and thunderstorms grow in intensity leading into the wet season. Within a week after the heavy rains begin, the trees have leaves, the grass and plants new shoots, and the low country and plains are dotted with sheets of shallow water. The low areas along the river become covered with Blady grass (*Imperata arunclacea*) which is 6 to 7 feet tall by the end of the wet season and makes travel difficult for months. There is so much flooding during the wet season that for months the country is almost impassable. During the dry season, there is almost no rain, and the rivers are dry or contain just a trickle of water. The temperatures are moderately cool.

Cape York Peninsula is mostly savannah forest. The coasts, though, have extensive areas of low lying plains or "salt pans" which flood with brackish water during the wet season and are bare and arid though intersected with tidal creeks during the dry season. The creeks contain great amounts of fish, shellfish and crabs. Honey and several species of mangroves are found throughout the country side

(Thomson 1939:212). The Wik Munkan themselves do not come in contact with the sea as there is a strip of land along the coast varying from 2 to 10 miles in width that is occupied by kindred coastal tribes (McConnel 1930:97).

### Culture Contact

At the time of McConnel's work in 1927 and 1928 there were about 50 to 100 Wik Munkan in the Archer River area though some of these lived on a mission and in the reserve. There were about 200 on the Holroyd, Kendall and Edward Rivers (1936:454). The population was probably 3 or 4 times larger in earlier days but hostility with the cattle ranchers as well as disease had reduced the numbers. A reserve was set up for the aborigines along the Gulf Coast, and several missions have been established. These attempts at acculturation have affected the Archer River Wik Munkan the most, and McConnel claims that at the time of her work the Edward and Holroyd River Wik Munkan "lived a natural hunting existence relatively undisturbed" (1930:99).

### Subsistence

At the beginning of the dry season, mid-March to late July, the food waters recede but surface water and tall grass are still sufficiently abundant to make travel difficult. The Wik Munkan continue to use bark canoes on the rivers in order to travel. Fish are abundant, but it is

vegetable foods that are most important. A large number of them are ready for harvest including 2 varieties of mangrove (*Avecinnia marina* var *resinifera* and *Bruguiera Rheedii*), 2 of yam (*Dioscores transversa* and *D. sativa*), water lily tubers and seeds (*Nymphaeae gigantea* and others) and many leguminous roots (*Eriosema chinense*, *Vigna canascens*, *Tacca pinnatafida*, *Typhonium Brownii* and others).

At the height of the dry season (late July through early October) vegetable foods slowly become scarce and water sources dry up. Vegetable foods listed above are still eaten. Nonda plums (*Parinarium Nonda*), honey and the tubers of a swamp plant (*Heliocharis sphacetata*) all become important. The end of the dry season (October through early December) is characterized by a hot climate and a change in wind direction. Surface water is scarce and can only be found in deep holes and wells. At the end of this period lightning and thunderstorms announce the coming wet season. Vegetable foods have become relatively scarce. Nonda plums and honey are still available. The tubers of the *Heliocharis sphacetata* become the most important vegetable food and, on the coastal plains, practically support large camps of people. Round yams and water lily bulbs stored earlier are eaten. Wallabies and fish are also eaten.

The wet season (late December through early March) brings much flooding. Vegetable foods are scarce except for fruits of plants like *Flueggea microcarpa*, *Vitex glabrata*,

*Eugenia suborbicularis* and certain *Ficus*. Fish, shellfish, crabs, eggs of water fowl, turtles and crocodiles, and the Red and Grey kangaroos become important food sources (Thomson 1939:214-125).

### Settlement Pattern

In late March when the rains have stopped, the wet season camps are abandoned and new ones are built on open ground exposed to the south-east wind, for protection against mosquitoes. Most travel is by bark canoe and fish are caught with nets, fences and traps. The large camps break up when the grass begins to burn in July and the Wik Munkan disperse in groups of one to several families beginning a nomadic life. Camps are occupied for a few days or weeks only. Much burning of grass so as to aid the hunting of wallabies, native cats, goannas and snakes, is done. Vegetable foods become slowly scarce. By October, the nomadic movements are less extensive and grass burning is done on a large scale to hunt kangaroo. Camps gradually become established close to a permanent water source, preferably one also near a food supply, as water has become scarce. When the wet season begins in late December a more or less permanent camp is established. It is usually on well drained ground where there is protection from the wind and rain. Patches of dry jungle near rivers and dense cover on raised beaches fringing the coast are popular locations (Thomson 1939:214-215).



The Wik Munkan tribe was composed of about 30 clans, some of which were already extinct in the late 1920's. Using much guesswork, McConnel estimates that each clan probably had 40 to 50 members and an area of 50 to 100 square miles so that the average population density would have been 1 person per 2 square miles. Clan members hunted mainly on their own land. Each local camp contained members of the local clan plus women who had married into the clan and minus the women who were born into it and had married out. However, it was common for relatives to visit so camp composition was often a bit amorphous. When food was scarce in ones clan area, one could visit relatives in an area where food was more plentiful. At special times of plenty, members of a clan might invite relatives to come join them and parts of the male initiation ceremony might be held. Such situations of abundance were good hunting in panja swamps, water lily lagoons and river reaches where fish were plentiful (McConnel 1930:182; 1934:335).

The Wik Munkan, then remain settled in large groups during the rainy season and the early part of the dry season when travel is difficult except by canoe. When the grass is dry enough to burn, they begin to do so and disperse in small family groups to hunt and gather vegetables. As the drought becomes extreme, they are forced to settle somewhat around water sources and then when the rains begin

again they establish a long term camp in an area protected from wind and rain. They follow a variable semi-sedentary pattern of movement. Their movements seem to be dictated by the presence and absence of water, rather than of food. The wet season brings so much water that movement is too difficult and the height of the dry season brings so little that movement is not advisable. During good traveling weather, the major portion of the dry season, they do travel extensively.

### THE GUATO

The home of the Guato is eastern Bolivia and western Matto Grasso in the upper Paraguay River Basin. They are south of the Bororo at latitude and longitude of  $56^{\circ}$  and  $19^{\circ}$  respectively.

### Environment

The upper part of the Paraguay River meanders across sands, salts and gray and white clays. On both sides of it are vast marshes with lagoons drained by a complex network of streams. These marshy areas, home of the Guato, are called the Pantanal and are only a few hundred feet above sea level. They flood annually. The river itself is from 13 to 16 feet deep. The rainy season lasts from October til about May. During the first two months of it, the waters of the plains remains low. The water begins to rise in December and reaches a high in May and June (a month or so after the rain ends). At the water's height, the

area is an immense swamp that can only be traveled by boat. As the water subsides, the land dries out in vast stretches.

A climate such as this is not conducive to the growth of trees, and although the Pantanal is often referred to as part of the Matto Grosso, the only forest to be found is on its borders. There are patches of very poor woods with a dense undergrowth of palms. The plant life in the area shows adaptations to the alternating periods of drought and flood. Camalote, a river plant, flourishes in the wet depressions, and caranda palm is found along the Paraguay river and its streams. Water birds flourish in this environment. The jacana, ibis, heron, boatbill and many varieties of ducks are among some of the ones found (Dorst 1967:152-153).

#### Culture Contact

The Guato have been in their present location since the sixteenth century but have suffered greatly from Brazilian contact. In 1905 Max Schmidt counted 46 of them scattered in single families on Lake Gaiba and Lake Uberaba and the river connecting them. There were other Guato at that time that he did not contact. At that point, however, they were on the verge of extinction. The few that were left wore European clothing and had been greatly affected by culture contact with the Brazilians. The ethnographic data on the Guato is not only scant but from a period when their

culture had already virtually ended. Thus some attempt can be made to reconstruct aboriginal ways, but it should only be done with an understanding of the difficulties. They are included in this study, but data are too scant to allow a thorough analysis of their movements.

### Subsistence

The Guato apparently ate fish, especially piranha and pacu, alligators, turtles, lizards, boas, deer, monkeys, birds, and lizard and turtle eggs. Wild rice, which was harvested from the canoe, was a staple during the wet season. They also ate bananas found at the ancient habitation sites in the area and the fruit of the acuri palm, the trees growing on mounds made by man long ago. Other important plant foods were aquatic plant seeds and the fruit of the sibota tree. They had domesticated chickens and dogs and used fish hooks, arrow, harpoons and clubs to catch their prey (Metraux 1942:137).

### Settlement Pattern

The Guato lived mostly in canoes. The nuclear family was the common economic unit. Each family spent several months each year in a permanent house on the river bank. Goods were stored above flood reach on a platform in the house or in the trees. At other times they camped for a day or two at various places. There were three patrilineal,

polygynous local groups living in 1) the upper Paraguay River basin, 2) the Lake Gaiba and Lake Ubera ba region and the Caracara hills and 3) on the lower Sao Lourenco River. Each family owned an acuri palm grove and made wine from the sap during the dry season, although draining the sap usually killed the tree (Metraux 1942:140).

The Guato lifestyle had probably been greatly changed by depopulation and European contact, and thus it is difficult to assess the legitimacy of the data and of one's conclusions from it. Given these reservations, from data available, the Guato would be of the fixed semi-sedentary type as they remained in permanent homes on the river bank part of the time and wandered, moving frequently, the rest of the year.

### Conclusion

Of the four cultures discussed in this chapter, three live in savannahs with sufficient rainfall and poor enough drainage to flood during the rainy season. These three, the Yaruro, Wik Munkan and Guato, rely on aquatic animals and fish as well as palm fruit, yams and aquatic plant seeds. Both the Yaruro and the Guato travel mainly by boat. The fourth group, the Hadza, live in a thorn scrub and acacia savannah which is much dryer and supports large numbers of game animals. They depend on these as well as roots, berries and fruits. Three of the four are semi-sedentary reacting

to the degree of rainfall in determining their movements. The other, the Yaruro, are highway nomads who, because they travel by canoe are able to avoid the travel limitations of their wet season.

The Yaruro, Wik Munkan and Hadza provide an interesting comparison in the study of movement. The Yaruro live in a climate sufficiently wet that finding drinking water is no problem in the dry season but movement is difficult in the wet season. They have solved this problem by traveling and hunting by canoe. Thus the limitations of a flooded habitat do not affect their movement and they are highway nomads. The Wik Munkan are affected by both the travel limitations of a rainy season of flooding and high grass and by the travel limitations of a dry season of water scarcity. They remain settled during the rainy season dispersing during the dry one. However in the height of the dry season, they must congregate again to some extent because of water shortage. They are semisedentary. The Hadza live in a drier climate where transportation in the rainy season is not such a problem, and they disperse during it. They must congregate during the dry season, however to find water. Thus the savannahs are truly a transitional zone between the tropical forests and the deserts in terms of settlement pattern as well as environment. Semi-sedentary movement in the forests was dictated by the difficulty of

traveling during the wet season. Semi-sedentary movement in the deserts will be dictated by the difficulty of moving during the dry season. In the dryer savannah climates, movements are becoming more like those of the desert. The Guato cannot be easily fit into this picture as we do not know at what time of the year they remained sedentary.

## CHAPTER VI      CULTURES OF THE DESERT

The major deserts of the world lie beyond the equatorial rainfall belt in the area where trade winds blow year round and annual precipitation is less than 10 inches. Some, like the Sahara and Kalahari, are hot deserts having no cold season. The Gobi and the Great Basin, on the other hand are considered cold deserts because they have one or more winter months with a mean temperature below 43°F.

There are five types of desert: sub-tropical, cool coastal, rain-shadow, interior continental, and polar. Polar deserts differ from the others in that water is present but not usable by plants and animals because it is found only as ice. The other four types are arid because the amount of evaporation greatly exceeds the annual precipitation. Sub-tropical deserts are caused by semi-permanent belts of high pressure in tropical regions. By the time the air reaches ground level it is quite hot, has very little humidity and will not produce rain. The cool coastal deserts are rainless but covered with chilly moisture. The Namib, Atacama and coastal desert of Baja California are examples. Rain-shadow deserts are caused by the wind and moisture behavior on the lee sides of



mountains. The Mojave, Great Basin, Patagonian and Australian deserts all are affected by the shelter of mountains.

The trait common to deserts is aridity throughout the year. As opposed to the more stable climates, the tropical deserts experience extremes of temperature and humidity. Rainfall is usually seasonal but quite erratic, and total annual precipitation varies greatly from year to year. The absence of clouds is responsible for the extremes of temperature.

Vegetation in the desert must, of course, adapt to the climatic extremes. Plant life is scant compared to most other climates. The spacing reduces competition for water. Deserts usually merge into scrub steppe lands or grassland savannah where a slightly increased amount of available moisture allows for more vegetation. Desert plants have ways of searching out or storing what little moisture they can find. As a means of reaching all available water, many have wide spread root systems, like the saguaro cactus, and others have deeply penetrating roots, like the mesquite. Some, the succulents, store water in their roots, stems and leaves. Cacti and agaves are examples. Some plants are equipped to lower water loss by transpiration because they have small, fleshy leaves, a thick waxy cuticle or a downy hairlike covering. The xerophytes fall into 4 categories: 1) those drought-escaping ephemerals which germinate and flow rapidly after rainfall 2) those drought-evading plants which are so tiny

that they require little water and grow slowly, 3) those drought-enduring species which simply stop growing when there is no water in the soil, and 4) those drought-resisting succulents which hold water in their tissue.

Desert animals too must adapt to the extreme heat and lack of water. Lizards and tortoises burrow in the ground to avoid the heat. The tortoise's main water source is the succulent plants it eats, and thus it does not need to actually have drinking water. Desert birds differ less from their counterparts in more humid climates than do most desert animals. Birds are found in the largest numbers in areas that possess surface drinking water and are scarce in other areas of the desert. Small mammals usually avoid the mid-day heat by burrowing in the ground, and some of them, like the herboas and kangaroo-rats, can exist without any drinking water. Desert carnivores have not been thoroughly studied. They obtain a large amount of water from the body fluids of their prey. Carnivores are rarely found outside the range of surface drinking water. Typical desert carnivores are foxes, jackals, hyaenas, coyotes, small cats, badgers, skunks, ferrets, some marsupials and the Australian dingo. The larger mammals include antelopes, gazelles and wild asses in the Old World, pronghorn and mule-deer in North America, and Kangaroos and wallabies in Australia. All of these have low water requirements and are sufficiently mobile to be able to travel long distances to find water.

While deserts are characteristically hot and dry, they often have a seasonal change of one of two kinds. They have either a season of precipitation and a resulting outburst of plant growth or a season of cooler, less severe weather though often still with no rain. These seasonal changes can be seen in the animal life as the adult populations of animals reaches its peak at the rainy season. A number of bird species are triggered to breed after a rain. They may not breed for several years due to absence of rain, and they breed several times in succession when a rainy period occurs. In temperate climates, birds mate as a result of the day-length of the photoperiod while in the desert it is rainfall or the visual stimulus of green vegetation produced by that rain that stimulates them. Similarly, rainfall has been found to trigger the mating of many mammals as well.

Desert animals must come to terms with the extreme heat of the desert day. Many of the smaller ones solve the problem by being nocturnal. Some cope with it by becoming dormant (diapause) during the desert summer. Some types of desert snails have been found to remain in diapause for over 5 years. The most common means of dealing with the heat for small animals is to burrow in the ground during the day (Cloudsley-Thompson 1975:70).

Thus the most obvious characteristics of deserts are the extreme aridity and the extremes in temperature.

All life in the desert must adjust to this. Three of the cultures in this study live in desert environments and will be discussed in this chapter. They are the !Kung in Africa and the Ngatatjara and Walbiri in Australia.

### THE WALBIRI

This group lives in the central-western part of the Northern Territory of Australia in an area covering approximately 35,000 to 40,000 square miles. Fairly recently the Walbiri have wandered into an area extending to the headwaters of the Victoria River in the north and into another extending to Teatree on the Stuart Highway in the southeast. These two additional areas add about 15,000 square miles to the Walbiri area.

### Environment

Most of the Walbiri area is in the 5 to 10 inches rainbelt. The northern (Hooker Creek) region gets up to 15 inches per year. Typical of deserts the annual rainfall varies greatly from year to year. Phillip Creek got 17 inches in the summer wet season in 1952-3 and only 2 inches the next summer. Temperatures are also extreme, Hooker Creek in the summer of 1953-4 recorded shade temperatures hovering between 100° and 115° for 2 months. During the rains and for a short time afterwards, the temperature drops to 85° to 90°F. Winter temperatures range from 50° to 85°F.

Much of the area is rolling country 1000 to 1500 feet above sea level with little drainage. The land is mostly red-sand and loam covered with spinifex grasses, stunted acacias, grevilleas and hakeas and a few eucalypts. Water occurs a few feet below the surface near the Hanson and up to 150 feet below the surface near the granite outcrops in the west. Hooker, Winnecke, Lander and Hanson creeks are dry 6 to 9 months of the year. Since surface water is so scarce, the Walbiri must often dig for soaks in favorable spots in creek beds and rely on tiny rock-holes and rock-seepages. Their desert is covered with trails they have made taking advantage of these water sources. These sources are not adequate for European stock raisers, however.

While spinifex grass and stunted trees seem to be everywhere, many plants do prefer particular niches. Cyprus pines and wild figs are found on granite hills. The wild orange is also found on hills. The bean tree grows along creek banks in the southern portion of the country just as the coolibahs and the river red gums can only be found on water courses. The ghost gum appears on drier hill sides. Bloodwood and plum bush grow in drier areas. Desert plum and plum bush and mulga and witchetty bush all grow in sandy loam in the southern areas. Cassias, eremophilas, hakeas, grevilleas, conkerberries and acacias are widely distributed (Meggitt 1965:1).

Culture Contact

Because of the inhospitality of their region, the Walbiri have been less bothered by Europeans than many of their Australian counterparts. The Europeans living to the south did not even begin exploring the Northern Territory until 1860 and then did not develop any interest in it until gold was discovered in 1907. This brought a few years of hostile contact between the miners and the natives. Later cattle stations were set up in some parts of the area. The Walbiri avoided the Europeans for the most part but a severe drought from 1924 to 1929 forced them to rely on the White stations as most who remained solely in the desert perished. Increased contact with Europeans brought more hostilities. The Walbiri, however, had become so dependent on white foods, clothes and axes that most did not want to return to the desert life and thus had to go to work for the Europeans in order to support their lifestyle at the white stations. In the following years, the Walbiri not employed on cattle stations were gathered in reserves and in other special areas. By 1955 two-thirds of them lived in settlements where they were supervised by government officers. The remaining third lived on cattle ranches.

Meggitt estimates the tribe contained about 1400 members at the time of his fieldwork in 1955. He suspects

the population was increasing due to improved diet and medical services associated with white contact. If this is true, it is almost a unique situation as white contact usually has the opposite effect on hunters-gatherers. At any rate, Meggitt estimates the pre-European population at 1000 to 1200 with an average population density of 1 person per 35 square miles (Meggitt 1965:33).

Meggitt's fieldwork in the early 1950's is the best source of data on the Walbiri. However, it must be remembered that it occurred after the Walbiri were all settled in permanent camps and acculturated to European goods. The following is thus a reconstruction of their lifestyle earlier in the century.

### Subsistence

The fall and early winter were considered the "good" season as people congregated in one or two large groups and traveled from one waterhole to another as particular plants became ready to harvest and as they pursued game. As water and food became more scarce, the main party broke into smaller and small groups. The "bad" season was the end of the dry weather in late spring and early summer. The typical food gathering unit was the nuclear family (a man and possibly several wives) and maybe an elderly widowed mother or father in law). The day's food might be supplied by only a lizard or two, a few yams and a handful of

grass seeds. After the rains had broken and food became more plentiful, the small groups converged again at the big waterholes. The composition of the groups is difficult to define. Small groups might be composed of consanguinal and affinal relatives as well as friends (Meggitt 1965: 49-50).

#### Settlement Pattern

The Walbiri recognized themselves as having 4 major divisions or "countries" varying in area from 7000 to 15000 square miles. The residents of each were economically self-sufficient and each contained totemic tracks and centers visited by the men.

The Walbiri were amalgamated during the rains and the ensuing season of food and water abundance and were dispersed during the height of the dry season when they must take advantage of the tiny hidden water sources they have come to know through the years but which will not support large numbers of people. This is the variable semi-sedentary pattern.

#### THE NGATATJARA

The Ngatatjara speak a dialect of Pitjantjara and are located in the Gibson Desert in the state of Western Australia. This desert is between 22° and 27° south latitude and 124° and 130° east longitude.



## Environment

The Gibson is one of a group of deserts comprising the central section of Australia. The country is composed of parallel sand ridges in a northeast-southwest or east-west direction that are often miles long, but are usually less than 50 feet high. Between them are valleys of flat sand plain ranging from a few hundred yards to over a mile wide. All is covered with spinifex grass, a desert plant with sharp spines that grow in clumps. Periodically the sandhill landscape is broken by low rolling hills of reddish conglomerate covered with spinifex, other grasses or mulga scrub. There are also some groves of "desert oak" as well as scattered kurrajong trees and ghost gums.

Other than the kangaroos and euros, most of the animals are nocturnal, avoiding the daily heat. The small marsupials like the rabbit-eared bandicoot, the jerboa mouse and the rock wallaby are examples of some of these nocturnal creatures. Lizards are more common than mammals. They are found primarily in the spinifex and sand areas while the marsupials live near the mulga scrub. A number of animals have been introduced to the area by man and are replacing some of the marsupials. These relatively new species include dingos, foxes, field mice, cats, camels, goats and rabbits. Some of these have been in Australia for some time. The dingo, for example, probably arrived 3000 years ago. The emu, who lives in the mulga scrub, moves in large groups

by day and can run up to 30 miles per hour, is common in the area as are galahs, finches, green budgerigars, and peregrine falcons, all of which can be found near waterholes.

