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RESIDENCE, ECONOMY, AND HABITAT IN THE CAROLINE ISLANDS

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A Study in Ecologic Adaptation

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by

William Henry Alkire

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Thesis Committee:

Dr. L. Mason, Chairman

Dr. A. Spoehr

Dr. N. Bowers

TABLE OF CONTENTS

LIST OF MAPS		111
CHAPTER I.	INTRODUCTION	1
CHAPTER II.	AREA DESCRIPTION	8
	Palau	12
	Yap	15
	Ulithi	19
	Ifaluk	23
	Truk	28
	Losap	31
	Ponape	34
	Mokil	38
CHAPTER III.	CLASSIFICATION	42
	Economy and Habitat	43
	Residence and Habitat	49
	Economy and Residence	53
	Summary	57
CHAPTER IV.	CORRELATION	58
	Matrilocality	58
	Patrilocality	64
	Avunculocality	70
	Summary	72
CHAPTER V.	CONCLUSIONS	75
APPENDIX		85
BIBLIOGRAPHY		89

LIST OF MAPS

KEY TO MAPS	93
PALAU	94
YAP	95
ULITHI	96
IFALUK	97
TRUK	98
LOSAP	99
PONAPE	100
MOKIL	101

CHAPTER I
INTRODUCTION

As one looks back over the history of cultural anthropology, which began little more than one hundred years ago, one can find instances of the whole of the profession supporting some particular theory of human behavior, attempting elaborations and refinements only to have the entire basis of the hypothesis shattered by a critical observer. This process is not unique to anthropology, as similar reviews of other sciences will show. In anthropology one such example may be found in the nineteenth century "cultural evolutionary" stage in the elaboration of ethnological theory. Most present day anthropologists regard this earlier hypothesis to explain cultural change as unsubstantiated by the facts which have since been made available by more objective and extensive field work. Many feel, however, that anthropologists, in this rejection, have committed an equally grievous error by moving to an opposite extreme in their theoretical approach and attributing most cultural change to some form of diffusion. Presently, this is still a question for debate.

It is not the purpose of this thesis to amass conclusive evidence either in favor of or against these comprehensive theoretical views. Instead this thesis will attempt to apply aspects of both theories in a more moderately oriented methodological approach.

An attempt will be made to determine whether or not

a relationship exists between (1) the habitat of a group of islands and atolls in Micronesia and (2) the economic basis of their societies, and (3) the residence patterns of these societies.

When man first arrived at the many and varied islands of the Pacific he found a natural habitat in which plant and animal forms had ecologically adjusted within the total environment. The necessity then arose as to how he was to fit his activity into this web of life. His survival depended upon what indigenous resources would be available to him and what introductions were possible to supplement these resources. For continued existence in the new environment, the immigrants had either to adjust their exploitative patterns to the existing resources or to alter the habitat to fit these patterns. In most instances some combination of these alternatives probably prevailed. This does not mean that adjustment is geographically or economically determined. Julian Steward (1955: 30,34) has proposed that creative processes, as well as limitive and permissive factors, are involved in the adaptation of a culture to an environment. "Culture, rather than genetic potential for adaptation, accommodation, and survival, explains the nature of human societies" (Steward 1955: 32). Man's adjustment to any particular environment, according to Steward, is determined not alone by that environment (as geographical determinists have said) but by his cultural possessions which are at least equally basic in the adjustment

he must make. Thus, to quote Steward further, "the economy may owe as much to the social and ritual pattern as does the character of society to the economy. The possession of particular methods of hunting or cultivation, of certain cultivated plants or domestic animals, in no wise defines the pattern of society" (1955:36). However, in Steward's concept of the "cultural core" of a society, it is recognized that those features of culture which are most closely related to subsistence activities and economic arrangements are the first to be altered in any society's adjustment to a particular environment.

Laura Thompson (1949) hypothesized that in the first human settlement of the Lau Islands of Fiji a system of economic exploitation developed which involved introduction of new plants and animals. This eventually resulted in an equilibrium developing between the people of Lau and their environment. In other words, man had ecologically accommodated his whole way of life to his habitat through his economy. Although neither the geography nor the economy determines adjustment or development of the total culture to a new locality, the economy is importantly affected by the environment before most other aspects of the culture.