Rainfall averages less than 8 inches per year but varies greatly from year to year. There is no coherent system of drainage. The desert contains numerous dry lakebeds that after a rain fill with salty, undrinkable water. Summer temperatures fairly regularly climb to 120°F in the shade while night time temperatures in the winter may be below freezing (Gould 1969:40).

#### Culture Contact

The first exploration of the Gibson Desert by Europeans occurred in 1873; however, the land was found so inhospitable that Europeans had virtually no interest in the area until gold was discovered in 1892. At that point the previously isolated Ngatatjara were drawn to the gold rush towns. Many of these towns were later abandoned but were replaced by other white settlements which attracted the aborigines in turn. In 1967 when Gould did his fieldwork with the Ngatatjara, the desert had been almost totally abandoned by them in favor of living near white settlements. In some cases this meant being a long way from home lands. Thus though Gould did go out in the desert with a group of Ngatatjara and live for a period of time on the desert's wealth, his discussions of aboriginal ways are reconstructions based on the time he

spent hunting and gathering with the Ngatatjara and on their comments regarding their earlier foraging lifestyle.

### Subsistence

Gould lists the following vegetable foods as providing a substantial portion of the diet during the seasons they were collected in the year 1966-1967. December through February, the fruits of 2 of the Solanum species, February through April the berries of the Canthium latifolium, March through June the seeds of Chenopodium rhodinostachyum, March through May the seeds of Eragrostis eriopoda, May through July the fresh fruit of the Solanum, June through September the fruit of Santalum acuminatum, and September through November the fruit of the ficus were staples. Other than these staple foods, a number of other edible plants are consumed.

The Ngatatjara hunt 47 varieties of meat or fleshy foods although meat is less important in the diet because it is less easily obtainable than vegetable foods. Honey ants, white ants and 2 types of grub are also eaten.

Gould noticed that during the average day from December through February, women foraged every day for vegetable food and collected an average of just about 10 pounds of edible food after processing. The women in a pair of related families totalling 13 people were able to collect just under 30 pounds of one species of Solanum and 10 pounds

of another in an average of 4 1/2 hours of collecting. These observations are limited to one season in one small group in the Clutterbuck Hills.

Hunting is done largely by lying in wait in blinds or bushes. Communal hunting occurs after periods of heavy rain when kangaroos, emus and wallabies are numerous and gregarious. It is done by means of fire, brush pounds and natural game traps. Any large gathering for ceremonial purposes was observed by Gould to coincide with large supplies of meat. The Ngatajara have no way of storing meat, and thus it must be eaten. Though they do store vegetable foods, they do not seem to use these stores for large gatherings. Gould (1969:265) states that "there was a tendency for group size to be based on natural as opposed to man-made surpluses."

#### Settlement Pattern

The Ngatatjara's movements are geared to the availability of water. There are few springs or truly permanent rock holes or soakages in the Western Desert, and thus they must take advantage of water where they find it. Rainfall is unpredictable and because of this they do not follow a strict seasonal round. They tend to move from one water source to the next using up the small ones while they have water and gathering within a 5 to 10 mile radius of them. They then move to the larger and more permanent ones. Gould was informed that families used to travel 250 to 300

miles in search of food and water, but the longest trip he observed was 100 miles. From December 1966 to March 1967, 2 families of a total of 13 people moved 9 times over 950 square miles area. The direction of movement is determined by 1) the location of rain, which can be seen for 50 miles, 2) the location of a known staple abundant during that season, 3) the direction of a known line of water holes if they corresponded with the first two points (Gould 1969:267).

Groups of aborigines converge on areas that have had heavy summer rains for one or preferably two seasons and stay together in groups of up to 150 until the meat intake drops below 1 1/4 pounds per person per day. Kangaroo and rabbit are the main meat sources during this time. Such locations are not predictable as the rains are not predictable. The largest gathering Gould actually witnessed was of 107 people for 2 weeks. During times of severe drought, people disperse into family groups and forage at the more or less permanent water sources (Gould 1969:256).

The Ngatatjara, then follow the variable semi-sedentary pattern. During the driest times of the year they disperse into family groups ranging in size from 10 to 30 people and forage at the few water holes available. After the rains they converge on locations that have received the most rain gathering in groups of up to 150 and depending greatly on the animal food sources available in these areas. The animals too are attracted to the water sources and thus more animal food is available.

## THE !KUNG

The !Kung live in the Kalahari Desert in Africa. The group studied most thoroughly live in the Dobe area near the South-West Africa border and 125 miles south of the Okavango River at 20°S, 21°E.

### Environment

The !Kung area is the semi-arid northwest region of the Kalahari Desert. Droughts occur every second or third year. Whether the actual area the !Kung live in should be classified as a desert is a matter of debate. Much of the area termed the Kalahari is actually a semi-arid grass and thorn shrub savannah with mean annual precipitation of over 10 inches. No precipitation figures are available for the !Kung area although those for its borders indicate over 10 inches annually is common. Ethnographers working in the !Kung area say it is more arid than its surrounds. At any rate, there are 8 permanent water holes in the area which are large enough together to support the 379 permanent !Kung residents during the dry season.

### Culture Contact

Extensive fieldwork with the !Kung has been done by professional anthropologists in the 1960's and 1970's. The !Kung were entirely hunters and gatherers with no guns, live-stock or agricultural practices. Thus the data collected on them is copious and quite valuable to the study of foragers.

It is quite accessible to the reading public as it has been published in the last 10 years, and consequently the discussion of the !Kung in this study will be brief. There is no need to reiterate such lengthy and easily obtainable data (see Lee and DeVore 1968, 1976; Yellen 1977).

### Subsistence

Vegetable foods comprise 60 to 80% of the diet by weight. The mongongo nut is the staple vegetable food and comprises 50% of the vegetable diet by weight. It is drought resistant and available year round on the ground. Of the 85 edible vegetable species in the area (which includes 29 species of fruits, berries and mellons and 30 of roots and bulbs), 90% of the diet by weight is drawn from only 23 species.

Of the 223 species of animals in the area, the !Kung only consider 54 edible and only 17 are eaten regularly. In order of importance, they are: wart hog, kudu, duiker, steenbok, gemsbok, wiledbeeste, spring hare, porcupine, ant bear, hare, guinea fowl, francolin, korhaan, tortoise and python.

### Settlement Pattern

From May to October is the dry season, and the 397 Bushmen congregate at the 8 water holes. The group at each hole is amorphous and people move as they please. There may be more than one camp at a single hole. The area regularly

exploited is that within a 6 mile radius of the hole. During this time the men trap small game in snares and the women gather roots, bulbs and resins. The rains begin in December and as the summer pools of water develop the people disperse in smaller groups to take advantage of these pools. At this time the men are capturing newborn animals and the women gathering roots and leafy greens. By February there are temporary pools of water everywhere and the people are widely dispersed, the men still capturing immature animals while the women have begun to gather fruits, berries and melons. By April some of the small pools are drying up and the people are moving to the larger ones and in May or June the boy's initiation ceremony is held, though only once every five years. Throughout the year, in addition to the foods eaten in specific seasons, mongongo nuts are gathered and hunting with bow and arrow carried out (Lee 1968:32).

The Kung follow the variable semi-sedentary pattern dispersing in the rainy season to take advantage of the many available water sources and gathering in large groups during the dry season at the few water holes. Their pattern is variable as no family feels compelled to return to the same permanent hole each year and is in fact likely to move among them in any single year.

### Conclusion

Of the three desert groups discussed, the two Australian ones live in almost the same environment and follow almost



the same lifestyle. The !Kung of the Kalahari, however, differ from them in a number of ways. It should first be noted, however, that all three are similar in that their movements are geared primarily to the presence of water and secondarily to the presence of other resources. Like other large desert mammals, aboriginal man must be able to travel great distances in search of water and food and all three are able to do that. All three depend on the drought resistant parts of plants as their staple food. For the Australian groups these are seeds and yams that remain on or in the ground year round waiting for rain to trigger their growing activity. The Kung depend on the Mongongo nut which has similar traits. The primary food resources then are always available and naturally stored in or on the ground. Meat is more difficult to obtain and understandably less important. In all three groups it makes up only 20 to 30% of the diet.

Water availability is the key to settlement pattern in all three cases. All three are variable semi-sedentary groups. Water availability is geared to the wet and dry seasons, and thus a seasonal settlement pattern would be expected. For the Australian groups, water is so scarce that large groups of people can gather only during the rainy season when the desert is in flower and only in areas that have had good rains. During the dry season, water is so scarce that the people must disperse into family units as they are unable to support

any larger group. The !Kung, on the other hand, are fortunate in having 8 permanently dependable water holes in their area, and they are able to retire to these in large groups during the dry season. The animal life as well is attracted to these reliable sources. The staple food, mongongo nuts, is also available. Consequently, during the wet season the !Kung enjoy dispersing and taking advantage of the other food sources available. Water during the wet season is accessible in pools in many locations. It appears to be more widely accessible than rainy season water in the Western Desert. So even though all three follow the variable semi-sedentary pattern, their times of amalgamation and dispersal do not coincide, and this is due to a difference in water availability.

The temperate grasslands or steppes usually occur in temperate regions with hot summers, cold winters and low annual rainfall in the interiors of the continents. Along lakes and rivers they merge into forest as only there is there sufficient water for trees to grow. Grasslands of this type appear in Europe and Asia and in the prairies of North America. These regions have become important agricultural ones as they produce cereal grains for the world.

There are four rainfall patterns found in the warm temperate zone. They are: 1) constant drought, which produces desert, 2) evenly distributed rain at all seasons, which corresponds with eastern margin sub-tropical climate and produces temperate forest, 3) periodic rains with a maximum in winter, which occurs in western margin sub-tropical climate and also supports temperate forest, and 4) periodic rains with a maximum in spring and early summer, which supports temperate grasslands. It is the fourth one which is of interest here.

The temperate grasslands, or steppes, differ from tropical ones, savannah, in that they do not present good

opportunities for plant growth. The savannah has a brief period of rain that supports luxurious plant growth. While steppe vegetation may not be as luxurious as savannah, it does cover many gradations of plant life from dense short grass to semi-desert. Steppes occur in a wide variety of climates, from sub-tropical to temperate, at low or high altitudes. Other than grasses, flowering plants, species with bulbs and corms, poppies, thistles, and low woody plants like *Artemisia* spp. are likely to predominate. Some steppes have soil rich in salts and support only thin growth. Meadow grass (*Poa pratensis*) is the dominant grass of the Eurasian steppes and has been brought to America where it thrives under the name of Kentucky blue grass. Two-fifths of the continental United States and a good bit of Canada were grass-land before the advent of Europeans. The western range of the United States contained a good bit of prairie. The tall grass prairie was dominated by bluestems (*Andropogon* spp.) needle grasses (*Stipa* spp.), switchgrass (*Panicum vergatum*), and herbs, trees and shrubs of low stature. Short grass prairie existed between the tall-grass prairies on the east and the Rocky Mountains on the west. It was dominated by grammas (*Bouteloua* spp.), buffalo grass (*Buchloe dactyloides*), bluestem wheatgrass (*Agropyron smithii*) and needle-and-thread (*Stipa comata*). In Montana, the Pacific northwest and central California, Pacific bunchgrass was common. Arizona and New Mexico and the colder Great Basin desert of Utah,

Nevada and Idaho were semi-desert grasslands. Open forests of pinon pines and junipers were common in the foothills of mountain ranges from Colorado to Oregon to California. The whole biome is now mostly artificial, however, as over-grazing and range mismanagement have led to the depletion of the forage and the invasion of shrubs. Erosion developed on a large scale in the mid 19th century.

The animals of the steppe also appear in the surrounding forests and deserts. They do not have many peculiar steppe adaptations. The mammals that chose the steppe are usually either gregarious and speedy, predominantly ungulates or burrowers, mainly rodents. In North America, bison (*Bison bison*) and pronghorns (*Antilocapra americana*) were the common ungulates. Bison have now been almost totally replaced by sheep and cattle. The Pronghorn, the fastest mammal in North America, lives in small herds in the summer eating grass and sagebrush in the dry prairies. Later they form in larger herds of 100 or more and move south for the winter. Calves are born in April or May when the grass is actively growing.

Of the small mammals, white-footed mouse (*Peromyscus maniculatus bairdii*), grasshopper mouse (*Onychomys leucogaster*), and meadow mouse (*Microtus pennsylvanicus*) are found essentially in grasslands and other varieties were found in both prairies and woodland. Lizards and snakes are quite common in the steppe. In North America, tortoises and terrapins are also plentiful.

It is interesting to note that animals of the steppe do have certain commonalities. Since much of the vegetation they must eat consists of hardened stems, dried foods and sometimes thorny stalks, seeds and roots, strong masticating apparatus is needed. Grasshoppers and ants have powerful mandibles, rodents and ungulates have front teeth adapted for clipping vegetation and strong molars with broad roughened crowns for grinding. The molars grow continually which is useful since such grinding slowly wears the teeth away. Grain eating birds grind their food with muscular gizzards.

The climatic extremes are also important. Many animals aestivate in the hot, dry steppe summers. During cold winters snails, insects, spiders, amphibians, reptiles and small mammals hibernate. The majority of the birds migrate to warmer climates. The burrowing rodents often remain active and feed on stores of food they have gathered in their burrows. The larger mammals grow thick coats and are less affected by severe winters. The ungulates feed on dry grass, lichen, twigs and leaves. Many migrate, possibly due more to the water shortage from frozen water than to the scarcity of food (Cloudsley-Thompson 1975:107).

The temperate grasslands of Eurasia were controlled by agriculturalists so early in time that we have few examples of hunters and gatherers there in recent years. The four cultures included in this study are all in North America. They are the Chiricahua Apache, the Arapaho, the Coahuilteco and the Kiliwa.

## THE CHIRICAHUA

Of the Apache groups the Chiricahua depended the most heavily on foraging. They lived in southwest New Mexico, southeast Arizona, and northern Sonora and Chihuahua in the area of 31° north, 108° west.

### Environment

The Chiricahua territory included a number of different life zones. The southwest contained flat lowlands like the Tularosa Basin dominated by sagebrush (*Artemisia filifolia*), creosote bush, cacti, yuccas and mesquite. The low foothills contained mescal and sotol. The foothills of the mountains were characterized by one-seeded juniper, pinon, and three-leaved sumac while higher in the mountains western yellow pine, spruce and aspen grew. The winters in the lowlands were mild and sunny while the summers were extremely hot and dry. In the mountains the summers were cool while the winters were harsh with much snowfall. Animal life in the lowlands was characterized by prairie dogs, rabbits, and antelope while in the mountains it was dominated by deer, elk and mountain sheep.

The Chiricahua ranged through much of this environment. Specifically, the central band lived in the area of Sulphur Spring Valley. Sulphur Spring and Arivaipa Valleys are bordered by two parallel mountain chains extending from the Gila River to Mexico. The precipitation varies annually with the Chiricahua Mountains (part of one of the mountain

chains and a favorite habitat of the Chiricahua) averaging over 20 inches per year. The vegetation in Sulphur Spring Valley varies according to altitude. Meinzer found that western yellow pine dominated on the higher reaches of the Chiricahua Mountains. Junipers and oaks occurred regularly on the foothills and the lower parts of the mountains. The forested sections along streams contained mostly oak and sycamore. The higher regions of the valley were covered with upland grass and brush. This contained mostly a light growth of various grasses. In the central and southern parts of the valley there were large areas of shrubs, especially creosote (*Covillea glutinosa*) and yucca. The middle and lower parts of the valley near the streams were covered with mesquite. Sagebrush covered a small portion of the valley. Some of the lowest areas contained alkali vegetation like shadscale (*Artiplex canescens*), bunch grass (*Sporobolus airoides*), and Mexican salt grass (*Eragrostis obtusiflora*). In the northern part of the valley floor in the lowest section there was a 50 square mile area almost destitute of vegetation (Castetter and Opler 1936:10,12). Thus the Chiricahua lived in a varied habitat with a number of ecozones available for exploitation.

### Culture Contact

The Chiricahua were not extensively studied until the 1930's when their early lifestyle had long been altered. The life reconstructed for them here is that of the oldest



informants of the 1930's who remembered a life with horses and guns but not yet bereft of its cultural identity due to hostilities with the Whites. At that time there were three bands of Chiricahua. The "eastern band" to the east and north controlled the Chiricahua area west of the Rio Grande in New Mexico. The "central band" ranged south and west of the first eastern band in the southwestern part of New Mexico west of the Continental Divide and in southeastern Arizona. The "southern band" lived almost entirely in old Mexico. The Chiricahua are famous in the history and lore of the west for their refusal to submit to White control. In 1870 and 1872 reservations were established for the Chiricahua in their home areas. In 1875, however, these were abolished in favor of moving all the Chiricahua to one reservation. This move was heartily resisted by the Indians. As a result of the hostilities, the entire group of 400 Chiricahua were sent to Florida as prisoners. Later they were moved to Alabama and then sent to Fort Sill, Oklahoma. It was not until 1918 that they were released as prisoners of war. They were then given the choice of taking land allotments in Oklahoma or going to live on the Mescalero Reservation in New Mexico. Most chose the reservation where they lived with Mescalero and Lipan Apache (Opler 1941:1-4). It is obvious from this look at their history that the Apache lifestyle of the 1930's was much altered although a reconstruction of an earlier day was possible.

### Subsistence

Deer was the most important game animal and was hunted by individuals or pairs of Chiracahua. Late fall was a time of intensified deer hunting because the deer were fatter and the hides better, but deer were sought all year round. The animal next in importance was the pronghorn followed by the wapiti or "American elk". Also eaten were mountain sheep and goats, woodrats, opossums, cottontail rabbits and squirrels. Birds were killed more for their feathers than for food. Another important economic source for men was raiding, the object being to bring back horses, cattle and possessions that could be eaten or traded.

The women specialized in the gathering of wild plant foods. They follow a seasonal round gathering various plants in season. In the spring they collected and stored mescal. After that it was time to gather the first acorns and store them. Then the yucca fruit and sumac berries were ripe. Some foods could be collected during a single day, but others required the women to go out in groups of 6 or so and be gone for several days. Men accompanied them if the trip required was any longer than that. Winter and early and mid-spring are times when fresh vegetables are scant, and the Chiricahua depend mostly on stored ones. Yucca stems are one of the first fresh vegetables available in the spring, as well as the white rootstocks and the shoots of the tule. Next the

Yucca flowers appeared and then the agave. The agave was quite important and women made long trips to gather it. After the mescal, summer was there. Favorite early summer plants were locust tree flowers, wild onions, the inner bark of the Western yellow pine, and one variety of sumac berry. Midsummer brought the one-seeded juniper berries, edible seeds, raspberries, strawberries, wild grapes. The late summer brought mountain produce like chokeberry, mulberry, wood sorrell and the potato *Solanum jamesii*, Torr. Late summer lowland produce included nipple cactus and pitahaya fruit. Fall foods included the fruit of the screw bean in the lowlands. In the south, the fruit of the giant cactus was available. In the hills the broad-leafed yucca or datil fruit was ripe and in the mountains, the algerita berries, currants, howthorn fruits, alligator juniper berries were all available. Prickly-pear cactus fruit was also available. In the lowlands, mesquite beans, walnuts, pinon nuts, acorns of the Gabel oak and the live oak were ready. During the summer and fall various greens like lambs' quarter were gathered along with the above mentioned produce. Some of the grasses and other plants harvested for their seeds were dropseed grass, bumbleweed, pigweed, spurge and sunflower. Women out gathering also took advantage of honey whenever they could find it.

Many vegetable foods, especially yucca fruit, mescal and berries were dried and stored for use in winter and early

spring and any other lean period. Only a small amount of this was carried on one's rounds. The major portion was cached in holes in the rocks or little caves to be returned to from time to time when provisions were short.

#### Settlement Pattern

In order to take advantage of all the vegetable harvest available in different ecozones at different times of the year, the Chiricahua wandered a great deal. The extended family usually traveled together though a nuclear one might take off for a short period to utilize a particular resource. The local groups were loose aggregates of extended families who just happened to live in one area and were usually related due to the ease of marriage with close neighbors (Opler 1941:24). Due to this roving lifestyle, the Chiricahua are identified as restricted nomads.

#### THE ARAPAHO

The Arapaho inhabited the country at the headwaters of the Arkansas and Platte Rivers. This was basically the eastern half of Colorado and the southeastern quarter of Wyoming in the United States.

#### Environment

The area inhabited by the Arapaho is the western portion of the High Plains. It is characterized by broad, monotonously flat upland areas which become more undulating as one goes north. The Arkansas and Platte Rivers flow eastward across the area in wide flat valleys. The land is dominated

by buffalo and grama grasses, yucca, cactus and sagebrush. The Valleys contain hack berry, cottonwood and willow as well as some elm and ash. The ravines and streams support wild plum and elderberry. Juniper and western yellow pine can be found in some locations. Bison, antelope, mule deer, prairie dog, coyote, black-footed ferret, jack rabbit, badger, prairie chicken and grouse are common (Wedel 1941:6).

Surface water is scarce in the area. The summers are warm and the winters cold and dry. The daily, seasonal and annual precipitation and temperatures vary. Annual precipitation averages from 12-15 inches with about 70% of it coming in the spring and summer. Surface water is scarce in the area; however, primary springs or creek bed waterholes occurred not more than 25 to 30 miles apart in most areas and often not more than 10 to 15 miles apart.

### Culture Contact

The characteristic Arapaho culture to be discussed here was dependent on the horse. As the horse had been brought by the Spanish, this is not a culture devoid of influence from Europeans. However, until the end of the eighteenth century, the Arapaho did wander freely from the Cheyenne River on the north into eastern Colorado and from the Rockies into the Black Hills and did support themselves on wild foods. It was at the beginning of the nineteenth century that they first became known to outsiders.

Fieldwork with the Arapaho was undertaken at the turn of the century when many changes had occurred and much of the culture has had to be reconstructed (Kroeber 1902:3); Trenholm 1970:33).

### Subsistence

The bison was the primary source of food and the pursuit of it the primary cause for movement. During the spring and summer growing season various fruits, nuts, berries, starchy roots and tubers were collected as well. Some of these vegetable foods, like chokeberries, squawberries, wild haws and currents, were stored for winter use. Buffalo, deer and elk were hunted.

### Settlement Pattern

The Arapaho were highly mobile. In the spring, summer and early fall, they gathered in large groups to follow the bison herds. They might travel hundreds of miles from their winter homes to take advantage of the bison. They sometimes went as far as western Nebraska and Kansas. Meat was dried for the winter as was the vegetable produce gathered by the women.

In the winter they lived in the sheltered nooks along clear water streams on the eastern slope of the Rockies. The plains provided no shelter from storms and lack of grass in the winter even drove the bison elsewhere. The Arapaho summer

groups broke into smaller units of extended families or local groups who took advantage of the slopes for shelter, fuel, water and forage for the horses. While they continued to hunt, they depended a great deal on stored resources. Often a group returned to the same location year after year (Kroeber 1902:3; Wedel 1941; 9, 1963:9; Trenholm 1970:33).

The Arapaho are classed as variable semi-sedentary hunters and gatherers. The seasonal extremes prevented them from maintaining their nomadic summer existence year round. Instead they were nomadic in the summer and settled in the winter. The winter camps of some may have been fixed instead of variable, but sufficient data is not available to determine the extent of either pattern.

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THE COAHUILTECANS

The Coahuilteicans lived in the mountains and plateaus of northeastern Mexico and in the semi-arid region of southern Texas. Their name covers a large number of Indians living as hunters and gatherers in this area and speaking related languages during the Spanish colonial period.

Environment

Before the landscape was forever altered by grazing, grasslands extended south of the Rio Grande River into Mexico almost to the latitude of Tampico. They extended west to the low hills and mountain ridges. In Tamaulipas they merged into acacia country and then into a mixed shrub habitat (Shelford

1963:324-325). In general, the Coahuiltecan area contains low flat plains along the coast of Mexico and Texas, mountain chains and plateaus in inland Mexico, and rolling hills in Texas.

The area is semi-arid. The coast experiences mild winters with frequent rain and high humidity. The summers are hot with occasional rain and high humidity. The western part of the Coahuiltecan area has cool winters and hot summers but also has low humidity and light precipitation throughout the year. Between these two areas is, naturally enough, a transitional area.

Common trees and shrubs in the area are the mesquite, retama, granjeno, cenizo catclaw, Texas ebony and pecan. Also are found prickly pear cacti, peyote, 2 varieties of agave, and the sotol as well as many seed-producing reeds and grasses. Deer, coyote, jackrabbit and peccary are the most important game animals. Migratory water fowl can be found in the winter. Though the area is now covered with mesquite, prior to the historic period, it was probably grassy and there are accounts of buffalo there in the 16th century.

### Subsistence

Deer, coyote, jackrabbit and peccary were the primary animals hunted. Hunting was done individually with bow and arrow or trap or communally by surround or fire. Aquatic



birds and buffalo were hunted as well as small animals like rats and snakes. The Coahuiltecanes fished with bow and arrow and net. The staple food was the agave. Other important vegetable foods were the prickly pear tuna, mesquite beans, and the buds of the walnut tree. Pecan nuts were gathered when available as were other wild fruits and seeds.

### Settlement Pattern

The Coahuiltecanes appear to have been nomadic moving camp every few days. They followed the seasonal harvest of vegetable and animals foods and possibly actually followed a cyclic round. Movement was generally by foot though some, especially in the western most bands, had horses. It is suspected that each group moved generally within a restricted territory (Ruecking 1953:489). Due to the scant amount of data available on the Coahuiltecanes, it is difficult to determine just which settlement pattern they fit in to best.

They were probably primarily dependent on plant foods. Many of these characteristically ripen at different times of the year with different stands of the same plant even ripening at different seasons (Taylor 1964:198). Thus, for the Coahuiltecanes, like for the evergreen forest foragers, there was no seasonal need to be sedentary. Nomadism is understandable. Taylor has developed a similar hypothesis stating that food of a "high bulk/low food value" was ample and that "the boundaries of each group's nomadism were determined by

water, specifically the distance the group could safely travel from dependable water" (Taylor 1964:260).

### THE KILIWA

The Kiliwa live in lower California in an area approximately 1,500 square miles in area. They ranged from the Gulf of California west to about 116° west. They went as far south as the prt of San Felipe and as far north as the territory of the Cocopa. Although two thirds of their land is desert and only one third steppe, they are being discussed in this chapter as they rarely used the desert lands depending instead on the better watered areas for resources.

### Environment

The semi-arid part of Kiliwa land lies between two forested plateaus, the Sierra San Pedro Martir and the Sierra Juarez. The southern part of the Sierra Juarez plateau gives way to a series of mesas. This is to the north of the Kiliwa. In the western part of their area is the Arroyo Leon Upland, a rough granitic upland averaging 3000 feet in elevation and containing several mountains. Between it and the mesas is the Valle de la Trinidad, a flat floored valley 20 miles long east to west and 5 miles wide. East of the mesa is the low alluvial basins of the Colorado Desert region. The eastern part of their territory is represented by an area of rugged narrow canyons that have been eroded by streams.

In the southern part of the area is the San Felipe Valley, a wide alluvial floored structural basin about 1500 feet above sea level. East of the canyons is desert.

The eastern two-thirds of the area is hot, dry desert. The Arroyo Leon Upland, the Mesa Zone and the higher parts of the Canyon Zone and the western part of Valle Trinidad had warm steppe climate with rainfall chiefly in winter. Surface water was scarce except in the canyon zone and the Arroyo Leon Upland.

The lower parts of the Canyon Zone and the eastern part of the valle Trinidad typically contained thorny Lower Sonoran vegetation like creosote bush, cholla, yucca, desert agave, and mesquite. The higher parts of the Canyon Zone and the Arroyo Leon Upland was cooler and more moist. Yucca, agave, mesquite, as well as some juniper, cottonwood and willow were common. There were also stands of pinon.

On the semi-arid uplands, jack rabbits, cotton tails, quail, deer and mountain lions were found. In the higher areas, the mountains and parts of the Canyon Zone, mountain sheep were common. Antelope migrated from the lower deserts in the winter to the Valle Trinidad in the summer. The Gulf of California provided fish and shellfish.

### Culture Contact

The Kiliwa culture has long been in demise. At the time of study by Meigs (1939) in 1928 and 1929, there were only 36

living Kiliwa. Together they formed 5 families, 3 near Arroyo Leon, 1 at San Isidoro and 1 at Valle Trinidad. Most of the wives were from neighboring tribes. Little is left of the 13 once active lineages. Kiliwa customs had largely been replaced. Thus this study of their aboriginal ways is a reconstruction based on informant information. It should also be noted that Meigs' field time covered only a few weeks. The accuracy of any reconstruction concerning the Kiliwa is difficult to determine.

### Subsistence

The agave or mescal was the staple food, having the advantage of being available year round. A number of other plants were eaten. At least 13 types of seeds, and 8 of fruit were eaten, especially in June, July and August. The primary sources of meat were rabbits and deer hunted both individually and communally. Antelope, mountain sheep and mountain lions were also taken. Honey was available year round and gathered when the opportunity presented itself.

There were several important food sources found outside the Kiliwa area. Pine nuts could be found on the slopes of San Pedro Martir Mountain and the Kiliwa journeyed there every August and spent 2 months collecting them. Acorns were found in the San Pedro Martir foothills, and through they ripened in the fall, they remained on the tree until December or January. Pine nuts and acorns were staple fall

and winter foods, and thus these excursions were made to bring home large quantities of them to last through the winter. In March or April the Kiliwa made another journey. This one was to the port of San Felipe on the Gulf of California to fish from the shore and gather clams and mussels. This was the preferred time for fishing because in the summer the fresh water dried up in that area, and there was not sufficient water to drink.

### Settlement Pattern

Of the 13 patrilineal lineages known among the Kiliwa, 8 belonged to the Canon Zone, 4 to the Arroyo Leon Upland and 1 to the Mesa Zone. None lived in the eastern desert which makes up two thirds of the territory. Lineages appear to have been identified with specific ancestral areas and to have been primarily sedentary. They lived in family groups building houses and storehouses. In case of a death, the house would be burned but a new one was built within a mile of the old. They made annual trips to the pinon and acorn groves of the San Pedro Martir Mountains 25 miles away and to the fishing grounds of San Felipe 50 miles away (Meigs 1939:6). Thus their settlement pattern must be classed as single base sedentariness.

### Conclusion

Of the four groups discussed here, 2 are nomadic, 1 semi-sedentary and 1 sedentary. The Chiricahua and Coahuilteco collect various plants as they become ready for the harvest. According to the data we have on them, neither

settles for any extensive part of the year. The Arapaho follow a pattern that will appear again in the next chapter with the Upper Kutenai. They are semi-sedentary remaining in one location during the winter and eating stored foods and following the bison during the summer. This is a pattern convenient among bison hunters of the plains. The Kiliwa, on the other hand, are sedentary living on stored nuts in the winter and on agave and other plants during the summer. They leave their homes only to make annual trips to pinon and acorn gathering sites and to a spring fishing site.

The Arapaho adaptation is a special one but the only three cultures under study here subsist on similar foods. They all hunt deer and rabbits and gather agave and nuts. Unfortunately culture contact had made it difficult to recapture the details of some of their early patterns of movement. Information on the Coahuiltecan is just too scant to provide the detail needed. We know that they wandered making use of many resources. It is impossible to be sure, however, that there was not some pattern to this movement which, if known, would place them in a different category.

The Chiracahua on the other hand are also placed in this nomadic category. Although they were living on a reservation at the time of study, we have excellent data on the resources in their seasonal round. It is possible, however, that they were more sedentary in the winter and early spring than reports indicate as they ate stored plant foods then

and it seems inconvenient to carry a large supply of them around in one's travels.

The Kiliwa, at least from the information we have on them, lived a more sedentary existence but ate the same foods the 2 groups discussed above ate. The reasons why the same food sources should lead two groups to be nomadic and one to settle most of the year are uncertain. The Kiliwa seem to have been restricted to a smaller area by the presence of other tribes and of geographical boundaries of ocean and desert. However, there is not enough information on their population density to determine if their density was lower and they were providing for fewer people and thus able to remain in a single area.

## CHAPTER VIII CULTURES OF THE TEMPERATE FOREST

Large portions of the mid-latitude zones of the world were originally covered with temperate forest though little of it exists today in its virgin state. There are three basic types of temperate forest. Temperate deciduous forest originally covered eastern North America, Europe, part of Japan, Australia and South America. Moist temperate coniferous forest was found in western North America from California to Alaska and in the Mississippi delta. It was characterized by relatively high temperatures with a small seasonal range, high humidity and often fog and the dominance of conifers such as red woods and spruces. Broad-leaved evergreen forest was found in Florida and in central and southern Japan and was characterized by high moisture, less difference in summer and winter temperatures than in the temperate deciduous forest and the dominance of live oaks, magnolias, hollies, bays and sabal palms.

The dominant trees of the temperate forest around the world are pines, oaks, beeches and species of Eucalyptus. Pines have deep roots and do not grow well on frozen or poorly drained soils but do like coarse dry soils like



sands, gravels and rock outcrops. They are able to tolerate hot, dry conditions in the tropics and in northern continental climates. One reason for their dominance is that they regenerate rapidly after burning. Oaks are common in dry areas and may be either deciduous or evergreen. Other common hardwoods are beeches and maples while limes, chestnuts, sycamores, alders, ashes, and elms are also found.

In warm temperate climates, eastern margin sub-tropical climates are characterized by evenly distributed rain and mild winters. Due to the even distribution of rainfall, they usually contain broad leaved evergreen forests but may be dominated by deciduous or coniferous trees. Western margin or Mediterranean warm temperate climates are characterized by a rhythmic recurrence of rain and drought. Rain occurs in winter when temperatures are low; the summer is dry. The forests here are usually broad-leaved deciduous. Like coniferous forests, these often contain stands of a single tree species.

Forest is the typical vegetation in areas where precipitation exceeds evaporation and indeed can only exist where rainfall is relatively high. The air is damp, the ground soft and there are many juicy leaves and fruits to support animal life.

The animals of the temperate forest are not as diverse as those of the rain forest, but they do have a greater variety of environmental adaptations than the grassland animals. Small mammals like shrews and mice inhabit the

temperate forest floor and burrow beneath it. Larger mammals include red deer, roe deer, wild boar, badgers, foxes, wild cats, martens, lynx. Many of these have subterranean dens. Arboreal mammals like squirrels and bats are not uncommon.

Bird species are numerous in the temperate forest. Many of them adjust their eating habits to seasonal availability of foods. They eat tree buds in the spring, insects in the summer and seeds in the fall and winter. Others that are only insect eaters must migrate in the winter. In comparison with their numbers in the tropics and sub-tropics, reptiles and amphibians are scarce.

In contrast to tropical forests, temperate and arctic zones exhibit seasonal changes in the length of daylight. It is the seasonal increase in the length of daylight that triggers breeding in many animals. The reproductive cycles of a large number of temperate forest mammals is thus regulated by the seasonal variation in day length.

Thus in contrast to tropical forest, temperate forests have less diversity in numbers of species and consequently more individuals within each species. Tropical forests are either evergreen and seasonless with animals breeding and plants flowering throughout the year, or deciduous with seasons marked by changes in precipitation. In the temperate forests, on the other hand, seasons are marked by differences in day length, and much breeding is regulated accordingly.

The seven cultures of the temperate forest to be discussed here are all in the New World. They are the Ona and Yahgan of South America and the Kutenai, Paiute, Nootka, Yokuts and Hupa of North America.

#### THE ONA

The Ona live on the Island of Tierra del Fuego, 65° - 70° W. longitude, 53° - 56° S latitude. In earlier times they occupied all of the island except for Useless Bay and Admiralty Sound, which were inhabited by the Alacaluf, and a strip near Beagle Channel that was frequented by the Yahgan.

#### Environment

Tierra del Fuego is a triangular shaped island spreading 240 miles east to west and 170 miles north to south. The western part of the island is a mountainous continuation of the Argentine pampas. It gets a fair amount of rain from the Pacific and is usually foggy. The eastern part is drier with skies that are often clear. Its banks are gently sloping sandy beaches.

There are two main environmental zones on the island. The northern part is rolling pampas with the highest elevation being 984 feet. It contains many lagoons and shallow lakes with streams to the sea. The Rio Grande separates this pampas-like environment from the wooded region in the south. The southern area is mountainous. The Valdivia

and Darwin Mountain Ranges have peaks of over 6,500 feet high. There are fewer rivers and lagoons and the whole, up to the tree line, is forested.

Climate in Tierra del Fuego is the victim of several ocean and air currents that meet at the tip of South America. Heavy rain is frequent everywhere and in the south there is snow 4 months of the year with temperatures of 15°- 25° below zero for several weeks of the year.

The flora of the northern part is typical of the steppe. As one goes south, one enters a transitional parkland zone where *Nothofagus antarctica* dominates, and then in the south one finds a humid evergreen forest where *Nothofagus betuloides* prevails. More specifically the northern steppe contains grasses, predominantly *Festuca gracillima*. On the hill slopes and in the small depressions are low thickets of shrubs, especially *Baccharis*, *Berberis* and *Chiliotrichum*. Along the coast are thick stands of *Baccharis cupressiforme*. In the forests south of the Rio Grande, while *Nothofagus antarctica* is dominant, other beech species as well as *Maytenus magellanicus*, *Berberis* and *Fuchsia* shrubs are found. In the evergreen area, the *Nothofagus* is quite dense and on the forest edge the above mentioned bushes are extremely dense as well. Above the tree line, about 1,000 feet, typical alpine flora is found.

Tierra del Fuego is interesting in terms of animal life. The Strait of Magellan acts as a kind of zoogeographic boundary with typical pampas animals like the ostrich, puma, deer, gray fox, and skunk found north of it but not south. The southern side also lacks all snakes and some of the insects found on the north. The waters in and around Tierra del Fuego contain many species of marine fauna but the number of terrestrial fauna is small. The guanaco, *Lama huanachus*, is the most important hunted animal in the southern part. The guanico lives in small groups of one adult male and 4 to 10 females. The young males live in separate herds until they reach maturity. At certain times of the year, however, they collect in herds of up to 100. They are good climbers, and in the summer herds of them can be found above the timberline. They winter down in the lower regions.

Also to be found in the region are the large fox, and the fish otter. Two rodents are important. They are *Cytenomys fueguinus* and *C. magellanicus*. Also to be found are seals, whales, dolphins and over 100 species of birds. Snails and mussels are abundant (Gusinde 1971:4-31; Dorst 1967:272; Cooper 1946:107).

#### Culture Contact

The first contact with Europeans occurred in 1580, and the Ona had sporadic contact with them afterwards as ships happened upon their lands. Extensive involvement with

Europeans did not occur until the 1870's when whites began to establish sheep and cattle ranches and to search for gold. It was in 1875 that the first study of the Ona was made by a missionary, Thomas Bridges. At that time Gusinde estimates there may have been some 4,000 Ona on the island. By 1930 there were only 100. The Ona had been massacred by the Europeans, and the few who survived were able to do so only through missionary protection. Gusinde's fieldwork occurred during four journeys spanning the years from 1919 to 1923. Lothrop worked with the Ona in 1924 and 1925. Gusinde maintains that at the time of his work Ona culture was unchanged though the number of its members had been drastically reduced. It is difficult to believe possible that the culture could have been not drastically affected by such population decimation. The few Ona left had been routed from their home lands and from their social ties and had to have had extensive contact with missionaries, since it was missionary protection that saved the remaining Ona from death. It is true, however, that European intervention had been so recent that a fairly thorough picture of aboriginal life should have been easily accessible from informant information.

### Subsistence

The bow and arrow was the primary weapon used by the Ona although they also used slings and fish spears. The

southern Ona in the forested mountains depended primarily on guanaco meat for their food. The guanaco spent the spring and summer in the mountains and the winter in the valleys. They used the same paths daily to watering holes and usually used the same spot for droppings. They were also fairly friendly and curious, and if one of their herd was shot with an arrow, the rest would stand by to watch him die. The herd would, however, be scared away by a gun shot. In the winter they were very easy to track through the snow. As a result of these habits, guanaco were relatively easy to hunt and kill. Men usually hunted alone but might hunt in groups of 3 to 8 members if they happened to meet or if they were low on meat.

The Ona in the northern pampas were faced with a different subsistence situation. The guanaco was not common in the pampas, and cururos were the main food source. These nocturnal rat-sized rodents lived in burrows in the ground. The hunters sought out the nests and captured the animals. Cururos were quite abundant; however, in the winter they were hard to catch and the northern Ona depended more on sea animals. Cormorants, sea geese, penguins and wild geese were also eaten.

The women near the coast gathered mussels and small fish. Bird eggs were eaten in the spring. Flora was sparse

and thus plants were not important in the diet; however, 4 varieties of berries, dandelion leaves, leaves and stalk of the *Apium austrle*, root of *Boopis australis* and several varieties of fungi were eaten. A flour was made out of the seeds of *Descurainea canescens*.

During the winter, especially, meat was stored fresh by hanging it in a tree for "many days" (Gusinde 1971:422). Fish was smoked but still usually eaten within a few days. Fat from seals and whales could be stored submerged in a swamp for months. Fresh meat was always preferred. The Ona would not kill more meat than they could use at any one time. If they had some meat hanging in a tree they often looked for fresh meat preferring to feed the old to the dogs (Gusinde 1971:425).

#### Settlement Pattern

The Ona of both the northern grasslands and the southern forests were reported to be nomadic. They had no permanent dwellings but instead settle for a few days in an area where they have made a kill and then move on. The nuclear family was the basic economic and traveling unit. The families of the north lived in windscreens with wooden frames and leather covers which were transported by the women. The people of the south lived in conical huts; however, Gusinde doubts



that they did so before acquiring the European axe. They probably lived in windscreens too (Gusinde 1971:276). In moving camp the southern Ona women and children followed the valley floor carrying the family possessions while the men walked along the hillsides in order to capture any guanaco fleeing in the path of the women and children (Lothrop 1928:80). The southern Ona remained in one camp longer in the winter. Guanaco were so much easier to track and catch in the snow that finding meat was less difficult, and they could maintain the same base for slightly longer periods of time, although they remained essentially nomadic. Also several families might live together in the winter as communal hunts would furnish enough meat. A family of 6 would take 4 to 5 days to eat a large guanaco, and thus it would be common to stay in one spot for at least this long (Gusinde 1971:412). Camp sites were normally near a brook or pond or else water was obtained by digging a shallow hole in a depression until water was found. Water was so easily accessible that it was not an important determining factor in camp location. The location of the kill was much more important.

The Ona were generally monogamous with a patrilocal tendency. Gusinde suggests that 7 births was average per woman with each family having an average of 4 living children. While the nuclear family was the basic economic unit, families

were often meeting temporarily by accident or design. Some might come together for communal hunting or fishing, to ward off some impending danger or sickness, or for festivities. Ona land was divided into patrilineal family territories, and one ventured into another's territory only with permission. The size of these kin groups is irretrievable, but Gusinde guesses that it varied greatly and could be as small as 40 people or as large as 120. Territorial boundaries were ignored when a whale became stranded in the area as there was meat for all. Also young men or older widowers who were courting could ignore the boundaries.