The relationship of this economy to the social structure entails some major propositions which should be discussed. In any culture where the economy is primarily one of subsistence, i.e., direct production and consumption of food

resources, the social units involved in economic organization are of fundamental importance. Every society segregates most tasks as either "men's work" or "women's work." In order to have the full complement of production necessary to survival the simplest social unit of organization will then be a man and a woman working together. An important foundation of marriage is contained in this economic relationship. At marriage it is always necessary for at least one of the individuals involved to change his place of residence either temporarily or permanently. Whether such change of residence be from one sector to another of the same village or from one village to another, one or possibly both of the newly married couple will be moving to a new surrounding. A change of residence usually requires some modification of an individual's participation in community life.

George P. Murdock writes, "The one aspect of social structure that is peculiarly vulnerable to external influences is the rule of residence" (1949:201). Furthermore, "It is in respect to residence that changes in economy, technology, property, government, or religion first alter the structural relationships of related individuals to one another, giving an impetus to subsequent modifications in forms of the family, in consanguineal and compromise kin groups, and in kinship terminology" (1949:202). This last idea Murdock recognizes as originating with Robert H. Lowie as early as 1920, when the latter stated that changes

could occur in a society by way of a simple alteration in the residence patterns (1920:70-76). By way of illustrating the effects that alternative economic pursuits may have upon residence rules, it has been observed that cultures which are primarily dependent upon hunting (almost universally a man's occupation) tend to be patrilocal in residence pattern (Steward 1955:137). In this manner the man remains in familiar hunting grounds while his wife comes to live with him. On the other hand, in an agricultural society it is often the woman who tills the garden land. In this case it is possible that matrilocality will prevail, enabling the woman, when joined by her husband, to continue exploitation of familiar land. That factors other than subsistence economic may be important in agricultural societies is apparent from the fact that matrilocality does not always prevail.

In the present study it is hypothesized that patterns of residence may be importantly related to features of the exploitative system in a subsistence economy. This relationship in turn may be affected by the creative processes involved in man's attempted adjustment to his ecologic setting.

If one wishes to test or further develop the hypotheses presented above, it will be advisable to choose for observation (since experimental procedures are obviously ruled out in this instance) an area in which the conditions of habitat, economy, and residence may be defined as precisely

as possible. If outside influences are held to a minimum, as in small populations which are self-sufficient, the study will prove to be more valid. These requirements are well met among an insular people where communities are well defined by geographical limits of island shorelines.

In the Caroline Islands of Micronesia two distinct types of habitat occur--high volcanic islands and low coral atolls. Palau, Yap, Truk, and Ponape are examples of the former and Ulithi, Ifaluk, Losap, and Mokol represent the latter. (This selection is based on the fact that all have been sufficiently studied and reported on by anthropologists to provide a more or less suitable basis for a comparative study of the topic proposed here.) The characteristics of any volcanic island vary considerably from those of an atoll. In both settings man has based his subsistence on a combination of horticulture and fishing. The adjustment man has made to these divergent settings by his development of contrasting exploitative systems should in part be reflected in the variation of residence patterns between the respective populations.

Preliminary examination of the data reveals that among these selected islands there is variation in economic orientation and emphasis. Residence patterns, too, show some variation from one island setting to another. As stated previously, it is recognized that factors other than economic (e.g., political, religious, social) will have some effect on residence, especially in societies dependent on agriculture.

The objective in this study, however, will be to determine the extent to which the varied patterns of subsistence economy among the named Caroline Island societies appear to be related to patterns of residence.

If the relationship proposed between habitat, economy, and residence can be demonstrated, a step will have been taken to join Steward's and Thompson's ideas about the significance of habitat for the development of economic culture with Murdock's and Lowie's hypotheses concerning the importance of residence patterns for the development of other aspects of social structure.

In areas where no apparent correlations between these factors of residence, economy, and habitat appear alternative hypotheses will be suggested.

CHAPTER II

AREA DESCRIPTION

Micronesia is an area in which are found a large number of small and widely scattered island groups--the Carolines, Marianas, Marshalls, and Gilberts--nearly all lying just north of the equator to the latitude of 20° and between the longitudes 130° and 180° East. Geologically, it contains two distinctly different types of island formations--the high volcanic island and the low coral atoll.