The male initiation ceremony, the "kloketen" celebration, was the occasion for the largest gathering of the year. The southern Ona preferred to hold it during the winter when hunting was easier and the men had more leisure time. The northern Ona held it in the summer because hunting cururo was easier then. The duration of the celebration varied but sometimes the location had to be changed due to lack of food, spring floods or winter snow buildup (Gusinde 1971:1180).

Thus both Ona groups are restricted nomads, according to the ethnographic data available on them. Meat and water were both apparently easy to find, and thus one simply camped within a convenient distance of the food source. While seasons were distinct and winters often quite cold,

the Ona apparently were not bothered by winter weather hardships and continued their warm weather lifestyle.

### THE YAHGAN

The Yahgan are neighbors of the Ona as they inhabit the islands around the southern tip of Tierra del Fuego. The islands here are varied, some are covered with a peat bog, others with tussock grass and colonies of Magellan penguins, and still others have mountain peaks of 2,000 feet in height. The area is also the meeting place of a number of strong ocean currents, having prompted Darwin to compare the water movement to a boiling cauldron. In amplitude the tides are the highest in the world reaching 45.6 feet at Puerto Gallegos.

The area is extremely rich in marine life. Part of the shore is surrounded by a belt of *Macrocystis pyrifera*, a form of seaweed that often grows to a length of 600 feet. It grows in water 6 to 20 fathoms deep and shelters an extraordinary amount of marine life, especially invertebrates. Mollusks, sea urchins, crustaceans and fish are abundant in the waters off Tierra del Fuego; the marine life in turn attracts many birds like cormorants, penguins, geese, and ducks (Lothrop 1928:16; Dorst 1967:276).

### Culture Contact

The plight of the Yahgan is similar to that of the Ona. At the time of fieldwork by Gusinde and Lothrop, their

population had been severely depleted by hostilities and influenza. The population had at one point been divided into five territorial groups, but by the time of fieldwork, these five had been amalgamated and Lothrop, who estimates a population of 3,000 in 1850, found there were only 40 or 50 Yahgan remaining. The data presented here depict the Yahgan at a hunting and gathering stage, although it may not represent their precontact foraging ways.

### Subsistence

The Yahgan live almost entirely on marine resources. Mussels are plentiful and provide the staple in their diet. The women gather many varieties of them, as well as snails, crabs and sea urchins. The women also fish with lines from their boats commonly catching 2 varieties of *Notothenia*, and 1 of *Genipterus*, *Choenichthys* and *Latilus* respectively. At any season other than summer, schools of herring may arrive unexpectedly. The women gather them by the basketfuls while the men kill the predatory fish, seals and sea birds that accompany them. Birds are abundant and the Yahgan eat the birds as well as their eggs.

The women gather some plants on the islands, but they confine themselves to the shores and never go into the forests to collect food. There are 10 kinds of fungi available and eaten by the Yahgan. There is usually some variety

available fresh at any time of the year, and it is usually eaten on the spot. The only variety conscientiously gathered is the *Cyttaria darwinii*. Berries are available only a few weeks a year in the late summer and fall, and several varieties are gathered at that time. Other plants eaten include the roots of the *Osmorrhiza chilensis* and of the *Armeria chilensis* and leaves of the *Taraxacum magellanicum*. Gusinde indicates that plant foods are incidental in the Yahgan diet; however, Bridges wrote that they were eaten extensively.

Seals are the most important source of meat acquired by the men. In the winter they hunt otters, foxes and guanaco who come to the water's edge and can easily be seen because of the snow. In the spring they kill young cormorants, and late summer is a good time to catch penguins, wild geese and seals. Formerly seals were quite plentiful, and there were several varieties available. The Yahgan hunted them year around. While whales have been almost exterminated in the area by European whalers, they used to be fairly common. The Yahgan took advantage only of the dead, sick or wounded ones, however, not being equipped to attack a healthy specimen. Of the numerous birds available, the Yahgan preferred penguins, cormorants, geese and ducks.

#### Settlement Pattern

The Yahgan have no permanent dwellings. They move as they need to for food. They move by boat and though they

camp on the island shores they very rarely go inland on the islands. They usually camp near a brook or riverlet in order to have fresh drinking water. They do not stay more than 2 to 3 days in one place as the animals are driven away after one of their number has been killed and as the women have picked the best of the mussel crop in this amount of time. The nuclear family is the basic traveling and economic unit, though sometimes 2 or 3 families will camp together for a while. They travel more in the summer than the winter, though the weather is worse, because there are more animals available. When traveling, the women row the canoe while the men watch for game (Gusinde 1961:304).

In earlier days the Yahgan were divided into 5 dialectical groups, which by the time of fieldwork had amalgamated. Each of these had territorial areas. In fact each family kept largely to the area he knew and belonged in. The coasts of all the islands were well known to the Yahgan, and many of what would appear to be the most insignificant places had names. Each person was named for his birth place and identified with his local area. At marriage a woman moved into her husband's local group. One might travel into the area of a different dialect group to trade, get food in an emergency or to share the plenty of a stranded whale.

Bridges estimated that the Ushuaia local group occupied an area of coast about 20 miles long which was approximately one-third of the area occupied by that dialect group.

Hyades stated that in 1882 around Orange Bay among 8 women ranging in age from 35 to 60 there were 18 living children, 11 girls and 7 boys, and among 8 women aged 25 to 30 there were 18 living children, 10 boys and 8 girls. Gusinde estimated that each woman averages 6 children, and Eahn estimated 5 while Hyades estimated 4. Gusinde suggested that mortality was low during the first year but quite high from ages 2 to 10 (Gusinde 1961:531).

The Yahgan follow the highway nomadism pattern of mobility. Like the coastal Andamanese, they have developed a special adaptation to exploitation of marine resources. They travel only by boat and exploit only the ocean and its shores. They do not use the inland to any significant degree. Mussels are the staple of their diet, and these are available year round. Their movements are thus not governed by the seasons even though they live in a seasonal environment. Each group travels up and down the coastal waterways in its area.

#### THE KUTENAI

The Kutenai live along the Kootenay River in Canada and the United States. This includes part of the interior of

British Columbia, the northern tip of Idaho's panhandle and the extreme northern part of Montana. This area is west of the Rockies and north of the range of the Kalispel and Flathead Indians.

### Environment

The Kootenay River is 400 miles long. It flows from British Columbia into Montana and Idaho, and then turns north again into British Columbia where it runs into Kootenay Lake. It continues on from there to join the Columbia River. Parts of the Kootenay are broad and peaceful, running through broad valleys, while other parts are turbulent, running through canyons. Kutenai country is part of the Plateau region. Precipitation ranges from 28 inches per year at Nelson, B.C. to 15 inches at Fort Steel, B.C. It includes 2 types of environments: (a) the well watered and heavily forested mountain slopes and the fertile flood valleys of the river and (b) the semi-arid country like the Tobacco Plains (Turney-High 1941:25).

The chief trees in the area include 4 varieties of pine, 3 of fir, 2 of hemlock and 1 each of poplar, cedar and spruce. Some of the larger mammals found in the area include mountain sheep, mountain goat, moose, woodland caribou, mule deer, white-tailed deer, coyote, wolf, lynx, elk and grizzly, black and brown bears (Turney-High 1941:26).



### Culture Contact

The Kutenai region was first explored by the Northwest Company in 1808. This began Kutenai contact with Europeans and their relations with the fur trade. The years following involved much disruption of their original ways as they were affected by the fur trade and by hostile contact with Europeans and other Indians. By the time of Turney-High's fieldwork in 1939, their population had been reduced to about one-fourth its pre-contact size, and they had been forced to move to reserves and even to be adopted into the Flathead tribe. Turney-High's fieldwork with them was brief. He spent 4 months with them in 1939 and a shorter amount of time in 1940. His ethnography must of necessity be a reconstruction.

### Subsistence

The Kutenai were divided into the Upper and Lower Kutenai according to where they lived along the river. The Upper Kutenai had horses and spent part of their year on the Great Plains hunting buffalo, while the Lower Kutenai had few horses, stayed nearer their home base, and depended primarily on fish.

Among the Upper Kutenai the most important vegetable food was the bitter root, *Lewisia rediviva*, which was gathered only in the spring and grew only in arid regions

like the Fort Steele area, Tobacco Plains and Little Bitter Root Valley of Montana. Each woman was likely to gather about 2 grain sacks full of it each year. The Lower Kutenai did not live within easy access of this root and thus used it much less. The Kutenai also ate 2 varieties of camas, which could be kept for up to 2 years. The lower branch had plenty of this food within their reach. While a number of berries were gathered, service berry, huckleberry, and choke berry were the most important (Turney-High 1941:33).

The bison was the most important meat source for the upper branch. They temporarily moved out onto the short grass plains in order to hunt this animal. While some of the meat was eaten fresh, much of it was dried for later use. Deer were second in economic importance as a meat source for the upper branch and first in importance for the lower branch. The Upper Kutenai hunted them individually while the Lower Kutenai hunted them communally. The elk and the caribou were also important meat sources. Other animals hunted were the beaver, mountain goat, moose, lynx, gopher and muskrat. A variety of birds were also hunted. Among the Lower Kutenai, duck was a staple food, and the flesh was dried for later use (Turney-High 1941:42).

The staple food in the diet of the Lower Kutenai was fish, although the Upper branch ate a good deal of fish as well. The fish commonly caught were trout, salmon, sturgeon, white-fish, and 2 kinds of suckers. Pea-mouth and

squaw-fish were eaten when very hungry. Fish was dried. In fact Turney-High comments that the Kutenai preferred cured fish to fresh. Excess food was stored in caches high in the trees, and one only disturbed the cache of another if he were very hungry.

### Settlement Pattern

From early spring into May, the Kutenai moved to their fishing grounds to fish. In May, the men took a break from food getting while the women gathered first the bitter root and then camas. In mid-June the Upper Kutenai went over the mountain to hunt bison. They moved in large groups or bands taking the women and children. They usually stayed 4 weeks or less. Most men brought back 2 or 3 pack horses loaded with parfleches of meat. Men with more horses brought back as many as 5 loaded pack horses. In July they returned home and dispersed into family groups. The men relaxed and allowed the horses to fatten in the summer pastures while the women gathered berries. In September, the Upper Kutenai again went bison hunting returning before the snows. The Lower Kutenai engaged in communal deer drives. All Kutenai wintered in their home ranges, although the Upper Kutenai did leave for a time to make one more bison hunt by foot. They traveled on snowshoe and left the sick and the children aged 5 through 12 at home.

The Kutenai were bilateral but had a weak tendency toward patrilineality. The upper group lived in plains-type skin

tipis, although their housing was formerly more like the lower branch. The lower ones lived in tipis with vegetable covers in the summer and in long houses in the winter. The long house frame was covered with the same plant covers used for the summer tipis. An average of 8 families pooled their summer tipi covers to use on the long house and all 8 lived inside. A long house contained 40 to 50 people and had 3 fireplaces (Gurney-High 1941:56).

In general the Kutenai followed a pattern of dispersion in the summer taking advantage of various food resources and sedentation in the winter eating stored food while they continued to hunt what was available. Thus they were semi-sedentary.

#### THE OWNES VALLEY PAIUTE

This North American group was located between the Sierra Nevada Mountains and the California-Nevada border in the Owens Valley.

#### Environment

Owens Valley is found in the Great Basin, an area in California and Nevada which has only internal drainage so that much of the soil contains salt, and the depressions containing greater accumulations have edaphic climaxes. A variety of vegetation types are found. At lower elevations the shadscale-kangaroo rat-sagebrush biome occurs with

shrubby vegetation, and sagebrush *Artemisia* occurring throughout. Above 5,500 feet, a woodland of pinyon and juniper begins. Mule deer are found in the sagebrush areas. They leave the highlands west of Owens River with the first snowfall and move down river often crossing it at the same point each year (Shelford 1963:291).

In the winter months mule deer, mountain lion and coyote are common large mammals in the pinon-juniper woodland. They spend their summers high in the mountains. Bobcats and grizzly bears are also common. Smaller mammals include the rock squirrel, cliff chipmunk, desert and dusky-footed wood rats and pinon mouse. In the sagebrush biome, mule deer are found during the winter and brush rabbits and woodrats are numerous. Quail, hummingbirds, wrens and thrashers are also found (Kendeigh 1961:312).

#### Culture Contact

Population of the Paiute in and around Owens Valley has, according to Steward, remained stable from the 1850's until the time of his field work. It stayed at approximately 1,000, which was 2.5 persons per square mile. At the time of his study, the Owens Valley Paiute lived in settlements around the towns in the valley and made their living by ranching or doing highway labor. They continued to hunt and do some seed and pinenut collecting but were primarily dependent on modern occupations for their livelihood.

The following, then, is a reconstruction of their earlier lifestyle.

### Subsistence

Plant foods were extremely important to the Owens Valley Paiute. Pine nuts were used extensively and many seeds were commonly collected. Steward lists 37 varieties of seeds eaten as well as 5 roots, tubers or bulbs, and 4 berries. This Paiute group purposely irrigated wild seed plots to increase their yield. They also fished in the Owens river, in fresh-water sloughs and in the Sierra Nevada streams, catching mainly trout and suckers. Fishing might be done individually or communally with the use of bow and arrow, spear, hook, or basket. Hunting was done individually or communally, and deer, mountain sheep, antelope and rabbits were the prime targets. Small burrowing animals and water fowl were also taken.

### Settlement Pattern

The Owens Valley Paiute were divided into "districts" each with territorial restrictions. Pine nuts grew in the arid ranges east of the Sierra Nevada mountains, especially in the Inyo and White mountains between 6,000 and 9,000 feet. Each district owned a pine nut area. Hunting by an individual could be pursued anywhere but communal hunts could only be held in one's own territory.

In the summer the Paiute lived in villages in the valley fishing and collecting seeds and irrigating wild seed plots. In the fall after all seeds were gathered they held communal rabbit drives accompanied by dancing and gambling. In the winter they traveled up to pine nut groves in the mountains, and if crops were good, they spent the winter. Otherwise, they returned to the valley village and ate stored seeds. In the spring, they returned to the valleys and began irrigation, fishing and seed collection.

Consequently they exploited a number of geographically narrow ecological zones and acquired a variety of food types near home. Owens Valley is a deep trough 20 miles wide at the most. On the west it is bounded by the Sierra Nevada Mountains and on the east by the Inyo and White Mountains. The ecological zones available to the Paiute were:

1. Owens River and the related streams from which fish were collected.
2. the valley floor which yielded seeds, roots, antelope and rabbits.
3. the foothills of the Sierra Nevada containing several varieties of seeds.
4. mountains of the Sierra Nevada where mountain sheep and goats were found.
5. The slopes of the Inyo and White Mountains which contained pine nut groves.

Villages were located on the streams 2 to 4 miles from the river, and all essential food resources were within 20 miles of the villages.

Therefore, the resources in the area were so dependable and the zones in which they were found were so close together that while their subsistence cycle is quite similar to that of the neighboring Shoshoni, their mobility was reduced substantially. Each family had definite summer and winter locations and mobility in general was limited to migrating back and forth between the two. Seasonal movements were within an average radius from the valley village of 15 to 20 miles. For example, the distance between the valley village and the pine nut grove for the people of Pitana Patu territory was about 15 miles. The distance of that trip for the Panatic group was about 12 miles. These calculations are rough and may be inaccurate but even at a distance of 20 miles, the Paiute would only be making a 40 mile round trip annual migration. Owens Valley Paiute, according to Steward, had village heads, band organization and recognized band territory. Irrigation was a communal effort in that all in the territory helped build the dam. One was selected as head irrigator and had the responsibility of maintaining the system throughout the summer.

Steward found women usually had 8 to 10 children. From genealogies collected from three informants, 62 marriages



of women of all ages averaged 2.8 living children each. 32 marriages of women with at least 1 married child averaged 2.9 living children. In the case of twins, both infants were raised.

The Owens Valley Paiute have been placed in the pattern of multiple based sedentariness as they occupy specific summer and winter sites and major travel is limited to the annual trip back and forth between the two. The fact that they live in a narrow river valley containing several ecozones in a small amount of space probably contributes to their ability to remain relatively settled.

#### THE YOKUTS

According to Kroeber, the Yokuts of California are unique among California Indians in that they are divided into true tribes with names, dialects and territories. They occupied the San Joaquin Valley and the nearby foothills of the Sierra Nevada mounts up to an altitudde of 1,000 feet.

#### Environment

The San Joaquin River flows through half of the valley. The Kern and Kings Rivers are above it. Kerns River drained into Tulare Lake, which was a large shallow basin of water surrounded by an extensive tract of swamp filled with tule rushes. During floods the lake drained north through Fish

Slough into Kings River. The San Joaquin River was also bordered by tule swamps though they were not as wide as those around Tulare Lake. Much of this area of swamp had been dried up for years as the land was reclaimed for agricultural use.

The east side of the San Joaquin valley contains many streams from the Sierra Nevada but the west side is arid with no permanent streams of any size making it down to the central river system. This west side is on the lee side of the Mt. Diablo Coast Range. The flow of the Sierra rivers decreases as one moves south. The streams in the Yokut area are therefore smaller than those in Miwok territory and the Miwok ones in turn smaller than those in Maidue territory (Kroeber 1953:746). On the eastern side of the valley, the floor gives way rather sharply to the mountains. The foothills are few and there is thus no slow transition into the mountains (Gayton 1946:259).

The southern part of the valley is more arid than the northern part. The southern foothills are in the Upper Sonoran Life Zone with small areas in the Lower Sonoran. The area is predominantly woodland-grass, and the oak is the dominant tree. Pinon, buckeyes, manzanita as well as deer, quail and rabbits are common (Beals and Hester 19 :192).

Winters in the foothills (November through February) are cold and rainy. Spring arrives in March and from then

through May the weather warms and streams, rivers and lakes flood. Plants grow vigorously culminating in a period of flowering. June through October is the summer season and is hot and dry (Gayton 1946:254).

### Culture Contact

Data on the Yokuts have been gathered by several distinguished anthropologists as well as many nonprofessional observers (Kroeber 1953, Latta 1949, Gayton 1930, 1946, 1948). Unfortunately, however, Yokut culture was disturbed by white influence at such an early date, much of the information is confusing. Gayton, whose fieldwork dates from 1925, used the period from 1840 to 1890 as her ethnographic baseline. However, as early as 1833 S.F. Cook estimated a 75% population reduction in the valley as the result of a malaria epidemic (Beals and Hester 197). By 1850 the Yokuts were experiencing hostility at the hands of the whites and some dislocation of their groups had taken place. The 1850's and 1860's were a period of fighting between the Yokuts and their neighbors the Western Mono. This fighting was probably due to pressure on both groups from the intrusive whites.

By 1925 when Gayton did her fieldwork, the Yokuts' lifestyle was similar to that of the poor white farmers in the area. The San Joaquin Valley floor was no longer a swamp

but had been turned into a desert by agricultural projects. The northern valley people were extinct. There was a small remnant population from the Central Valley (Tulare Lake) living on a racheria in Kings county but there was only one woman there able to give a useful account of her childhood (1860-1880). The culture of the southern valley people was extinct. It was only for the foothill people that Gayton was able to gather substantial data. There were several members from each foothill tribe who still lived near their old villages and were able to give her information. Thus the best of the ethnographic data come from them, from the Kings-Kaweah river area. Gayton states that it is representative of the entire valley between Fresno and the Kern River (Gayton 1930:363).

#### Subsistence

According to Latta (1949:28), the Yokuts can be divided into 3 groups based on environment. (1) The river people lived in permanent settlements except for acorn gathering excursions and communal jack rabbit and antelope surrounds. (2) The lake people were migratory and ate clams, fish, water fowl, seeds and tule roots. They moved as the lake shores shifted with the wind and rain. (3) The plains people, who probably had permanent villages on the east side of the San Joaquin River, ate salmon, antelope, jack rabbit and elk.

They used horses when possible as horses were quite useful in hunting through the 30 miles of dry, barren plains from the San Joaquin River to the Sierra foothills.

Gayton (1948:6) states that rabbits and antelope were hunted on the plains, rabbits, squirrel, quail, pigeon, dove and deer in the foothills and mountains, and that acorns and seeds were important to all who could get them.

### Settlement Pattern

Settlement pattern details are best for the foothill groups since more members of these groups survived to be questioned by anthropologists. In winter these groups hunted until it became too cold and wet. They spent the winter in a single location living largely on stored acorns. In the spring, plants could be harvested and people traveled to neighboring communities for the male initiation ceremony, and the rattlesnake ritual. In May those on the lower Kings River and other waterways with salmon, took advantage of the spring salmon run. From May on the villages broke up for the summer seed harvest. Families left for their habitual summer camps where the men would fish, hunt small game and carry loads of seeds back to the storage bins at the winter village. The women spent this time collecting the seeds. The families changed camps as the seed crops changed but all camps probably encompassed not more than an average of a 20 mile span. In September the people

returned to their winter villages to prepare for winter and to participate in the annual mourning ceremonies of their own and other moieties. In November the Bear Dance was held which signaled the first use of the new acorn harvest.

As is indicated above, the Yokuts had moieties as well as village officials, and patrilineal totems. Their concept of territory was loose but each individual had a sense of belonging to one area (Gayton 1946:255).

The Yokuts exhibited a variety of settlement patterns depending on their environment, and the environment in their valley was indeed varied. The river groups were apparently sedentary depending on the river and the nearby hillsides for food. The Tulare Lake people could not easily be sedentary as the continually shifting swampy shoreline forced them to move often if they were to live near the shore and take advantage of the teeming life of the swamp. The regimen of the foothill people is best known. It is the patterns of the foothill Yokuts that will be used in this comparative study, simply because there are more data on them. From the earlier discussion it can be seen that they remained sedentary in the winter eating stored foods and dispersed in the summer to collect seeds as the various harvests in their area were ready. This is fixed semi-sedentariness, even though their movement averaged a 20 mile span and the summer camp sites were habitual.

## THE NOOTKA

The Nootka live on Vancouver Island, which is an island off the northwest coast of North America. They live on the seaward side of the island from Cape Cook to Port Renfrew.

### Environment

The main axis of Vancouver Island runs northwest-southeast. It is actually a mountain mass partially submerged in the sea and thus contains many rugged peaks rising as much as 4,000 feet above sea level. The outer coast has a number of steep gullies that become narrow fiords 1 or 2 miles wide and up to 60 fathoms deep.

The seaward or "west" coast of Vancouver Island averages 100 inches of rain a year. Most of it falling in fall, winter and early spring. While the interior mountains experience snow all winter long, the temperatures on the coast are relatively mild due to the warming effect of the Japanese current. The tidal cycle produces very strong currents in the inlets and channels (Drucker 1951:8).

Though the soil is poor, the island's interior is densely forested. From sea level to 2,000 or 3,000 feet, 70% of the trees are Douglas fir, 17% are western red-cedar, 6% western hemlock, 2% Pacific silver fir and 5% a combination of western white pine, Sitka spruce and others. Between 2,000 and 4,000 feet, 60% is western red cedar, 22% is western

hemlock, 11% is Pacific sulfer fir, 4% Sitka spruce and 3% others. Above 4,000 feet and locally at Quatsino Sound as low as 1,700 feet, western hemlock composes 60% and Pacific silver fir 39% (Shelford 1963:214). At the forest edges, salal formes a dense tangle.

Food from the sea was easily acquired along the coast. Dog salmon, coho, spring salmon and sockeye (all 4 salmon species run up the river to spawn), sea trout, stealhead, herring, codfish, shellfish and halibut were available in substantial quantities. Hair seals, sea lions, porpoises and whales were also available. The most common land mammals were elk, deer, black bear, mountain lion, wolf, racoon, land otter, marten, mink, beaver and squirrel. Waterfowl was abundant (Drucker 1951:9). The abundance of land mammals in some parts of the forest has been called into question. Cowan (1945:109) states that food potential for deer in the climax cedar-hemlock forest was low. This forest could support only one deer per square mile and most deer lived in secondary communities where populations of 30 to 35 per acre were possible.

#### Culture Contact

First European contact with the Nootka was made by Juan Perez in 1774. Soon after trading interests were established, and by 1850 trading was brisk. In 1852, a smallpox epidemic



decimated an already declining Nootkan population. In 1861 Swan took a census of every winter village among the Nootka of Cape Flattery and found a population of 205 men, 224 women, 93 boys, 93 girls and 39 infants for a total of 654 people. Koppert places the total population of the Nootka in 1881 at 3,698 and in 1929 at 1,634. Trade was so good that most native villages had been abandoned in favor of remaining in the summer ones near trading posts. White missions and settlements were established. Profits from trade and from work in the canneries and hopfields brought inflation to the Nootka. In the early 1900's they began building individual family homes, some of which were patterned after the Victorian homes of the whites. The decline in population had led to social disintegration as many chiefs found themselves with no heirs and once thriving villages with population expanding into new daughter villages were suddenly left with too few people in the parent location. In 1913 the government of Canada established a law prohibiting potlatching (Drucker 1951:14).

Nootkan life, then, had been greatly altered by the time Koppert did his fieldwork in 1923 and 1929. His work was mainly carried out in the summer, and the village of Opitsit where he worked was virtually deserted then as most were at work in the canneries. Drucker's fieldwork with the Nootka occurred in 1935 and 1936 and provides the most data. The data

he collected refer to the childhood and early adulthood of his aged informants and thus pertain to Nootkan life from the 1870's to the early 1900's. At that date Nootkan life had already been severely altered by contact with Europeans, but it was still based primarily on hunting and gathering. Little comprehensive information is available from an earlier time. Drucker's work will form the basis of information on the Nootka presented in this study.

### Subsistence

The two staple food sources for the Nootka in order of their importance were dog salmon, and herring. Dog salmon not only ran up the streams and rivers in great numbers and was relatively easy to catch, but they ran in early fall which was the most useful time for the Nootka to gather and store food for the long winter to come. The sockeye and spring salmon runs were also exploited but they occurred in fewer rivers in fewer numbers. As mentioned, herring was another staple food. Halibut, cod, clams and other mollusks were also eaten. Sea mammals were prestigious catches though the Nootka did not actually need to depend on them for food. The principal mammals eaten were whale, hair seal, sea lion and porpoise. Land mammals were little utilized although bears, deer, and elk were occasionally killed. Drucker theorized that the density of the forest plant life made it an inhospitable

and difficult place to search for food in light of the ease of obtaining bounty from the sea. Indeed land animals other than the three just mentioned were important only because of the fur trade. During certain seasons, water fowl were eaten (Drucker 1951:36).

Among plant foods, salal berries seem to have been one of the most important. They were available in dense thickets at the forest edge. Ten other kinds of edible berries were eaten. Roots included grass roots, wild clover, ferns, Grammas and others. Shoots of the salmonberry bush, wild rhubarb and crab apples were also eaten (Koppert 1930).

The ability to preserve food was important to Nootkan life. Dog salmon was the food source preserved in the largest quantities. Herring, halibut, cod and other fish were also dried. Salmon roe was smoked and kept for long periods. A few varieties of berries were dried and roots stored in a dry place could be kept for a long time. The flesh of mammals and birds was never dried (Drucker 1951:65).

#### Settlement Pattern

The Nootka had distinct winter and summer villages and several principal fishing stations as well. They kept permanent house frames at these sites moving only the roofing and siding. Residence was said to be patrilocal but no true rule existed. Houses were communal. Social organization was

elaborate for a hunting and gathering group. The local group centered in a family of chiefs who owned territorial rights, houses and other privileges. These lineages were further united into a tribe united by possession of a common winter village, fixed ranking for assembled chiefs and a name. Tribes were further amalgamated into confederacies united by a common summer village site. The confederacies corresponded fairly well to the major geographical division of the area and functioned together in war and ceremony.

In late October, the Nootka moved to their winter villages where they lived through January on stored food, especially dry salmon. They continued to fish, especially for cod, and to gather clams and winter huckleberries and to trap deer. Other furbearing animals were also trapped but only so their pelts could be traded. In February they moved to the spring fishing sites on the lower reaches of the inlets to catch herring roe. In April they moved to the summer village on the outer beaches for halibut fishing and sea mammal and waterfowl hunting. Hair seal, sea otter and whales were some of their primary targets. In late spring the gathering season began with the ripening of berries. In late summer they gathered roots and caught shiners and perch. By September all local groups were at their fishing stations bringing in the fall salmon catch. Following this they returned to their winter villages and the year was complete (Drucker 1951:55; Sapir and Swadesh 1955:39).

The Nootka settlement pattern was one of multiple base sedentariness. They occupied several sites each year but always returned to the same ones and indeed left permanent structures there. While their environment provided them with plenty of food, it would have been quite difficult to exploit it so efficiently from one site. The salmon streams, herring grounds, outer coast halibut banks and mollusk beds were so far apart that they could not have been successfully utilized from one single living site. On the other hand these food sources were so bountiful and reliable that they could be depended upon year after year. This dependability and bounty in turn made population expansion and elaborate social organization possible in aboriginal Nootkan times.

#### THE HUPA

This group of hunters and gatherers lived in Hoopa Valley in the lower part of Trinity River in Humboldt county of California.

#### Environment

The Trinity River flows through Hoopa Valley in a north-westerly direction. The valley is 6 miles long and 1 to 2 miles wide. The western side rises in a mountain ridge about 4,000 feet high and is heavily wooded. The eastern side of the valley culminates in a 6,500 feet high mountain. Each side of the valley has 3 good sized creeks apiece that

flows into the Trinity. The eastern side of the valley is so cut by the creeks that it forms 1,500 feet high ridges that run back to the mountain. These ridges are wooded on one side and covered with grass on the other. The northern end of the valley contains a 1,900 feet grass covered slope with trees on the top.

Sugar pine is one of the predominant trees at the highest elevations on the valley sides. Digger pine is found in and near the valley along with yellow pine, redwood, and especially Douglas spruce. Cedars are found along the creeks. Four varieties of oaks are also common. Alders, willows and cottonwoods are found along the streams. Chaparral covers the less fertile part of the valley and the hills and contains mansanita, deer brush, and poison oak. Large animals include elk, deer, bears, mountain lion, bobcat, wolf and coyote although the elk and wolf have been gone from the area since the arrival of Europeans. (Goddard 1903:5).

#### Culture Contact

Goddard (1903:8) claims that in 1840 the Hupa did not know whites. In 1859, however, gold was discovered and whites rushed in. In 1855 a military post was built and in 1865 an Indian reservation was established in the valley and surrounding hills. During the next 40 years, the Hupa underwent great change. In 1866, Hupa population contained 650 souls

but by 1893 it had decreased to 450. Goddard's field work was done in 1899 and thus describes a Hupa culture confined to a reservation. They were able, however, to continue their foraging ways within the confined area.

### Subsistence

Deer and elk were the primary animals hunted. Heads of families held the hunting rights to all the regions near the valley and many with no hunting rights of their own had to depend on friends and relatives. Squirrels, woodrats, grouse, mountain quail and robin were also eaten.

Salmon were an important food source. The spring salmon run began in April. The fall salmon began after the first rains in September or October. Sturgeon, trout, lamprey eels, suckers and other fish were also eaten. Heads of families held the fishing rights along varying lengths of river shore.

Acorns were a staple food among the Hupa. The tanbark oak acorn was considered the best but the acorns of the Pacific post oak, black oak, and maul oak were also used. Hazel nuts chinquapins, pepperwood nuts, seeds of the sugar pine and of the digger pine, lily bulbs, soap-root, bulbs and shoots of a number of other plants were also eaten. Seaweed was obtained from the coast. Grass seeds and berries especially the manzanita, were also eaten.

### Settlement Pattern

The Hupa were divided into upper and lower divisions, each having a major village and several minor ones. Each village had a head man. Each division was responsible for building the weir across the Trinity in alternate years though all could fish from it. Hupa home range may have covered no more than 7 square miles with a few trips to spots distant for special gathering purposes. They effectively utilized only 15 miles of the Trinity River (Beals and Hester 19 :170). The river was a chief food source, providing them with the fish they ate in such abundance. The tanbark oak was found in the valley and thus its acorns were near at hand. The other acorn species were further up in the hills. Digger pine seeds were available in or near the valley in June and sugar pine on the ridge tops in October. Manzanita and other berries were found in the valley and nearby hills (Goddard 1903:4-5).

The Hupa lived in villages on the river bank near springs. During the fall and winter they lived in these villages. During the summer they slept in brush shelters along the river. They thus lived a sedentary life.

### Conclusion

Of the seven cultures in temperate forests, four have a number of similarities. The Paiute, Yokuts and Hupa all



exploit river valleys where they have access to river products, land mammals and abundant nut crops. These valleys are similar in that the inhabitants do not have to travel far to take advantage of all of these kinds of resources. All three spend the winter in villages living on stored food, primarily acorns in the case of the Yokuts, pine nuts for the Paiute and acorns and salmon for the Hupa. Their summer patterns of movement show more diversity as the Yokuts make the rounds of habitual seed gathering camps, the Paiute settle into permanent summer villages from which they irrigate seed crops and the Hupa move to summer brush shelters and fish and gather plants. It is unclear from the literature whether the Hupa summer habitats represent a change in location or simply a change in house type.

The Nootkan settlement pattern is similar to the above ones. They have specific summer and winter villages as well as habitually visited fishing stations. They differ from the above groups in that they depend almost entirely on the products of the sea for their survival. They use few of the forest resources available, be they animal or vegetable. Their winter sedentation is made possible by the use of stored food, as in the three cases mentioned above, but this food is mostly dried fish, especially salmon, rather than nuts and seeds as in the above cases. The Nootkan lifestyle bears a great resemblance to that of the Ainu and Gilyak to be discussed in the

next chapter. However it also bears a great resemblance to the three discussed above.

The other three cases discussed in this chapter are quite different. The Yahgan, although they live in the temperate forest, do not exploit it and bear more resemblance to coastal Andamanese of the tropical semideciduous forest than to any of the other temperate forest groups. Like the coastal Andamanese, they exploit the coasts only and travel only by water. Also like the Andamanese, they depend primarily on marine resources that are unaffected by the seasons. The Yahgan staple food is mussels though they eat many other foods related to the sea as well. Both the Yahgan and the Andamanese exploit similar environments and it is not surprising that their settlement patterns are similar. Both have been placed in the highway nomadism category as they travel by water and wander along the coast exploiting sites for periods of time and then moving on with no prolonged settled periods.

The Ona are an unusual case. The literature states that they are nomadic staying in one place only long enough to consume their kill. Frankly, it is suspected that the details of their settlement pattern have simply not survived to be reported since they were almost extinct at the time of ethnographic study.

The remaining group, the Kutenai, are reported to be fixed semi-sedentary as they spend the winter eating stored foods

and disperse during the summer to take advantage of resource variety. The mobility pattern of the upper Kutenai has been reported in more detail than has that of the lower Kutenai. The upper group disperse in the summer to hunt buffalo and to gather. The lower group remains near home fishing, and indeed just how mobile they are in the summer is not known. It may be incorrect to place them in the semi-sedentary category.

The cultures of the temperate forest present a variety of settlement patterns and use a variety of food resources. Indeed no generalizations about similarities among them can be made. Two of them, the Yahgan and the Nootkan, utilize the forest very little and should more accurately be placed in a category for exploration of marine environments than one for terrestrial environments. The three most similar are the Paiute, Yokuts and Hupa all of whom exploit fairly narrow river valleys containing both grassland and forest and are all capable of leading fairly sedentary lives within these valleys which contain so many ecozones.

## CHAPTER IX            CULTURES OF THE BOREAL FOREST

In places where the growing season is too short for deciduous forest, coniferous forest can thrive because the leaves survive through the winter and are ready to begin photosynthesis immediately when temperatures become warm enough. Also, coniferous fructification is pollinated one year and dispersed the next whereas deciduous plants pollinate and disperse all in one growing season. Forest types are largely determined by length of growing season. Deciduous trees pass through both hydrophilous and xerophilous stages in a single year and need a long transitional period in which to move from one to the other. The spring and fall seasons provide deciduous trees with the time to make these transitions, and long springs and falls occur only in marine climates. In continental climates, the transition between winter and summer occurs quickly and thus is better suited to coniferous evergreens. Also, coniferous trees require less rain. Boreal forests usually contain comparatively few species of trees and most of these are xerophilous and grow in soil which is physiologically dry and exposed to bitter desiccating winds in the winter.

Winter in the boreal forest is cold and dry with long periods of frost. Summers are relatively short and hot. Wind direction is irregular and causes fluctuation in temperature as one day it may blow warm air in from the direction of the equator and another bring in cold air from the poles. The frost free period is very short. Precipitation is usually 10 to 40 inches per year and the mean temperature of the warmest month exceeds 50 F. (Cloudsley-Thompson 1975:129).

There are 5 types of northern coniferous forest. 1) Mixed coniferous forest covers sections of Eurasia and North America and is dominated by spruce, fir, pine and larch trees. 2) Open taiga is the park-like formation at the northern limit of the tree line where the trees are thinning out and merging into the tundra. 3) Lake forest occurs in eastern North America, especially the northern Great Lakes and contains mostly white pine, Norway Pine and hemlock with some broad-leaved deciduous trees which merge into deciduous forest to the south. Precipitation in the lake forest averages 24 to 45 inches per year. 4) Montane and sub-alpine forest found in western North America and other places is due to local physiographic factors. 5) Moist temperate coniferous forest is not true boreal forest and has been discussed with the mid-latitude forests.

In the northern reaches of the boreal forest, larch, and birch are common while in the south these become interspersed

with fir, pine and cedar. Thickets of aspen, mountain ash and willow also occur. The circumpolar forest is characterized by spruces, except in eastern Siberia where larches dominate. Firs are distributed throughout the same area as spruces but are less tolerant of poor drainage and fire and better adapted to warm, dry climates. Spruces and firs are suited to cold, wet climates while larches, which are deciduous do well in cold, dry climates. Birches and aspens are often found in the same forests with spruces and firs but they can extend into drier climates. They occur in abundance in areas that have been severely hit by forest fires.

Common mammals of the boreal forest are bears, wolves, otters, badgers, sable, lynxes, elks and mooses. Birds are fairly plentiful and usually are migratory seed eaters. Insects are also plentiful (Cloudsley-Thompson 1975:134).

There are four cultures of the boreal forest in this study. They are the Ket, Yukaghir, Ainu and Gilyak.

#### THE KET

This group lived in Siberia. From the analysis of place names and information given by survivors who still speak the language, it appears they formerly lived as far south as the Sayan range, as far west as upper Tom. In the sixteenth century they were pushed further north by surrounding tribes and have been found since in the Yenisei basin.

### Environment

The Podkamannay-Tunguska region where the Ket were found contained silver fir and cedar trees but no larch. The climate was continental and winter snows were heavy. Animals were mainly furbearers; squirrels and hares were numerous. Common birds were the goose, duck, ptarmigan and loon. Fish found in the area included the muksun, nelma, grudgeon, perch and carp. Many fish ascended the Yenisei in the spring and descended it in late summer. The left bank of the Yenisei river was covered with spruce or pine forest and had many swamps and lakes but little snow. It was a good habitat for reindeer. In the north the larch forest began and then turned to tundra.

### Culture Contact

When the Ket were pushed north in the sixteenth century they came into contact with the Samoyed, and many Ket became reindeer herders as a result of that contact. The other Ket remained hunters and gatherers. The data in this study is from the work of B.D. Shimkin who did no fieldwork with the Ket but whose work is based on the research of Tretyakov (1869), Anuchin (1914) and Dolgikh (1934).

### Subsistence

The Yenisei River and its streams provided the Ket with a variety of fish, which was a vital part of their food supply. They also hunted squirrel, hare, ermine, fox, bear and elk. Squirrel was probably the most important animal hunted.

Little is known about their specific preferences in vegetable food. They preserved fish by drying it (Shimkin 1939:152).

### Settlement Pattern

In 1850 the Ket were divided into two dialectical divisions, the Podkamennaya-Tunguska people and all others. They had 7 territorial bands varying in size from 32 to 324 members.

Basically there were two phases in the Ket year. Summer was the time of migratory fishing and winter was that of hunting from a permanent base. April was the beginning of the fishing season. The snow began melting then, skis became unusable, and walking was difficult; so the Ket quit hunting, left their earth covered winter houses and set up tents along the river to begin fishing and bird hunting. Then they began to move downstream traveling in small dugouts made of aspen, that had the advantage of being light enough for one man to carry from stream to stream, and in large dugouts, probably copies from the Russians, that would hold more people. This was a time of plenty and was the only time when the Ket would congregate in large groups. After the summer solstice, they became more serious about their fishing and also began to gather foods, especially pine nuts, in preparation for the coming winter. The bands began to move back up river with their dogs pulling the canoes. They fished at night. In September they went upstream to a rocky region and built



their earth covered winter houses in preparation for winter. Mid-October through December was the period of most intensive hunting, and hunting was almost confined to the squirrel. A good hunter could bring in 10 to 15 squirrels from an 18 mile trip. He used bow and arrow. January was a month of extreme cold, and hunting was impossible. The Ket continued to fish through ice holes, but the catch was apparently small. February and March were important months for hunting and with the help of their dogs the Ket could clean out valley after valley of its squirrels, hares, ermine, fox, bear and elk. In April they abandoned their earth covered houses and began the summer fishing cycle. They did not return to the same houses the next year (Shimkin 1939:151-152).

The Ket followed a semi-sedentary pattern probably largely imposed upon them by the severity of the winters. It makes much more sense to remain sedentary in a warm earth hut in the winter than to wander when winters were so severe. Whether they should be classed as fixed or variable semi-sedentary peoples, is impossible to determine. While we know they did not return to the same hut a second year, we do not know if they returned to the same winter location.

#### THE YUKAGHIR

This group lived in northern Siberia. Their original territory stretched from east to west between the Lena and Kolyma rivers and from north to south between the Arctic Sea

and the Verkhoyansk Range. Aside from this area, some of them lived east of the Kolyma watershed in the valleys of the Big Baranikha and Anadyr Rivers and the upper Penshina River.

### Environment

This part of northern Siberia is made up of mountain ranges, rivers and river valleys of the tundra. The mountains of the Verkhoyansk Mountains average 1,300 to 33,000 feet in height. There are 6 river valleys in the Yukaghir area. They are bordered by tundra-like plains with lakes and swamps. The swampy conditions in summer are due to the fact that the snow melt has no way to run off and can not be absorbed into the frozen ground. Thus it sits in every depression. Summer travel is difficult except by canoe. In fact the swamps are more of a barrier to communication and travel than are the mountains. The main rivers are long, and fish from the sea ascend far inland (Jochelson 1926:3).