The high volcanic islands were formed, as the name implies, through volcanic activity and often a general uplifting of the ocean floor. The result was usually a mountainous island reaching several hundred feet above sea level, possessing a later developed foreplain, which varied in width depending upon how long the island had been exposed to erosive forces. The fertility of volcanic soils on the high island often allows an abundance of resources.

The coral atolls, on the other hand, are generally assumed to have been formed by the growth of a coral fringe around a submerging volcanic high island. This mountain core submerged until it lay below sea level, but the coral, maintaining near sea level elevation, grew continuously upward. The erosive action of the sea and wind then resulted in the formation of small low islets along this coral reef. The atoll island is usually smaller in area than a high island

and rarely rises more than 20 feet above sea level. The soils are decidedly less fertile than volcanic soils, are more porous, and consequently are difficult to cultivate. The atoll lagoon, on the other hand, provides easy access to an abundance of marine resources, whereas high islanders may, in the exploitation of marine products, be forced to rely on the more dangerous open sea.

The process by which the islands of Micronesia became populated is an historical and anthropological problem. It is most probable that the first migrants to enter the area did so from the west. These people are believed to have been of Indonesian physical type and to have arrived around 2000 B.C. (Spoehr 1952:462). In addition, they were probably all of a similar cultural background, entering Micronesia with a developed art of seamanship and such economic possessions, techniques, and goods as enabled them to survive, perhaps not at first on the less productive coral atolls but on the richer volcanic islands. The Micronesian population, as represented by the present day peoples, possesses a further history of adaptation to the particular environment of each group--either a high volcanic island or a low coral atoll. Each group in its adjustment should, then, reflect to some degree the physical peculiarities of its local environment.

In more recent times, early in the sixteenth century, Micronesians came into contact with the western world

when Spanish explorers discovered several island groups within the area. Spain was the first alien power to take possession of the Carolines, a part of Micronesia; however, she was far from being the last, for following the Spanish American War, she sold the Carolines to Germany. Germany, in turn, lost control of the area to Japan during World War I and the newly formed League of Nations approved Japan as administrator of the former German possessions under the League's mandate system. At the conclusion of World War II the United Nations placed the island area under the United States as administering authority of the new Trust Territory of the Pacific Islands. At the present time the islands remain in this status. The Carolinians, like other Micronesians, have experienced multiple and varied contacts with foreign powers of both eastern and western hemispheres.

The effects of such contacts have naturally brought Micronesians into closer touch with other cultural areas and with a world market. Nevertheless, the resources of Micronesia are definitely limited, even with aid from more technologically advanced peoples. Therefore, most of the islanders still feature a subsistence economy and depend for survival upon production for local consumption.

The Caroline Islands are one of four principal groups of islands in Micronesia. They extend nearly the total length of Micronesia from 135° to 163° East longitude. However, they are confined between the equator and 10° North

latitude. Unlike other island chains of Micronesia, the Carolines exhibit examples of both types of island formation-- high volcanic islands and low coral atolls. Palau, Yap, Truk, and Ponape have been chosen to be included within this study as representative of the high islands. Ulithi, Ifaluk, Losap, and Mokil represent the low atolls. These eight groups are distributed fairly evenly throughout the island chain and sufficient anthropological literature exists on each to make a comparative study possible. Where gaps occur in the published data it was possible to obtain information either from natives of the area who are resident students in Honolulu, or from anthropologists and other scientists who have conducted research in these islands.

The Caroline Island populations offer an excellent opportunity for an ecological study of this type because of their common cultural background, their generally similar and yet varied environment, and their relative isolation from each other.

A description of a representative island in each of these eight groups will be presented in the remainder of this chapter, and will include the available information on the three general areas of physical habitat, subsistence economy, and rules of residence. Under habitat special consideration will be given to location, topography, and climate. Within the subsistence economy attention will be centered on plant and marine resources, sexual division of labor, and work

organization. And when viewing residence patterns consideration will also be given to social groups and land tenure.

Palau

Habitat

The Palau Islands are the westernmost extension of the Caroline chain. They are 800 miles southwest of Guam and 500 miles east of the Philippines. The group, which is a little more than 80 miles long, trends in a northeast to southwest direction. Within the group, the island of Babeldaob has had the greatest amount of anthropological information published on it and will be the specific area considered within the larger Palau group. Babeldaob, which is twenty miles long with a total area of 153 square miles, has a hilly interior that reaches 700 feet in elevation in two of its peaks (Barnett 1949:11). It is a volcanic island with rich soil.

High islands usually have more climatic variation than do unobtrusive low coral islets. The climate of Palau varies considerably throughout its large area. Overall, however, the temperature reflects the latitude in which the islands are found. Ranging in the 80's, the temperature varies annually a few degrees less than the diurnal variation of some ten degrees. From December to May, Palau experiences northeast tradewinds, which result not only in a cooling breeze but also in clear skies and little rain. July to

October, on the other hand, have monsoon rains originating in the southwest which supply most of the over 100 inches of rain which fall annually.

Economy

The basic foods of Palau are taro and fish. Typifying a volcanic island, however, there is a plentiful supply of other foods, such as coconuts, bananas, breadfruit, papayas, sweet potatoes, and manioc. The latter two are more recent introductions.

Taro is a general term often applied to three different root crops raised on Pacific islands. True taro, or Colocasia esculenta, requires swampy conditions for growth, as does to some extent Cyrtosperma chamissonis, a false-taro. Alocasia macrorrhiza, often called elephant-ear taro, can be grown under dry land conditions. In Palau the cultivation of Colocasia and Cyrtosperma is carried on in swamp land which has been cultivated continuously for many years or on land which has been recently put under cultivation and is used for two or three years before being abandoned. Alocasia is cultivated in upland areas which are dependent upon rainfall for irrigation (Barnett 1949:4).

Cultivation of Colocasia and Cyrtosperma is left exclusively to women as is the preparation of food for everyday consumption. Only on special feast occasions do men engage in cooking these foods. On the other hand, dry land farming is carried on by both sexes. The men prepare

the soil, and the women plant and harvest the crops. In agriculture only a few plants are tended exclusively by men. These include bananas, mango, papayas, arrowroot, coconut, breadfruit, and betel palm. Of these principally tree crops, none is of major importance in the Palauan diet. "The Palauan man as a farmer therefore contributes very little to the basic food supply" (Barnett 1949:5).

Fishing, however, is a male occupation. Women view the lagoon much as men view the taro patch--an area in which they are not welcome. Men usually engage in fishing everyday. Two or more friends make up the usual fishing group.

Mutual assistance in work patterns usually originates in the obligations encountered by individuals of two families which are connected by marriage. Among these is the responsibility of a wife's brother to assist the husband at the latter's request.

Residence

Traditionally, Palauan residence was patrilocal, that is at marriage the woman would join her husband in residence with or near his family of origin. Today alternatives exist and newly married couples usually set up residence where the most profitable economic gains are apparent. As an example, if a wife's inheritance is larger than her husband's, matrilineal residence may result since in Palau actual residence on the land to be worked is important if an extended

claim to such land is to be exercised (Kaneshiro:personal communication). Although residence is patrilocal, inheritance is matrilineal. Useem noted that fathers were taking over some of the responsibilities of the family which in earlier times were accorded the mother's brother (1955:140).

Palauans, who number 3,665 on Babeldaob, are divided into two social classes, termed by Useem (1955:134) the elite and the lower class. Membership is determined by birth through one's mother. Although the actual location of households within a village is not determined by class affiliation, the quality of the residence is.

John Useem states, "There are five interlocking kinship systems which combine blood and social affiliations in varying ways. The fivefold units will here be referred to as the nuclear family, the extended nuclear family, the household, the clan, and the extended clan" (1955:139). Today the extended family, which played an important part in the past, is losing its significance and the nuclear family is becoming more important.

Yap

Habitat

Yap is made up of four main islands, enclosed within a reef, lying 325 miles northeast of Palau. The total land area of the group is between 80 and 90 square miles (Peabody Museum 1947:45). Yap, like Palau, is a volcanic group, with a hilly interior reaching elevations of 600 to 800 feet.

The southern islands of Yap have several small lakes and swamps. The interiors of the islands are covered with grass and scattered pandanus trees.