The coldest temperature on earth was recorded in Yukaghir territory. Temperatures for the year 1901 ranged from a maximum of 26.6 C. and a minimum of -51.5 C. (average temperature for the year, -14 C.) at Russkoye Ustye in the Verkhoyansk district to a maximum of 28.7 C. and a minimum of -49.5 C. (average of 11.1 C.) at Rodchevo in the Kolyma district. There were 41 days without frost and an annual rainfall of

114.2 millimeters at Russkoye Ustye that year and 72 days without frost and an annual rainfall of 207.5 millimeters at Rodchevo. The most precipitation occurs from August to November and the least from February to April (Jochelson 1926:8).

Common trees in the area are the larch, pine, poplar, aspen, birch, alder and willow. North of the tree line are found bushes like the dwarf birch, and the arctic willow. The tundra also contains mosses, cloudberry, bleaberry, red bilberry, crowberry and sedge grass. The drier parts are covered with lichens, a favorite food for the reindeer. A number of species of migrating fish come into the area. The mammals include black bear, wolves, foxes, ermine, squirrel, polar hare, elk reindeer, musk deer and mountain sheep.

#### Culture Contact

Jochelson's fieldwork among the Yukaghir was done in 1895, 1896, 1901 and 1902. By that time they had been under Russian influence for 200 years and the effects of this had changed their culture sufficiently in that they had lost many of their original tribal characteristics. In fact Jochelson states that the Yukaghir were on the verge of complete physical and ethnic extinction. There was a severe smallpox epidemic in 1885. The Yukaghir had suffered greatly from measles and syphilis as well. In fact many marriages appeared to be sterile, probably the result of syphilis. There were people alive

who remembered life as it had been, and thus Jochelson was able to reconstruct that earlier lifestyle.

### Subsistence

Salmon ran in area rivers in the spring and fall and were a staple food for the hunting and gathering Yukaghir. The species of salmon eaten by them were *Coregonus leucichtys* (nelma), *C. omul*, *C. muksun*, and *C. clupeodes* (sometimes mistaken for herring). They also eat 2 varieties of sturgeon, as well as chir, pike, and perch. They hunt elk (the most important game animal), reindeer, sable, wolverine and lynx. At the time of Jochelson's study, all these animals were extinct or their numbers at least drastically decreased. They also hunted birds like the wood cock and ptarmigan. Bear was eaten in time of famine but never otherwise as it was considered to be related to man (Jochelson 1926:380).

Vegetable foods eaten included lichens from the stomachs of reindeer, several kinds of roots, 16 kinds of berries and 3 of currents. In the spring they drank the sap of the poplar and willow. *Vaccinium uliginosum* was their favorite berry and it was stored for the winter. Fish and meat were also stored by freezing or drying. The inner bark of the larch and willow was eaten on occasion (Jochelson 1926:418).

### Settlement Pattern

Jochelson studied three groups of Yukaghir. The Russian-ized ones in the Anadyr district had adopted many Russian habits.

The Tundra ones had become nomadic reindeer herders. It is only his study of the Upper Kolyma Yukaghir that is being reported here as they were the only ones still living as hunters-gathers. They lived on the banks of the Yassachnaya, Korkodon and Popova Rivers. In the winter they lived in partially subterranean log huts or in earthen huts. They hunted reindeer and elk during late winter and in spring until May. Summer was the fishing season and from May through September they lived in tents of reindeer skin fishing along the waterways.

They traveled by dog sled, each house having 3 to 5 dogs. Often several families would tie all their dogs to one sled for travel. Until 1850, there were three clans in the Upper Kolyma District, but by the time of study these had amalgamated into one due to population decimation. At the time of study there were 159 people left in the area. From September to February all lived in winter villages. About two-thirds of them lived in a few small settlements on the Yassachna River within a space of 7 miles. The other one-third lived in a settlement 70 miles from the mouth of the Korkodon River at the mouth of the Rassokha River, excepting one or two families in other isolated spots. In February all left these permanent camps to wander in different areas. In the summer they reunited, going by boat to the mouths of the Yassachna

and Korkodon Rivers. They lived in tents and moved from place to place in boats fishing. In September they returned to their permanent dwellings (Jochelson 1926:53).

Thus they spent 4 months per year in permanent dwellings and the rest wandering in search of food. They were following the fixed semi-sedentary settlement pattern.

### THE AINU

The Ainu live from 41° N to 45° N and from 140° E to 146° E in Japan. In the past they lived on Hokkaido, southern Sakhalin and the southern part of the Kurile Islands. Now they live mainly on Hokkaido.

### Environment

Hokkaido has an area of 48,375 square miles. It is just north of Honshu, the Japanese mainland. Sakhalin is 40 kilometers from the northern tip of Hokkaido. The Kurile Islands are small and stretch northward. The annual temperature means for Hokkaido for the years 1921 to 1950 varied from 5.20° C. to 8.5° C. depending on the area. The season of snowfall runs from October to May. The monthly mean temperatures for the years 1921 to 1950 showed the 4 months of December through March as having mean temperatures below 0° C. and this corresponds roughly with the period when the ground is continually covered with snow.

Hokkaido is covered with forest. The southwestern part is covered in latifoliate trees, especially birch while the

northeastern part is coniferous, containing the firs *Abies sachalinensis* and *Picea jezoensis* especially. A north-south mountain range runs through the middle of the island. The highest mountain being 7,500 feet above sea level and the beginning point for many of the island's rivers. Many of the rivers experience successive runs of salmon from early summer to early or mid-winter. The two salmon species involved are *Oncorhynchus masou* and *O. keta*. Land animals common in the area are brown bear and deer (Watanabe 1973:1).

### Culture Contact

Today Ainu culture is virtually gone. In 1883 the Japanese government brought all the Ainu together and began to teach them agricultural techniques. Moving them from their homelands and their original territorial groupings brought social disorganization and the beginning of the dissolution of their culture. Their population size has remained stable since 1854 yet they have become so acculturated as to be almost unrecognizable among the Japanese.

The three main sources used in this study of the Ainu are Munro (1963), a medical doctor who lived with the Ainu from 1930 until his death in 1942, Ohnuki-Tierney (1972, 1973) whose field work with them occurred in 1965, 1966 and 1969 for a total of 15 months and Watanabe (1968, 1972, 1973) whose fieldwork consisted of a number of short trips spanning the years 1951 through 1959. All of these studies were thus

made after Ainu culture was practically gone. They are reconstructions of a past way of life based on information from the few informants still able to remember the old ways. Most of the data in this study are taken from Watanabe's work in the Hokkaido valleys of Azuma, Tokapchi and Otopuke and pertain to the time from 1865 to 1885.

### Subsistence

The staple foods in the diet of the Ainu were salmon and deer. Bear was also hunted but eaten mainly on ritual occasions. Plant foods were more varied in kind than animal ones but apparently were less important. Plants eaten included 8 kinds of leaves and stalks, 1 of bulbs, 3 of nuts, 3 of fruit and 2 of berries.

Meat and fish, mostly dog salmon and venison, were dried to eat during the winter period when base snow covered the entire island. Dog salmon caught in October and November was sun dried and that caught in December was frozen. Vegetable foods were dried to store for winter (Watanabe 1973).

### Settlement Pattern

Spring was the beginning of the fishing season as the base snow melted and chirai and Hucho perryi were fished. The cherry salmon runs began in the Upper Tokapchi and the Otopuke the first of July and in the Azuma in July and August. No regular hunting was done until fall as all efforts were



concentrated on the fishing. In Azuma and Otopuke valleys, the Ainu were able to spend the entire season at their settlements fishing in nearby streams. Those people on the upper Tokapchi, however, moved in August to fishing huts to be near better fishing grounds. The cherry salmon fishing did not end until the dog salmon runs began. They lasted from October through December and were the main source of winter food.

At the end of the fishing season, the Ainu remained in their settlements hunting deer in the fields. When the base snow covered the plants, the deer moved to the hills, and the hunters followed living in hunting huts. Only young unmarried men and others who felt they had not already preserved enough food for winter moved to the huts. These returned to the settlements when the snow became too deep for them and their dogs to walk in. As spring arrived and the snow melted, the deer migrated back to the valleys along fairly predictable paths, and the hunters took advantage of such an opportunity to hunt them. Bear was hunted only in the spring and fall.

The women gathered plants beginning in the spring with the melting of the snows and continued until the beginning of the dog salmon runs. In the summer they collected roots which were made into starch for winter storage. In the fall they collected nuts, fruits and berries but not in large enough quantities to store.

Thus the Ainu spent 2 months in the winter in leisure. The man hunted 2 to 3 months of the year and fished 8 to 9 months with the help of the women. The women gathered 5 to 6 months of the year and usually staid at the settlements year round. The men might leave during certain periods to go to the bear or deer hunting huts. On some rivers the men also had to leave to go to fishing huts to take advantage of good sites. They would periodically return home with their catch. During the dog salmon runs, all stayed at home to fish the rivers (Watanabe 1973:27-50).

Ainu settlements were composed of 1 to 10 families at sites close to drinking water, fishing and hunting grounds, especially the spawning beds of the dog salmon. Each settlement was referred to by the name of the stream near it. Settlements were 1 to 5 miles apart, the average being 2-1/2 to 5 miles. Within each settlement the dwellings were 300 to 1,600 feet apart. Often 2 or 3 households formed a cooperative unit for gathering. One or more settlements were integrated into a territorial unit with ownership of concentrations of spawnings beds, group participation in certain ceremonies, and cooperation in house building. The local group size varied from 3 to 11 households with 5 to 10 being typical. The patrilineal kin group was the core of the local group. The local groups were further amalgamated into larger territorial groups considered to be descended from a

common male ancestor of local origin. They lived along one river and their only cooperative activity was the bear ceremony. The largest socio-political group was the river group composed of all the groups on one river. They held no collective activities but were considered to own the river resources and be responsible for guarding the river and its deities from harm (Watanabe 1973:16).

Watanabe (1968:72) attributes the Ainu's ability to remain sedentary year round to the fact that they lived in a narrow river valley in which 5 ecozones were found in close proximity. The large number of ecozones offered a variety of food within easy reach. The river itself was of course a vital ecozone for them as it was the source of the fish, especially dog salmon, on which they depended for many months of the year. The wooded river banks provided them with 7 kinds of plants regularly collected. The woodless fields and the oak forests on the river terraces provided them with living sites, 5 more varieties of commonly used plants, and deer. The hillsides along the rivers' courses also contained deer and the mountains above were a source for bear.

It should be noted that a number of the most sedentary groups in this study do live in narrow, fairly steep river valleys which provide them with a variety of ecozones to exploit. Indeed it is possible that such an environment makes a sedentary existence more plausible for a purely hunting

and gathering economy than most other types of environment.

### THE GILYAK

The Gilyak lived in the extreme northeastern Amur region which included the lower most part of the Amur River, the Amur-Liman, and the adjoining coast of the Sea of Okhotsk and the northern half of Sakhalin Island. The Ainu were their neighbors. The Gilyak lived mostly near the sea, the Sea of Okhotsk and the northern part of the Sea of Japan and the Amur-Liman and the Amur River on the mainland and the Tymy on Sakhalin.

### Culture Contact

The Gilyak were a fishing and hunting people who pursued their livelihood undisturbed by outsiders except for a stretch between the mouth of the Dseja/Zeya/ and the Bureja/Bureya/ where there was a Chinese town and some Manchu-Chinese villages that subsisted through agriculture and livestock breeding. The data for this study are Leopold von Schrenck's whose fieldwork occurred in 1854 to 1856 and his work is a reporting of life as he saw it at that time. The Gilyak did have trade relationships with the Chinese and Japanese and some trade goods and foods had entered their culture. The trade foods, however, were unimportant in their diet. They also had contact with the Ainu, the Orok the Olcha and the Goldi.

In the 17th century, hostilities with cossacks had reduced their numbers and the exact effects of this population reduction are not known. At that time the Russians also took over some lands previously used by the Gilyak as hunting ground (Schrenck 1881-1895:1,192).

### Subsistence

The Gilyak of the lower Amur and its tributaries take advantage of the salmon runs. The *Salmo lagocephalus* Pall. runs in August and the *S. proteus* Pall in June. The fish are dried and the oil stored. The roe is eaten. Other fish are treated in the same manner. The Amur and the Tymy Rivers are the richest in fish. The coastal Gilyak do not have salmon and sturgeon but can fish all winter as *Kangi-tscho* and *Gadus wachnja* Pall. appear in shoals right under the ice near the shore. These fish are vital to the winter food supply. Seals are available throughout Gilyak territory. The meat is fed to the dogs and the fat used by man. Several varieties of whale are also available and hunted to some extent. Most land animals are hunted only in order to acquire their pelts for trade, although the meat is eaten. Bears are hunted and considered a choice food used for ceremonial purposes. Birds are eaten. The coastal people eat some crustaceans and mollusks (Schrenck 1881-1895:654).

Among plant foods, one of the most important is the bilberry, which is stored, as it is a common accompaniment for

fish. Several other varieties of berry are eaten, as well as several fruits. Schrenck lists four commonly eaten roots and several plants whose stalks and leaves are eaten. Leeks are eaten for flavor. They also eat Chinese, Japanese and Russian cereals and vegetables but they are not a part of the daily diet and are only available to the very rich in any case (Schrenck 1881-1895:667).

#### Settlement Pattern

The Gilyak are sedentary. From November through March they live in winter houses. In April they move into summer ones staying there until they move back into winter ones in October. The summer houses are located near fishing grounds and the winter ones near firewood and protection from storms. The houses were often at the same location, they were just different types of buildings. Sometimes they were at different sites but were never too far apart as stored food had to be moved from one to the other. Storehouses, built in the same manner as the summer house, were located near the winter house. Winter villages often had only 1 winter yurt but most had 2 or 3. The largest winter villages seen by Schrenck had 16 yurts. A winter yurt holds 8 to 16 people depending on the style of the house. The Gilyak were generally patrilocal. Rights to salmon weirs and forest trapping areas were owned though otherwise one could hunt and fish anywhere.

Thus the Gilyak were sedentary like the Ainu and indeed lived off many of the same resources.

#### CONCLUSION

The four cultures studied from the boreal forest are quite similar. All spend their winters hunting animals like deer, elk and caribou from a permanent base camp. In the summer they all fish and all take advantage of salmon runs in their areas. Two of the four, the Ket and the Yukaghir, are semi-sedentary as they exploit summer fish by traveling up and down the rivers fishing as they go. The other two, the Ainu and the Gilyak, take advantage of sufficiently rich salmon runs that they are able to remain sedentary at their permanent camps and gather the migratory salmon as they swim by. Since all four cultures exploit similar resources in similar environments, it is not surprising that their settlement patterns are similar.

## CHAPTER X            CULTURES OF THE TUNDRA

Tundra occurs in arctic climates with a summer season in which temperatures are above freezing and the ground free from snow long enough for vegetation to grow. It occurs only in the northern hemisphere as in the southern hemisphere the land masses stop at relatively low latitudes making its development impossible. Tundra is treeless, but there may be patches of coniferous forest in the river valleys. Such is the case in the Lena and Yenisei valleys and along the northern Russian coasts.

Tundra climate is transitional between the boreal forests and the polar icecaps. There are only 2 to 4 months of temperatures above freezing and frosts often occur during this time. The tundra has several features in common with the desert. While deserts are physically dry, tundra is physiologically dry as the water is frozen and thus unavailable to plants and animals. The growing season is short in both; in the desert this is due to the lack of rainfall and in the tundra to lack of frost free days. In both places the winds are strong and desiccating and the land is often covered with sand or snow. Both have oases; these are the damp spots



in the desert and the dry ones in the tundra. The dry spots in the tundra are where the snow melts early and the soil is well drained.

Beyond the tundra climate is the polar climate which occurs in even colder regions where there is perpetual frost. Only lower plants can grow in this environment. In fact north of the Arctic circle, only 400 species grow. There are, however, many mosses and lichens which do not die in the winter and thus provide year round food. Most plants and animals are found at ground level.

The Arctic tundra contains many dwarf birchs and willows. Most arctic plants are perennial and reproduce asexually. Ones with rhizomes, bulbs or runners are common. Mammals common to the tundra include the caribou, lemming, arctic fox, arctic hare, wolf and stoat. In Siberia, the wolverine, brown bear, and common fox are also found. The most common marine mammals are walruses and seals. The polar seas are rich in plankton which provides a good source of food for fish, birds and marine mammals. Birds are plentiful. Life in these climates must adapt to the change from the dark, cold winter to the continually warm and continually light summer. Most birds migrate in the winter. Some animals, lemmings for example, live beneath the snow. Others, like the fox, store food for the winter. Insects spend the winter in a resting stage (Cloudsley-Thompson 1975: 135).

The inhabitants of the tundra to be included in this study are the Mistassini Cree, the Iglulik and the Ten'a, all of North America.

#### THE MISTASSINI CREE

The Cree live in the Labrador Peninsula except for the coastal areas of it. They live as far west as the southern tip of James Bay, through the Hudson Bay Lowland to northern Manitoba.

#### Environment

The land is covered with boreal forest and tundra. The climate is typically continental with long winters and short summers. Precipitation is moderate; 15 to 40 inches fall annually. Snowfall in the area can be 100 inches or more. Lakes and rivers are frozen from October till May. The coniferous forest is composed of black and white spruce, balsam fir, Banksian pine, white birch and poplar. The stream banks and pond shores are covered in alders, willows and other shrubs. Berries are relatively numerous with the blueberry being the most common. Mosses and lichens abound in some areas.

Caribou, moose, coyote, bear, beaver, lynx, otter, mink, marten, muskrat, hare, ermine, fox, wolf and wolverine are common. Birds, especially water fowl, migrate through the area in spring and fall. The ptarmigan, spruce and ruffed grouse remain there year round. Fish species in the area

include pike, lake trout, whitefish, sturgeon, walleyed pike, speckled trout, ling, perch, goldeye and sauger. Insects abound, especially mosquitoes and black flies in the summer (Rogers 1969:26).

### Culture Contact

The Mistassini Cree were first mentioned by name in the accounts of early explorers in 1642. In 1820's all the Indians trading at the trading post to the northwest of Lake Mistassini were referred to as the Mistassini Indians. As other posts were established, some of the Indians left the Mistassini post to trade elsewhere and were then named after the new post. It appears that the name Mistassini simply was used to cover those trading at one post and bore no relationship to groups recognized by the Indians themselves. The Indians in the area did have some cultural identity, gathering in large groups for ceremonial purposes, but these cultural entities did not necessarily correspond with that group of Indians using the Mistassini trading post.

The Cree in this area were, at any rate, greatly affected by the presence of whites and the fur trade. They became somewhat dependent on trade with the whites, and thus they did not subsist entirely from hunting and gathering. Rogers did fieldwork with them in 1953 and 1954 at a time when they still spent much of their time in the wilderness but their long time association with whites had obviously changed their lifestyle greatly.

### Subsistence

The most important animal food sources were caribou, bear, beaver and fish. Previously caribou and fish were the primary food sources. With the coming of the fur trade, small game became important. At the beginning of the 20th century, moose moved into the area, and the Cree have since taken advantage of them as a food source. In the past, the Cree used bows and arrows, deadfalls and snares for hunting and trapping food. After the fur trade got underway, guns and steel traps became common (Rogers 1969:28). Gathering of plants was of little importance due to the paucity of the flora.

### Settlement Pattern

The hunting group among the Cree was ideally a patrilineal extended family; however, it usually contained an assortment of other people, related or not. A hunting group spent the winter together and occupied a winter camp. It varied in size from 7 to 25 people with 20 being about average. The men in the group hunted and trapped singly or in pairs. Winter hunting groups were scattered throughout the territory.

Several hunting groups were further amalgamated in the summer into a band which gathered at a favorite lake shore fishing spot. The band broke up again in the fall. These bands ranged in size from 50 to 150 members. Population density among the Mistassini is conjectured to have been

66 square miles per person. The reason for such a low density apparently was the lack of resources in the area, but many other factors probably came into play if indeed this density is at all accurate (Rogers 1969b:30).

Rogers recorded the following seasonal round for the Mistassini Cree. From mid-August to mid-September they moved from summer post at the southern end of Lake Mistassini to their various hunting grounds. Each hunting group traveled together by canoe. When the hunting area was reached, a base camp was set up. This camp might be moved after several weeks. Sometimes old camp sites were reused.

During the fall, men hunted meat to store for winter. They hunted primarily bear, moose and caribou. They traveled 20 to 30 miles a day round trip in the hunt. Sometimes they set up a temporary camp some 10 miles away to use as a base for several days of hunting. Muskrats, ducks, whitefish and lake trout are also captured at this time. The women gathered blueberries.

In mid-October the base camp was moved to a new location that was usually occupied until January. Winter was coming and protection from the weather was now as important as a good hunting location in positioning the base camp. In past times, men continued to hunt as before during this period, especially if they had captured little so far. In more modern times they began trapping beaver, otter, mink, marten and weasel.

In January, the group moved to a new base camp in an unexploited area of their territory. Because of the severity of the weather and the shortness of the daylight hours, it took a month or so to move the approximately 30 miles. The trip was made by sled. When established, fish nets were set under the ice and caribou was actively sought.

In April the group moved back to the early winter camp to pick up their canoes. When the ice thawed they trapped for muskrat and otter and hunted duck, geese and loons. Fishing was the primary activity, however. Toward the end of May they returned to the summer camp. Since they were moving down stream, a trip that took 4 weeks in the fall now took only 4 days.

During the summer there was much celebration. Fishing provided the main traditional food source, but food was also bought from the trading posts and a number of men worked for outsiders (Rogers 1969:131).

The Mistassini Cree were semi-sedentary. Winters were spent in a series of camps while the summers were spent in a single location. However, they were not self-sufficient hunters and gatherers as they depended greatly on the fur trade and on the trading posts.

#### THE IGLULIK

The peoples that lived in an area on or near Iglulik Island were referred to as the Iglulik Eskimos. This included

the Iglulingmiut, the Avilingmuit to the south and the Tununermiut of northern Baffin Island.