The northeast tradewinds affect Yap from the end of November through February. Typhoons occur during this season. The rest of the year is characterized by variable winds and the monsoon. The usual temperature is around 80 degrees and the humidity averages between 83 and 87 percent. Rainfall is heavy, totaling 130 inches per year. Although rain water is plentiful, most drinking water is taken from immature coconuts. An occasional well may be dug in the taro pits (Peabody Museum 1947:46).

Economy

The people of Yap have a subsistence economy based upon three foods: taro, fish, and coconuts (Peabody Museum 1947:127). Bananas, sweet potatoes, yams, tapioca, and on special occasions pigs and chickens round out the Yapese diet. Breadfruit is present but is not eaten in large quantities (Peabody Museum 1947:131; Useem 1946:26).

The dog, cat, pig, and chicken are kept as domestic animals. An abundance of large green lizards and a species of toad are found in the wild state; these, however, are not eaten.

Cultivation of Cyrtosperma and Colocasia is the responsibility of women. The actual work is done by women of certain age groups which are connected with the land; thus,

old women tend both old women's and old men's plots. Mutual assistance groups in gardening vary in membership and depend on agreements of the moment. If one or more women join to help a friend in cultivation this group may work all the plots briefly during the same day or successive plots more completely over a greater period of time.

Fishing is done by the men. In the past neighbors in a group of canoes engaged both in short trips and in expeditions of up to three months in duration. Today fishing is done on a smaller scale either with weirs or by individuals in shallow water (Peabody Museum 1947:131). Women limit their fishing to the gathering of shellfish in ankle deep water. They engage in this activity only occasionally and the catch is never large.

Residence

Marriage between persons of the same or nearby villages is preferred. Class membership restricts one to marriage within his own class or into one a step above or below his own. The couple then begins patrilocal residence and establishes its own household as part of a tabinauw group under the authority of the oldest male of this patrilineal group which is further defined below. In some cases matrilocal residence may be tolerated, e.g., when a man marries a girl from his mother's village (Peabody Museum 1947:83).

Yapese society is developed as an elaborate class

and caste system which is more complex than that of Palauans. The two castes, upper and lower, are sub-divided into five and four classes respectively. A Yapese village is usually made up of members of one of these classes and is therefore ranked with respect to other villages. The lower classes live on land that is less desirable in terms of both location and productability. All classes, however, live close to the shore and the island's interior is uninhabited.

Yapese distinguish two major kin groups. First is a formal matrilineal sib and second the tabinauw, which is made up of a group of patrilineally related men, together with their wives, their children, and their sisters. "The tabinauw includes, then, a group of nuclear families which are related in the patrilineal line and the out-marrying sisters of the husbands of these nuclear families" (Peabody Museum 1947:65). The core of the tabinauw resides on tabinauw land within one village and does not include the out-marrying sisters. Today it is through the tabinauw that inheritance of property and succession to positions of authority takes place.

The sib is a matrilineal, exogamous, and non-localized group which controls some land, but on the whole it is less important than the tabinauw (Peabody Museum 1947:67).

As was mentioned, most land in Yap is owned by the tabinauw. Each of these groups controls lands of several categories which are utilized for the production of different types of food. Cyrtosperma is grown in pits which range

from 10 to 200 feet square, the larger of which are cultivated by several individuals whose separate plots are marked off by low earthen walls. Fish are taken from what is called lineage land in the sea; theft of food from either garden land or lagoon area is equally punishable. Coconut trees are planted throughout the village and are representative of another method of ownership, whereby one individual may own the land on which the trees are located and another person may own the trees which are found on it.

Ulithi

Habitat

Ulithi is the first coral atoll to be described in this study. It is located at $10^{\circ} 05'$ North latitude and $139^{\circ} 43'$ East longitude, and is 85 miles east-northeast of Yap. The total land area of the several islands of the atoll is 1.8 square miles; the lagoon, which is $19\frac{1}{2}$ miles long and $9\frac{1}{2}$ miles wide, is 183 square miles in extent.

Falalop, the largest island in Ulithi, actually lies outside the atoll proper. Other smaller islands are located on the reef that encircles the lagoon; at low tide it is possible to walk between some of these. Falalop is approximately one mile long and has a high point some 20 feet above sea level. The ocean side is generally rocky while the lagoon shore is sandy. It is on the lagoon side that the villages are located. The islands of Falalop, Mogmog, and Mangejang have slightly swampy depressions in their

interiors (Lessa 1950:10).

Fresh water is a problem on coral atolls since most of the ground water is brackish. Mogmog Island has one well which is supplemented by rain-water collected from roof tops and trees. Most drinking water, however, is obtained from green coconuts.

The northeast tradewinds are prevalent in Ulithi from November to May and the southwest monsoon from July to September. Rainfall averages 120 inches per year, most of which falls in the summer. In general the days are cloudy, hot, and humid, with the temperature varying little from an average of 83 degrees.

Economy

Coconuts, in some form or another, are used in every Ulithian meal. They also provide drinking water, and the flower yields a sap or toddy which can be processed as an intoxicant. Colocasia, Cyrtosperma, and squash, a later introduction, are principal Ulithian foods (Lessa 1950:36-37). The first two are grown in the swampy depressions of Falalop, Mogmog, and Mangejang. These inland areas are regarded as sacred gardens. Breadfruit, also found on Ulithi, is highly valued but since the harvest season is short, it is less important as a staple food crop (Lessa 1950:37).

Several uncultivated plants are used by Ulithians; these include pandanus, mountain apple, and a parasitic vine prepared as a baby food. As in the other Caroline

Islands very few domesticated animals are found here, only the dog, cat, pig, and chicken. Pork is highly prized but consumption is limited to special occasions. Dogs were not eaten until recently.

A day's activity begins just after dawn and continues until early afternoon when a rest period is taken. Work is then resumed in the middle afternoon and terminated for the day at sundown. Women do all of the work connected with production of plant foods with the exception of gathering tree fruits. Men are primarily concerned with fishing but are also responsible for the tree crops and heavier types of work. Women collect shellfish and the catch from fish traps on the reef (Lessa 1950:45).

Work may be either cooperative or individual. In cooperative situations a man first calls upon his closest relatives. The order of choice runs: sons, brothers, father, father's brothers, mother's brothers, cousins, and close affinal relatives (Lessa 1950:44). Such assistance is later reciprocated in kind. The greatest amount of cooperative work takes place during fishing expeditions. All adult males participate in these by taking to their canoes and going off to the fishing grounds, which may keep them from home for several days. Leadership on these expeditions is usually assumed by those most skilled. Fishing on a smaller scale is done with hooks and lines by two men in a single canoe. Most fishing occurs within the

lagoon proper, though occasionally it may range farther out to the open sea. Individual labors include those of women who work alone in the small garden plots; gathering of coconuts by men is similarly carried out individually.

Residence

Residence on Ulithi is patrilocal. A man will either establish his home with his parents or near them. After this, though, he is obligated to perform some service for his wife's parents, and in some cases this may necessitate establishing an alternative residence near his wife's parental home (Lessa 1950:63). Since residence is patrilocal, the extended family is based upon the male-lineal relationship. Some exceptions occur, as on the island of Mogmog where out of 42 residential units, 10 consist solely of husband and wife, 8 are made up of members of the nuclear family, and only the remainder have secondary or tertiary relatives in residence (Lessa 1950:62).

Land ownership is complex. Theoretically, a chief has eminent domain over lands of his district. Four other landowning systems are recognized, which Lessa (1950:53-60) refers to as: 1) lineage fee simple, 2) intralineage usufruct tenure (on lands matrilineally inherited), 3) extralineage usufruct tenure (on lands patrilineally inherited), and 4) life usufruct tenure (on leased lands).

The sacred gardens which, as previously noted, are the swampy interiors devoted to Cyrtosperma cultivation are used

by the total population of an island. The land is divided into separate plots which are owned by lineages but are worked by individual families of these lineages.

Only five of the islands of the atoll are permanently inhabited; the most prominent of these are Mogmog and Falalop. The remaining islands are visited when gardens on them are tended or when coconuts are gathered. Ulithi has a total population of 421 people, 200 males and 221 females (Lessa 1950:22).