### Environment

The Iglulik area is composed of two zones. The Southampton-Melville upland is crystalline rocks rising 1,000 to 3,000 feet. The Foxe Basin Lowlands includes the eastern third of Melville Peninsula and Baffin Island shore. This is flat-lying Paleozoic limestone rising less than 300 feet. The climate is continental having high humidity and low precipitation. At Hall Lake the mean temperature for February was recorded to be  $-22^{\circ}$  F. while that for July was  $43^{\circ}$  F. The sea begins to freeze in October and may not break up in sheltered bays until early August.

Animals common in the area are the caribou, fox, musk ox, bear, hare, lemming, wolf, walrus, ringed seal, bearded seal, beluga whale and narwhale. Fish like trout are also found (Damas 1963:16). Mountain heath is the characteristic plant along with herbs, dwarf bushes and lichen. On the lower moist spots there is a covering of grasses, cyperacea and willow bushes. Berries are scarce though a few bilberries and black crow berries grow (Mathiassen 1928:12).

### Culture Contact

First mention of the Igluligmiut was made by Parry in 1822. The activities of ships in the area in the 19th century brought the Eskimos into periodic contact with Europeans.

Trading posts were established in the area in 1903, 1912 and 1921. The rifle was introduced about this time as well as European inspired changes in boat type (Damas 1963:21). Mathiassen visited the Iglulik in 1922 and 1923. The discussion of the Iglulik here will be with regard to the period from 1850 to 1920 and be based on the work of Mathiassen, Damas and Boas' recapitulation of the data collected by Parry and Hall. Mathiassen suggests that there had been a decline in population due to severe treatment at the hands of the whalers and contact with contagious diseases like syphilis.

#### Subsistence

Caribou, walrus and seal seem to have been the most important food sources. Whales, musk ox, bear, wolf, fox salmon and trout were eaten. Vegetable foods were scant in the severe climate and thus paid a small part in the food quest.

#### Settlement Pattern

Mathiassen (1928:30) recorded the following seasonal round for the Iglulik area as told to him by some aged informants. The spring was spent at Iglulik hunting utoq seal. The Eskimo lived in extended families during this part of the yearly cycle as utoq sealing was easiest done by 1 or 2 men together. Before the ice broke up, part of the blubber gotten from this sealing was carried to Qupers-ortuaq on the



south of Iglulik and cached. In the summer walrus and seal were hunted from Kayak and boat. In September the men split up with the older ones going to the island of Apatdleg west of Iglulik to continue walrus hunting while the young ones began caribou hunting on the mainland at Richards Bay, Hooper Inlet and Hall's Lake. Caribou hunting stopped about the time the ice formed as the caribou's hair grew too long for the skins to be used. The skins that had been collected were taken to Apaldleg where they were made into clothing and other items. Around January first, the people returned to the two major winter settlements of Iglulik and Pingerqalik to hunt walrus from the ice edge and seals from breathing holes. These two settlements were basically bilaterally linked extended families. The presence of a relatively large group was useful as a large number of men was needed to hunt walrus and seal in these ways.

The Iglulik thus spent part of their time wandering in search of food and part of it in seasonal settlements that might be used year after year. Fixed semi-sedentary settlement pattern seems most appropriate for them.

#### THE TEN'A

This group lived along the 64th parallel a few degrees this side of the Arctic Circle along the Yukon River in western Alaska. This study is with particular reference to three villages, Koyukuk, Nulato and Kaltag.

### Environment

For most of the year, October through May, the Yukon River is frozen. The Ten'a travel over it by dog sled. Winter temperatures often drop to -50<sup>o</sup> or -60<sup>o</sup> F. while the thermometer in summer rises to the 80<sup>o</sup>'s. Annual mean snowfall recorded for Nulato in the early 20th century was 95.4 inches, and the mean temperature was 21.7<sup>o</sup> F. The total annual precipitation was 17 inches (U.S. Weather Bureau).

Beyond the Yukon River stretches the tundra, swampy and seldom traveled in summer. Beyond the tundra are the Kaiyuh hills in which the Ten'a hunt and trap in winter. Plants found in the vicinity include blueberry, cranberry, currant, dock, raspberry, roseberry, salmonberry, strawberry and winter berry. Also trees like the alder, aspen, birch, cottonwood, spruce and willow grow.

Fish are fairly plentiful in the Yukon River and include blackfish, pike, lamprey eel, 3 kinds of salmon, 2 of trout and 5 of whitefish. Mammals present include bear, beaver, caribou, ermine, land otter, lynx, marten, mink, moose, muskrat, porcupine, rabbit, squirrel, wolf and wolvering. Also a large variety of birds are present (Sullivan 1942:x).

### Culture Contact

The Ten'a were studied by Sullivan for 7 months in 1936. They were fully hunters and gatherers but did have access to

trading posts. Guns had replaced the bow and arrow and metal pots and pans and stoves were used.

### Subsistence

Salmon was an important food source as a large number of this fish was caught in the summer and stored for winter. Ducks, moose, caribou and bear were hunted as well as migratory birds, squirrel, porcupine, wolvering, beaver, otter, marten and fox. Women collected berries, some of which were stored. They also collected dock and other plants.

### Settlement Pattern

The seasonal subsistence cycle, as it was followed in 1936, began with the king salmon runs in mid-June. The dog salmon runs followed in early July and the silver salmon followed them. Thus a good bit of the summer was spent by both men and women taking in the salmon catch. At the height of the runs, 300 to 400 fish might be taken each day. A single king salmon might be over 5 feet long and weigh over 50 pounds. Considering that the dogs alone, of which each family had from 7 to 11, were fed one good sized dried salmon a day during winter and 1/2 a salmon in summer, a large number of the fish must be caught, dried and stored. In addition, several times during the summer the women collected berries to store in underground caches for winter. This fishing was done from a summer fishing camp. A family had the right to

return to its fishing spot year after year and another would not move into it unless the spot had been abandoned. Usually more than one family used the camp although one of them was recognized as having the "rights" to it. From summer to summer there was, in fact, much shifting of camp members. Others in the camp might be relatives or friends. When the summer camp was close to the winter village, fish were transported back as they were collected. Otherwise they were cached at the summer site.

Toward summer's end men began to go duck hunting in groups of 4 or 5 and stay away from camp for 5 days or more. Ducks were smoked and thus preserved for a month or so. If duck hunting were good, all would return to the winter village for a one day duck feast between the dog and silver salmon runs (this would probably be in early August). Around the first of September the salmon runs were over and the Ten'a left their summer camps.

They returned to the three permanent winter villages along the river, which were Koyukuk, Nulato and Kaltag, and spent a week or so repairing their cabins. Then they set out for winter hunting camps in the hills where they set up fish traps, stalked moose and bear and drove caribou into fenses. By the end of October they began trapping smaller animals. While one could hunt the larger animals anywhere, each man had an area for setting his trap line for the smaller ones, and

he used the same area year after year. Small animals trapped in this way included squirrel, porcupine, wolverine, beaver, otter, marten and fox. At time of the winter solstice they returned to their villages for a 1 to 2 week winter festival. They then returned to winter camps for the period from January until April where they lived on fresh meat and dried salmon. The end of April brought melting snow, migratory birds and good hunting. Around the first of June the Ten'a returned to their villages by boat and a big feast was held. Afterwards food was scarce until the salmon runs began (Sullivan 1942:14).

The Ten'a had 3 regular places of habitat during the year. They were the summer fishing camps on the river, the winter hunting camps in the hills and the permanent villages on the river. The river villages of Nulato, Koyukuk and Kaltag contained approximately 250, 150 and 100 people respectively in 1936. The hunting and fishing camps were smaller composed of loosely related families. Multiple base sedentariness is the most appropriate pattern for these people as they lived in 3 fairly fixed locations during the year.

#### CONCLUSION

The three cultures of the tundra each represent a different adaptation. The Inglulik subsisted largely on sea mammals and remained sedentary during the harsh winters dispersing

in the summer. The Mistassini Cree remained sedentary during the summer fishing at Lake Mistassini and taking advantage of some outside sources of income. It is difficult to say whether they could have sustained such large sedentary summer groups under aboriginal conditions. The Ten'a represent an adaptation seen among several forest cultures. They depended on the rich summer salmon runs and upon winter hunting. Due to the richness of the salmon runs which allows them to remain sedentary in the summer and to preserve food for the sedentary period during the harsh winter, they are multiple base sedentary people. Their case will be discussed later in a discussion of the sedentary settlement pattern.

## CHAPTER XI      CONCLUSIONS

The anthropological literature contains much material that is useful in research pertaining to hunters and gatherers. One aim of this study was to gather some of this information and present it in a manner so as to show the wide range of lifestyles supported by foraging that are described in the literature.

It was concluded that in most environmental situations, a foraging group has several options as to how to satisfy its hunger needs, and it is often impossible to determine why they chose one method rather than another. Some trends in subsistence and settlement pattern are present. These trends appear to be based on many complicated factors. The conclusions found in this study are presented below.

Hunters and gatherers have existed into recent times in a variety of habitats and lived a variety of lifestyles.

Of the 33 cultures studied, 3 (9%) lived in the evergreen tropical forest, 5 (15%) in the semideciduous tropical forest, 4 (12%) in the tropical woodlands, 3 (9%) in the desert, 4 (12%) in the mid-latitude grasslands, 7 (22%) in the mid-latitude

forests, 4 (22%) in the boreal forest and 3 (9%) in the tundra. Thus hunters and gatherers can be found in all the environments traditionally inhabited by man on this earth. They can be studied on every continent except Europe and Antarctica. Twelve (36%) of the cultures studied were in North America, 5 (15%) in South America, 9 (28%) in Asia, 4 (12%) in Africa and 3 (9%) in Australia.

Their subsistence and mobility patterns also exhibit variety. In terms of settlement pattern, 6 (18%) of the cultures were restricted nomadic, 4 (12%) were highway nomadic, 7 (21%) were variable semi-sedentary, 9 (28%) were fixed semi-sedentary, 3 (9%) were multiple base sedentary and 4 (12%) were single base sedentary. Reducing the 6 settlement patterns to 3, we find that 30% were essentially nomadic, 49% semi-sedentary and 21% sedentary.

A study of subsistence techniques supported the now popular contention that gathering is often more crucial to forager survival than hunting. Seventeen (52%) of the groups studied depended primarily on gathering, 4 (12%) primarily on hunting 3 (9%) primarily on fishing and 9 (27%) on combinations of the above. Each culture was also recorded in terms of the ecozones it exploited. The ecozones looked for were sea, seashore and estuaries, streams and rivers, lakes and ponds, fresh water marshes, deserts, tundra, grasslands and forests.



Of the groups studied, 25 (76%) used 2 or 3 of these zones. Only 4 (12%) used one and only 4 (12%) used four or more. Thus 2 or 3 zones seemed to be the amount most easily handled by foragers. Of the group, 14 (42%) depended primarily on transportation by foot and 13 (39%) used boats extensively; only 1 relied on dogs, 2 on horses and 3 on a combination of boats and dogs or horses. Thus of the peoples studied, gathering was the favored occupation, foot and boat the favored mode of transportation and 2 or 3 the favored number of ecozones to exploit. However, to make these statements without a discussion of the intricacies involved in choosing one pattern over another is to grossly oversimplify the uses of movement among hunters and gatherers. As stated in the introduction to this study, no one pattern of movement can be assumed to represent hunters and gatherers and all patterns must be fully discussed.

Actual food scarcity was rarely recorded.

Some comments about popular notions concerning foragers seem apropos. A popular notion of late is that foragers were indeed rich in food resources with a great variety available to them. They had the luxury of choosing from this inventory the foods they preferred to eat and of rejecting those that were unappealing for cultural reasons. This study bears that out. The curious factor involved is this. It used to be a

commonly held notion among anthropologists that hunters and gatherers were constantly hungry and their every move was geared to looking for food. In general it has been thought that earlier ethnographies were responsible for this notion. This is not the case among the groups studied. Of the 33 groups studied, in only 2 (6%) did the ethnographers stress the scarcity of food. In 7 (21%) the issue was not mentioned, but in the other 24 (73%) food resources were considered adequate by the ethnographer. Thus the myth of food scarcity is not even supported by the earlier literature, and the reason for its great popularity is even more elusive. In the interest of precision, it should be pointed out that it was not uncommon for ethnographers to lament the poverty of the entire culture in comparison to European culture but rarely did they indicate a lack of food.

The band controversy is no longer much of an issue in anthropological circles and probably never should have been.

Much of the data collected for this study indicate a longstanding tendency toward fluid and flexible groups among hunters and gatherers. In groups where a typical unit size was determinable, 13 (62%) had 30 or fewer members, 6 (15%) had 30 to 100 members and 2 (10%) had over 100 members. In many cases a typical unit size was hard to determine because size fluctuated constantly and might change drastically with the seasons.

Quantitative precision is difficult to achieve in studying dying cultures.

Before going further, a word of caution needs to be added once more. Of the cultures studied, 20 (60%) exhibited extensive contact with cultures with advanced technologies, 11 (34%) exhibited some contact and only 2 (6%) showed no contact or an undeterminable amount of contact. Twenty (60%) showed extensive depopulation, 2 (6%) some depopulation, 6 (19%) undeterminable depopulation and only 5 (15%) showed a stable population with no depopulation reported. Thus among hunters and gatherers that have existed into the nineteenth and twentieth centuries, much culture change has taken place with extensive contact and depopulation increasing the difficulty of accurately depicting the aboriginal lifestyle.

Also it should be pointed out that it is difficult to quantify much of the information found on these groups. Accurate quantification of data would be of great help to spatial archaeologists and others interested in increasing the precision of our knowledge and analysis of foraging. The data above on depopulation can be used as an example of how difficult this is. Population data in these studies are not trustworthy for the most part. For the ethnographer to arrive at an accurate count of the population at the time of study is often difficult if the group is at all large and mobile. Since few of these ethnographers had a large staff of

assistants, it was impossible to get around to all the foragers to count them before their own movements turned that count into confusion. In many cases it was not possible to even find them all. Thus if it was difficult to get an accurate count of the living members of the group, the problems of determining the previous size of an obviously dwindling group was even more difficult. Such figures would have allowed us to measure depopulation more accurately and thus compare the amount of depopulation among groups more precisely. Instead the decision as to whether a group's depopulation was extensive or minimal was a subjective judgment based on the information given by the ethnographers. The statistics given for depopulation in this study then can not be taken too seriously. They indicate trends found in the data studied but are not hard and fast data. The same could be said for much of the material gathered. With this in mind, some concluding comments about the environmental types and settlement patterns can now be made.

#### SUMMARY OF TRENDS FOUND WITHIN EACH ENVIRONMENTAL TYPE

The most common adaptation in the evergreen tropical forest is that of restricted nomadism exploiting scattered plant resources.

The evergreen tropical forest had here been treated separately from the semideciduous tropical forest although

they are often grouped together by environmentalists. The reason they have been separated here is that the evergreen forest presents a unique and quite interesting environment in terms of hunter-gatherer mobility patterns. This particular forest is the only environment studied which contains only one season. It lacks seasonal change. In other tropical climates, seasonal change is signaled by a change in amount of precipitation. In temperate climates, it is signaled by changes in temperature and in amount of daylight. Environmental studies show that these signals of seasonal change then trigger breeding cycles in the flora and fauna. Seasonal variations in food resources for foraging humans then usually ensue and thus affect their mobility patterns. In the evergreen forest, however, temperature, level of precipitation, and length of daylight hours remain virtually the same all year round. While animals do go through breeding cycles and plants do flower and bear fruit, these occurrences are not triggered by a seasonal change, and thus they occur at different times throughout the year. Each variety of plant or animal follows its own cycle and each variety blooms or produces young at a time not in synchronization with other varieties. There are thus plants in bloom and fruits available most of the year. The evergreen forest contains an extraordinary number of species of flora and fauna; however, the number of individuals within each

species is relatively small. Thus the environment can not be said to be exceedingly rich in food resources, just varied.

The three groups studied in this environment were the Mbuti Pygmies of Africa and the Punam and Semang of Asia. All three depended primarily on plant resources, especially palm parts, tubers and fruits. Honey, monkey and pig were common foods and in most cases the small animals of the forest streams (frogs, mussels and snails) were utilized. These resources are ones that would be found scattered throughout the forest and, as the seasonless environment provided that some the plant resources were available at all times of the year, it is not surprising the settlement patterns followed by all three groups were ones that exhibited little or no seasonal change. The Punam and Mbuti were nomadic all year round taking advantage of the resources as they became available. The only group who did exhibit a specific change in movement at one point in the year was the Semang. They were placed in the fixed semi-sedentary category because they returned annually to privately owned durian groves during the durian harvest. Basically, however, they followed the same pattern as the Mbuti and the Punam. They wandered throughout the year taking advantage of harvests as they occurred. The only difference was that during this one particular harvest, they could be counted upon to be in a particular location.

Thus all three can really be characterized as following changeless mobility patterns throughout the year, living primarily on plant foods, especially palms and tubers, and on monkeys and pigs when they could manage to capture them. With the exception of the net hunting Mbuti, they lived in groups ranging in size from 16 to 33 with 25 being typical. The most typical adaptation to the evergreen tropical forest seems to be that of year round nomadism taking advantage of resources as they mature throughout the year.

In the semideciduous tropical forest the favored mobility pattern is semisedentation, with people remaining sedentary during the wet season when travel is difficult and dispersing during the dry season. Food resources continue to be the same as in the evergreen forest.

The semideciduous tropical forest has much in common with the evergreen one. The chief difference is that amount of precipitation varies throughout the year producing distinct rainy and dry seasons. The cultures studied here were the Tiwi of Australia, the Andamanese and Vedda of Asia, the Ache of South America and the Dorobo of Africa. In general the primary food resources of these cultures were the same as in the evergreen forest although larger animals like deer and antelope began to appear in the list of animals commonly hunted. Monkey and pig were still favorites, however, and yams, fruit, honey, palm parts and larvae are still of great

importance. The bow and arrow continue to be a common instrument of the kill.

Thus, although foods and methods of hunting are much the same as in the tropical forest, the settlement patterns are markedly different. Of the 5 groups, 3 are semi-sedentary, 2 are restricted nomads and 1 is a highway nomad. (It will be noted that 6 patterns are listed here. This is because the Andamanese exhibit 2 different patterns and both are being discussed in this study). From the cultures studied here, a semi-sedentary pattern seems to be the most common adaptation to the semideciduous tropical forest. All 3 of the cultures exhibiting it remain in settled camps during the wet season and disperse to wander during the dry one. The most common reason given for dispersal during the dry season was a desire to hunt in scattered areas. The reason for sedentation during the wet season was that travel was difficult.

Moreover, of the 3 remaining groups 2 have made special adaptations that easily explain their different settlement patterns. The Coastal Andamanese actually do not utilize the forest as much as they do the water and thus could more accurately be placed in a separate category for marine, rather than terrestrial environments. Since they travel by boat along the coast, the difficulty of overland travel during the wet season does not affect them. They also differ in they depend mainly on marine resources that are available



year round rather than on the terrestrial tropical forest fare. Their special highway nomadism adaptation occurs again with the Yahgan and will be discussed in more detail later. Suffice it to say here that they are a special case, and they do not exploit the tropical forest resources in the manner common to the other groups and thus would understandably follow a different pattern.

The Aché again present a special adaptation in that they purposely manipulate nature to increase the yield of one of their resources. Such manipulators are another special group. In the case of the Aché, however, the preparing of larvae beds in the decaying pindo palm tree and the subsequent visit to these beds to harvest the produce require a different settlement pattern, highwan nomadism. In other respects their adaptation to the environment is similar to that of the 4 semisedentary groups. This unique manipulation of their resources is sufficient to explain the difference in mobility.

The third remaining group is the Tiwi, restricted nomads. There is no obvious reason for this difference as there is in the above 2 cases, and it would simply be manipulating the data to try to devise one. Thus they are considered to represent a different mobility pattern possible in the semi-deciduous tropical forest but not found to be as popular as that of semi-sedentation.

The most common mobility pattern in this environment, then is semi-sedentation with the group remaining stationary during the wet season and dispersing to wander during the dry. It will be noted that I have not distinguished between the fixed and variable semi-sedentary patterns. That is because the distinction did not seem to have any useful explanation. The major difference between the evergreen and semi-deciduous tropical forests was the difference between an environment with no seasons and one with wet and dry seasons. The differences in common settlement pattern are reflected in this. Food resources remain largely the same.

The tropical savannah is transitional between the forest and the desert, and the settlement patterns there indicate this. Semi-sedentation is the most common but depends on amount and timing of rainfall. Groups tend to be sedentary during the wet season if flooding is common and travel is difficult because of heavy rains. They remain sedentary during the dry season if the season is so dry that drinking water is scarce.

The 4 savannah cultures studied were the Yaruro and Guato of South America, the Wik Munkan of Australia and the Hadza of Africa. Three of these, the Yaruro, Guato and Wik Munkan live in savannahs which flood during the rainy season and all three rely on aquatic resources, and on palm fruit and yams. Two of them travel principally by boat. The fourth

group lives in a thorn scrub and acacia savannah which is much drier and supports many game animals. They hunt these animals and eat roots, berries and fruits.