Lessa (1950:63) comments on the conjunction of matrilineal descent and patrilocal residence:

Ulithi provides an exception to the general rule among primitive peoples that matrilineal inheritance is normally associated with matrilineal residence and matrilineal descent. The explanation for this probably lies in the weak character of patrilocality, for as noted, village endogamy is more common than village exogamy, and even in cases of the latter residence is modified by the necessity of living part of the time with the wife's family. (Italics mine.)

In other words the rule of descent is more important than the rule of residence.

Ifaluk

Habitat

Ifaluk is located 296 miles southeast of Ulithi at 7° 15' North latitude and 147° East longitude. It is a small circular atoll with a total land area of some 0.567 square miles and a lagoon area of 0.939 square miles. The atoll is comprised of four islands: Falarik, Falalap, Ella,

and Elangalap. The first two are inhabited. Topographically, Falarik has a level area in its center with some depressions. The oceanward side reaches an elevation of about 20 feet above sea level. On Falalap there is a central depression, about half the total area of the island, which is used for taro production. The soils range from a fine muck in this swamp to coral aggregate on the ocean side of the islets.

The people of Ifaluk recognize two seasons in the year. The first is the season of tradewinds, followed by the season of variably strong westerly winds. Total rainfall is heavy, averaging yearly 100 to 120 inches (Arnow 1955:2). The calm period, April to August, is usually the rainiest with more than 10 inches each month. September, October, and November are relatively dry. The temperature averages 82 degrees, and the humidity 86 percent. Ifaluk is in such a position as to experience occasional typhoons.

Economy

Taro and breadfruit are the most important vegetable foods of Ifaluk. Breadfruit which is seasonal is harvested between June and August during the calm season and is the principal starchy food. Quantities of breadfruit are preserved for the season in which the trees do not bear. The fruit is cut up, submerged in the lagoon for a short time, and mashed before being stored in pits. Cyrtosperma plays a greater importance during the tradewind season when breadfruit is scarce. Since Cyrtosperma is non-seasonal the

main limiting factor in its production on Ifaluk is the supply of labor. Several other vegetable foods are utilized in the Ifaluk diet but none of these plays a major role (Burrows and Spiro 1953:53). Coconuts supply most of the oil in the diet and provide the principal source of drinking water. Coconut trees are located throughout the island except in the taro swamp. The largest groves exist just behind the sandy lagoon beach of the two larger islands.

Alocasia, Cyrtosperma, and Colocasia are all found on Ifaluk. Alocasia is the easiest to grow and can be raised in any area where a moderate amount of water can be obtained by the plant. Cyrtosperma is grown in the greatest quantity in the Falalap swamp. Colocasia, although best of the three crops in quality, is grown least, primarily because it requires the most care and effort in cultivation.

Cultivation of the above plants is women's work, and is performed by them singly or in small groups often consisting of mother and daughter (Burrows and Spiro 1953:52). Men are responsible for gathering both coconuts and breadfruit, and prepare breadfruit for preservation. This task usually requires a group of four men working together. Women prepare daily both breadfruit and coconuts for immediate consumption. Small work groups are most often formed of kinsmen. Some tasks require the efforts of neighbors and occasionally district members (Burrows and Spiro 1953:162-65).

Fishing is almost exclusively men's work. Women do

spend some time on the reef gathering crabs, shellfish, and stranded fish; however, men expend by far the greater amount of time in fishing activities. Burrows reported the methods of fishing to be so numerous that he doubted whether he had included all of them in his account (1953:104-05). With this great elaboration in technique, fish in actuality are scarce in Ifaluk waters. The lagoon, because of its small size, is unable to supply the needs of the people. The reef is small and subject to a high surf so that fishing there is difficult and often unproductive while the open sea around Ifaluk has few fish to offer. Because of these circumstances, fishermen are forced to make trips to nearby reefs outside the atoll where the best fishing grounds are available. However, these are inaccessible when the winds are too light or from an unfavorable direction (Burrows and Spiro 1953:120).

Animal life on Ifaluk is limited. The dog, pig, and chicken are domesticated, while lizards and birds are found wild.

In summary, women plant, cultivate, and harvest taro, gather wild plant foods, and do some reef fishing. They also prepare these foods in daily cooking. Men, on the other hand, plant trees and gather tree products, do most of the fishing, and occasionally prepare foods in an earth oven.