The Guato settlement pattern is poorly understood. We know they were semi-sedentary but we do not know during which season they restricted their movement. The other three cultures lived in climates with varying degrees of drought and flooding and this is reflected in their settlement patterns. The Yaruro lived in a wet climate where drinking water was easy to find in the dry season but which flooded in the wet season making travel difficult. They adapted to this situation by travelling by canoe so that they were not limited by floods. They were able to live as highway nomads. The Wik Muncan lived in a climate affected both by the difficulty of travel during a rainy season fraught with floods and the sudden appearance of high grass, and a dry season where drinking water became scarce. They adapted by remaining sedentary during the rainy season because movement was so difficult as well as during the height of the dry season because water was scarce. During the milder transitional phases between these two they dispersed. The Hadza lived in the driest climate where flooding was no problem during the rains. They dispersed during the rainy season and settled near drinking water during the dry one. Not only did the water

sources provide them with water, but they also attracted game. The varying degrees of rain and drought present in these 3 climates point out the transitional nature of savannah climates. In those environments where the rainy season is so wet that travel is difficult, foragers tend to remain settled during it. On the other hand in drier savannah climates the rainy season is not as wet and presents few problems. It is lack of water in the dry season that can cause difficulty and sedentation around reliable water holes may be advantageous. Semi-sedentation is the most common settlement pattern but the season of sedentation depends upon the amount and timing of the precipitation.

Desert inhabitants are semi-sedentary, and the season of sedentation depends on the availability of drinking water.

Deserts provide the extreme example of adaptation to drought. Whereas some of the savannah cultures geared their movements to travel difficulty during the rains, desert cultures' movements are determined by the amount of drinking water available. All three groups in the desert, the Kung of Africa and the Walbiri and Ngatatjara of Australia, depend on drought resistant plants as their staple food sources. The Kung depend on the Mongongo nut and the Australian groups on seeds and yams, all of which remain in or on the ground year round waiting for rain to trigger their growing activity.

While all three groups are semi-sedentary and their movements depend on the availability of water, the adaptation is handled differently in the Australian desert than in the Kalahari. The Australian desert is sufficiently dry that water holes are small and somewhat unreliable. Both Australian groups disperse in small units during the dry season moving from water hole to water hole. These locations are not rich enough to support a large human population. The Australians gather during and just after the rains in areas that have had one or preferably two good rainy seasons in a row. These areas are full of plant and animal life at that time.

The !Kung on the other hand enjoy the presence of 8 permanent water holes that are dependable throughout the dry season and are near mongongo groves. These areas are rich enough to support relatively large populations during the dry season. Thus it is during the wet season, when water is plentiful in scattered spots throughout the area, that the !Kung disperse. It appears that the !Kung desert is not as harsh as the Australian one, and indeed the !Kung live on the edge of a savannah in a climate that is just dry enough to qualify as desert.

The desert cultures mark the last of the cultures whose movements are geared to wet and dry seasons. The remainder of the environmental types to be discussed are temperate

ones in which seasons are determined by degree of sunlight and of temperatures, not by precipitation.

The two patterns found in the mid-latitude grasslands depend on teh two subsistence patterns found. Those exploiting agave/nuts/deer/rabbits were nomadic or sedentary as a long growing season provides plants most of the year and nut crops take up the slack during the winter. Those depending on the buffalo were sedentary during the winter and migratory during the summer.

Four cultures of the temperate grasslands were studied. This environment type is marked by the presence of a long growing season. Three of the four cultures studied in this environment depend primarily on the produce of that long growing season for their sustenance. All three (the Chiricahua, Coahuilteco, and Kiliwa) live in grasslands with mild winters where weather does not restrict movement. They all depend on agave and nuts as their primary food sources supplemented by many other plants and by the unting of deer and rabbit. Agave is available year round while nuts provide a dependable winter staple. The Chiricahua and Coahuilteco handle this be remaining nomadic year round and moving from plant harvest to plant harvests are available throughout it and the nut harvest supports them in the winter, the only season when large amounts of fresh plants are unavailable. Thus like in the evergreen

tropical forest, it is possible to wander year round taking advantage of available plant foods. The Kiliwa, the other grassland culture depending primarily on plant foods, deer and rabbit, are sedentary. Just how they are able to manage this is undeterminable unless their numbers are sufficiently small that they find it unnecessary to travel far for plant resources. They do make several trips annually to somewhat distant areas for fish and nuts.

The Arapaho, the other group of the grasslands studied represent in this study the many cultures living on the plains in the nineteenth century. Their settlement pattern is one of roving in search of the buffalo in the summer and settling to live on stored meat during the winter. This pattern appears again with the Kutenai who are also plains buffalo hunters but who have been included with the temperate forest cultures because their winter homeland is in the forest.

In the temperate grasslands, then, the cultures studied that depended on plant resources all depended on the agave, nuts, deer and rabbits and followed either a nomadic pattern or a sedentary one. Neither of these patterns indicates a need for seasonal change. The fourth culture, together with the Kutenai, represents the special plains adaptation of buffalo hunting.

Cultures of the mid-latitude forests exhibited a variety of settlement patterns.

The seven cultures of the mid-latitude forests which were included in this study represent a wide variety of settlement patterns. The Ona, the only restricted nomads among the seven, are a unique adaptation. They are the only culture of the study who subsist primarily by hunting ungulates and also wander throughout the year. Other hunters of large animals usually settle for part of the year. The Ona are an exception and provided us with the opportunity to study a culture which has not adapted in the way commonly found in the ethnographic literature.

The Yahgan and the Kutenai both represent special adaptations seen in other cultures in this study. The Yahgan, along with the coastal Audamanese and the Yaruro, have developed a special adaptation to the exploitation of aquatic resources available year round. They travel by boat and are able to wander year round on the waterways eating the foods of the rivers and oceans and coasts. They are highway nomads and should probably be grouped together as exploiters of marine environments rather than terrestrial ones as the difference in the terrestrial environments they live in has little effect on their lifestyles.

The Kutenai winter in the forest but migrate to the grasslands to acquire their main food resources and could easily



have been placed with the grassland cultures. Indeed their adaptation is like that of the Araphaho. They depend on the buffalo hunt in the grasslands for food and follow the same semi-sedentary settlement pattern followed by the Arapaho.

Of the remaining four cultures, one exhibits fixed semi-sedentation, two multiple base sedentation and one single base sedentation. Three of them, the Owens Valley Paiute, Yokuts and Hupa, lived in river valleys exploiting the river resources and the seeds, nuts, rabbits and deer of the hillsides. The fourth, the Nootka, lived on an island exploiting the coasts and the waterways. The Yokuts, Hupa and Nootka all fished for salmon.

The Owens Valley Paiute, the Hupa and the Nootka, all either single base or multiple base sedentary groups, exhibit an adaptation to steep valleys and rich resources that allow for such lack of movement in the settlement pattern. This adaptation will be discussed more thoroughly later. The foothill Yokuts are more mobile because they move from seed harvest to seed harvest in the summer although the sites of these harvests are within a 20 mile area and are habitual. They have been placed in the fixed semi-sedentary pattern but their movements are sufficiently restricted that they could almost be put in the multiple base sedentary pattern. They exploit resources similar to the Hupa, but they are not able to do so in quite such a sedentary fashion.

Thus the forest provides a variety of settlement patterns which are understandable in terms of the variety of subsistence techniques available to temperate forest dwellers.

The cultures of the boreal forest and tundra remain settled in the winter and are sometimes migratory in the summer. Winters are spent hunting from a permanent base and summers fishing.

The Boreal forests and the tundra will be discussed together here as many of the cultures found in them exploit both. All seven cultures, excepting the Iglulik, spend their summers fishing and their winters hunting. Plants, which grow in less profusion in these harsh climates, are less important in their diet. The Iglulik represent an adaptation not uncommon among Eskimos but not found in any of the other boreal forest and tundra cultures studied for this research. They subsist primarily on sea mammals like the seal and walrus and hunt them in a variety of methods throughout the year.

The Mistassini Cree are unique in that they are the only group of the seven who are more mobile in the winter than in the summer. In the summer they live near trading posts fishing in the lakes. In the winter they migrate to traditional hunting grounds to hunt and move camp 4 or 5 times in the course of the winter.

In general, however, the cultures of the boreal forest and the tundra seem to spend their summers fishing and their

winters hunting. They are sedentary in the winter. Degree of movement in the summer varies. The Ket and the Yukaghir both spend their summers fishing up and down the major rivers in their areas and thus follow a migratory summer pattern. The remaining three cultures depend on rich salmon runs and spend their summers settled in one area taking advantage of the migratory salmon who swim past their camps. They preserve much of their catch for the winter. The Ainu and Gilyak are able to do this from their winter location and are single base sedentary people. The Ten'a migrate annually between a single winter hunting spot and a single summer fishing spot and are thus multiple base sedentary people. Thus most of the peoples in the boreal forest and the tundra spend the harsh winters in one spot hunting. They spend their summers fishing and may or may not be sedentary during this time.

#### SUMMARY OF TRENDS FOUND WITHIN EACH SETTLEMENT PATTERN

Restricted nomads live on scattered plant resources available year round on or in the ground.

When the thirty-three cultures of this study are grouped together by settlement pattern, rather than environmental type, other interesting trends appear. Six of the 35 cultures follow the restricted nomad pattern. They are the Mbuit, Punam, Tiwi, Chiricahua, Coahuilteco and Ona. All except the Ona depend on scattered plants as their main food source. The Ona depend

on scattered animals (the guanaco). The three tropical forest groups live and travel in groups of from 20 to 40. Such information for the Chiracahua and Coahuilteco was not available. The staple meat eaters, the Ona, live and travel in much smaller groups, usually in nuclear families staying at the site of a kill for the 5 or 6 days it takes to consume the animal.

Highway nomads lived on scattered aquatic resources available year round and traveled by boat.

Among the 4 groups of highway nomads, 3 (the Coastal Andamanese, Yaruro and Yahgan) all depend on nonmigratory aquatic resources and travel by canoe year round in pursuit of them. These three represent an interesting adaptation to an essentially marine environment where a) most travel is by boat rather than foot and b) food resources are available year round through they are scattered. The fourth culture of highway nomads, the Aché, represent an adaptation unique among all the groups studied. They cultivate larvae in the trunks of decaying pindo palm trees. To do so they visit each palm twice a year, once to prepare it and later to harvest the larvae. This is a highway nomadic pattern, but one that is unique in this study.

All nomads live in the milder climates (none in the desert, boreal forest, or tundra). They eat scattered resources

Available year round in their natural state and thus requiring no preservation and storage.

A few comments need to be made about nomadic hunters and gatherers in general. This includes both the 6 cultures of the restricted pattern and the 4 of the highway pattern. The 10 groups display some variety. 20% live in the evergreen tropical forest, 30% in the semideciduous tropical forest, 10% in the tropical woodlands, 20% in the mid-latitude grasslands, 20% in the mid-latitude forests and none in the deserts, boreal forests or tundra. Of the 7 whose typical unit size was determinable, the size for 3 of them was 30 and below and for 4 it was 30 or above. Six of the 10 groups were gatherers primarily, 2 were hunting groups primarily and 3 were combinations. In none of the ethnographies of these 10 was food scarcity stressed. Food was indicated to be adequate in 8 cases and the subject was not mentioned in the other two. 70% of them exploited 2 ecozones. None practiced food preservation, 50% traveled by foot, 40% by boat and 10% by horse.

All 10 live in climates mild enough to allow year round movement. All eat scattered resources that are available year round in their natural surroundings. Scattered resources here refer to ones that are thinly spread over a large area and to exploit them the group must travel throughout the area. The fact that they are available year round in their

natural state means that no preservation is required to survive a seasonal scarcity. Preservation is usually associated with storage which then requires one to remain near these stores of food. While these cultures may experience lean seasons, food is always available in its natural state, be that on the ground or in the water, and they travel to that food.

Semi-sedentation occurs where there are seasons. Movement in the tropical climates is geared to rainfall and in the temperate climates to temperature. In the wetter tropics, sedentation occurs during the rainy season. In the drier tropics it occurs during the dry season. In temperate climates it occurs during the winter.

The semi-sedentary settlement pattern is the most common, occurring in 49% of the cases studied. The distinction between fixed and variable will not be discussed here as it did not appear to be significant. Semi-sedentation in general, however, occurred in every one of the environmental types. One lived in the evergreen tropical forest, 3 in the semideciduous tropical forest, 3 in the tropical woodlands, 3 in the desert, 2 in the mid-latitude grasslands, 1 in the mid-latitude forests, 2 in the boreal forest and 2 in the tundra.

In the evergreen tropical forest only one culture was semi-sedentary and (compared to the remaining 17 semi-sedentary

groups) that culture, the Semang, was much more nomadic. So much so that it could be listed in the restricted nomad category rather than fixed semi-sedentary. Their movements are like those of the Mbuti and the Punam of the restricted nomadic category with the single exception that they habitually return to the same durian grove for the annual harvest. This is not an extended period of sedentation and thus they are by far the most mobile of the semisedentary groups. There are no examples from the evergreen forest of a semi-sedentary group that remains settled for an extended period of time. The semi-sedentary pattern is geared to the necessity of exploiting ones resources differently according to season and it makes sense that the evergreen forest, which has no seasons, would have no true examples of this.

Among the remaining 17 groups, the change from migratory to settled activity is geared to the seasons. In the tropics and the desert, it is geared to the amount of precipitation and the wet and dry seasons. In the temperate zones it is geared to temperature change with the winter season usually being the sedentary one.

In the semideciduous tropical forest the three cultures (Dorobo, Vedda and forest Andamanese) remain settled in the wet season and disperse to wander during the dry one. All depend primarily on plants and terrestrial animals. The reason generally given for this pattern was not that food

resources required it but simply that travel was too difficult during the wet season. In the tropical woodlands, the data on the Guato is too vague to be helpful. The other two groups, the Hadza and the Wik Muncan, remain settled during the driest time of the year because of lack of drinking water. The Wik Muncan also remain settled during the wettest times of the year because of the difficulty of travel. Foods depended upon vary and included plants, animals, and fish. The three desert groups also gear their mobility to the presence of drinking water. The Australian ones, the Ngatatjara and the Walbiri, disperse during the dry season because water is so scarce they must scatter to find it. The !Kung on the other hand have dependable water holes that they settle near during the dry season. Drought resistant vegetable foods are the staples for all three and can be found on the ground year round so that movement is geared toward presence of water more than presence of food. Thus in the tropics, the presence or absence of water determines the settlement pattern. In the semideciduous forest, too much water during the rainy season makes travel difficult and sedentation desirable. In the woodlands and desert, lack of water during the dry season makes travel dependent on water hole locations.

In the mid-latitude grasslands the only examples of semi-sedentary groups in this study are the Arapaho and the



Kutenai, both of whom depend primarily on the buffalo. Like all the other temperate climate semi-sedentary groups, their settled period is during the winter. The Yokuts of the mid-latitude forest and the Ket and Yukaghir of the boreal forest are all sedentary in the winter. The Ket and the Yukaghir have a similar pattern as they hunt from a permanent base in the winter and move up and down the water ways fishing in the summer. The remaining two groups of the tundra, the Cree and the Iglulik follow different patterns. The Cree moved several times during the winter and in fact are the only temperate group whose movements are more nomadic in the winter than the summer, but their summer sedentation depends economically to some extent on the fur trade and jobs with outsiders. With the single exception of the Cree, all semi-sedentary groups in the temperate zones, then, are sedentary in the winter and disperse in the summer.

Food storage was practiced by 10 (59%) of the 17 semi-sedentary groups. The 7 (41%) who did not store food included all the desert cultures (understandable in that the desert plant life is uniquely adapted to withstand drought and some species remain on the ground and available throughout the year), the one evergreen tropical forest culture (an environment again where food is stored naturally, this time due to the seasonlessness of the environment and the rotational ripening of plants) one from the semideciduous forest, one from the tropical woodlands and one from the tundra. Thus 6 of these 7 were in the tropics and were mainly plant eaters.

Of the 10 groups who did store food to maintain their semi-sedentary lifestyle, 4 were in the tropics (3 stored vegetables, 1 meat and 1 honey). The remaining 6 lived in the temperate zone and 5 of these stored animal foods.

The following information on the semi-sedentary cultures underscores their variety. Typical unit size were determinable for only 8 but for 6 of these it was 30 people or less. Three of the groups were primarily hunters, six gatherers and six a combination. Eleven exploited two or three ecozones while only three used just one and only three others used four or more. Six traveled primarily by foot and six by boat.

Given their variety, however, certain trends emerged. It may not have been as much the need for food as the need for water and for comfort that caused groups to chose this mobility pattern. In areas where water was seasonally scarce (tropical woodlands and desert) movement was geared toward acquiring it. While a culture can pick and chose its food sources it cannot be so frivolous when it comes to water. Access to water is of prime importance and only after it has been found does one look around to chose foods. In environments containing ample water year round, other climatic factors become important. In the tropical semi-deciduous forest it was the difficulty of transportation during the wet season and in the temperate climates it was the harshness of the winters. Whether survival needs actually required sedentation during the harsh temperate zone winters and the rainy tropical season is difficult to

determine. Possibly sedentation was simply preferred as being easier. At any rate it often required some effort at preservation and storage.

Year round sedentation occurs most often in steep river valleys containing a rich food resource that is available in large quantities in one location and can be preserved.

Of the groups remaining, three (the Owens Valley Paiute, Nootka, and Tem'a) are multiple base sedentary and have only two or three places of residence throughout the year. All of these are habitual. These groups are so close to being fully sedentary that they will be considered here with the fully sedentary ones, the four (Kiliwa, Hupa Ainu and Gilyak) who are in the single base sedentary category. Several very valuable points can be made about the conditions most common among stationary foragers.

Six of the seven groups (excluding the Kiliwa) depend on concentrated resources that allow them to remain stationary. For five of the six this resource is salmon, a migratory fish which swims up the rivers to spawn in such large numbers that the fisherman can remain in one location and allow sufficient fish to come to him to provide him with food for much of the year. It is not necessary for him to go in search of this food resource. It is not scattered like many plant staples discussed earlier. The other group (Owens Valley Paiute) depends on plant resources but by "manipulating"

them, in this case irrigating wild seeds, they are able to harvest such large quantities as to support themselves for much of the year without needing to move. Thus to remain sedentary, hunters and gatherers in a majority of the cases studied depend primarily on foods that can be found in large quantities in one location. No cases of such a group living primarily off animal foods were found among the groups studied. Conceivably it would be possible for a group to exploit some migratory animal whose annual path of migration takes it through a mountain pass in predictably large numbers. Most of the groups studied depended on salmon, a migratory fish traveling in large numbers, but the Paiute show that, given the right circumstances, the dependency can be upon a plant if it can be manipulated to provide sufficient yield. Obviously in most cases where plant manipulation is the key to sedentation, that manipulation is the practice of agriculture. For the group (the Kiliwa) who is an exception to this, no explanation in terms of staple foods can be given. They exploit scattered plant resources yet are able to remain sedentary while doing so.

Another trend was noticed among sedentary foragers. Five of the seven (excluding the Kiliwa and the Ten'a) live in steep river valleys or along steep ocean coasts. Such an environmental situation provided them with an unusually large number of econiches within a small area.

The Ainu, for example, had easy access to 5 ecozones, the river, the wooded river banks, the woodless fields on the river terraces, the hillsides and the mountains. The Owens Valley Paiute also had 5 ecozones to exploit, the river, the valley floor, the foothills, the Sierra Nevada mountains on one side and the Inyo and White Mountains on the other. All these resources were within 20 mi. of the permanent village. The Hupa and Gilya lived in similar situations. The Nootka did not live in a river valley but lived on a steep ocean coast which provided them with a like environment.

The key factor involved in making it possible for a hunting and gathering group to live a sedentary life if it chooses is its ability to find enough food for the entire year close at hand. From a study of the seven sedentary groups included here, several factors emerge. Sedentation works well in an environment in which a) large quantities of a staple resource are available at the village site, be that because the resource is migratory and annually migrates past the village site or because the village inhabitants manipulate that resource in some fashion so as to provide sufficient yield, b) the inhabitants are able to preserve that resource for later consumption, and c) the inhabitants live in an environment which provides them with great variety of resources within a short distance from their village, like a steep river valley where a number of ecozones within a small area

provide a variety of additional food resources. The more ecozones a group has at hand to exploit, if they harbor different kinds of plants and animals as a steep river valley does, the more variety in foods available. Though the quantity of each food may not be great, the variety provides insurance in case some of them fail. This in combination with a major dependable staple available in large quantities at one location, creates the potential for sedentary living among hunters and gatherers.

Thus it can be seen from this study that hunters and gatherers follow a variety of mobility patterns. The ethnographic literature is full of data on hunters and gatherers and provides us with information from groups in almost every possible environment on earth. In the ongoing study of foragers, extinct and extant, a look back at the available literature can be quite helpful. Certain trends appear when a large number of foragers are studied in terms of their environment, subsistence techniques and settlement patterns, and the purpose of this study has been to isolate some of these trends.

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## APPENDIX A

## Society Name

1. Latitude/Longitude
2. Cluster Province
3. Ethnographic Present
4. Field Date
5. Culture Contact
  
6. Depopulation

## Geography

7. Climate  
(include annual levels of precipitation for 15 yr.  
period)

## Terrain

## Settlement Pattern

8. Type(Restricted Nomadism, Highway Nomadism, Variable Semi-Sedentariness, Fixed Semi-Sedentariness, Multiple Base Sedentariness, Single Base Sedentariness)

- |   |                        |
|---|------------------------|
| 9. Smallest Unit Size                         | Time of Year it occurs |
| 10. Largest Unit Size                         | Time of Year it occurs |
| 11. Typical Unit Size                         | Time of Year it occurs |
| 12. General Explanation of Settlement Pattern |                        |

## Subsistence

13. Does the authro state food is scarce?
14. Is the culture experienceing inflation and a surplus of goods?
15. Is food preservation practiced? Explain.
16. Explain seasonal round. List major foods and their distribution in diet and if collected by male or female.