Residence

Ifaluk is inhabited by 250 people. The dwellings are

usually single-room structures, two or three of which are grouped around the one or more cook sheds attached to a named site or homestead (Burrows and Spiro 1953:132).

Membership in this homestead group is dominated by kinship in the matrilineal line. When a man marries he does not lose his matrilineal inheritance rights, indeed some of these rights are passed on to his own children so that a secondary patrilineal tie exists.

Matrilocal residence is the rule, although some variation from this pattern occurs. Burrows found that in 1947-48 some 70 percent of the 59 residences were matrilocal and 30 percent were not, most of the latter showing some variation built about a matrilocal extended family. Such a variation would contain an individual or individuals of secondary or tertiary kinship status who, ideally would not be in such a matrilocal setting. Six households were patrilocal (Burrows and Spiro 1953:132). A tendency toward local (district and island) endogamy also appeared (Burrows and Spiro 1953:300).

Land is owned by the matrilineage. Every member of Ifaluk society shares in the use of these lands and their produce. A man acquires a claim to additional lands when he marries and joins the household of his wife (Burrows and Spiro 1953:169). Coconut trees may be owned exclusive of the land on which they are found, though permission of the land owner must have been obtained before they were

planted. The produce of the tree is shared by the owners of both the land and the tree.

Truk

Habitat

The volcanic islands of greater Truk are located near the center of the Caroline chain at 7° 7' North latitude and 151° 30' East longitude. This island complex was formed by the submergence of a mountain chain or ridge and is surrounded by a large barrier reef about 40 miles across. There are some 14 volcanic islands and 30 coral islets in the group. The water inside the reef is choppy and sometimes hazardous. Truk's land area totals just over 37 square miles and its lagoon covers an area of 822 square miles. The island of Romonum, with which this study will be primarily concerned, is 0.288 square miles in area, with a maximum altitude of 167 feet above sea level.

The trade winds bring the dry season to Truk from November to June. The wet season accompanied by variable southerly winds occurs during the period from July to October. Truk lies just east of the area affected by the regular monsoon wind system which was noted in the islands already reviewed. An average temperature of 85 degrees and a humidity of 83 percent accompany an annual rainfall of 127 inches. The vegetation of Truk has been classified into four distinct zones: mangrove swamp along the shore; a sandy coastal fringe of coconut, breadfruit, pandanus,

and hibiscus trees, with taro and ivory-nut palms in fresh water swamps; mountain slopes which are covered with gardens and groves of breadfruit and other trees; and uncult forest at the top of the higher islands. The islands were probably heavily forested in the past but after habitation by man most of the natural vegetation was removed and replaced by breadfruit and coconut groves, Alocasia, and other garden crops (Goodenough 1951:23).

Economy

The most important food to a Trukese is breadfruit. These trees are grown as close as possible to the village to ease the work involved when men pick and carry the fruit to the cookshed. Here it is peeled, steamed, and pounded into a pasty mass on a hardwood board with a coral pestle. This activity occupies two or three men working together for several hours two or three days a week (Hall and Pelzer 1946:33). A considerable amount of time is also spent during the harvest season in preparing breadfruit for preservation.

The second most important starch foods are Cyrtosperma and Colocasia which are grown in fresh water swamps. The only land which is used intermittently is the upland gardens where Alocasia is raised. The swamps are in continuous cultivation as are the tree crop lands (Hall and Pelzer 1946:34). Coconut meat is used only occasionally, most often as an accompaniment to starch foods when fish are not available. In Truk, as contrasted with the other areas thus

far described, the production and the preparation of starch foods are primarily the responsibility of the men.

Most of the fish utilized in Trukese diet are obtained by women from the fringing reef. Night fishing is engaged in by both sexes, but only when the day's catch has not been sufficient to meet the needs of the people.

The domesticated fauna of Truk is limited to dogs, cats, pigs, chickens, and a few recently introduced cattle. Bats, rats, and numerous birds exist in the wild state.

Cooperation in work is focused within the family. Men join together in the preparation of breadfruit and women cooperate when fishing (Hall and Pelzer 1946:85). Work is usually heaviest between May and August, the time when breadfruit is harvested and when the water is low on the reef making it relatively easy to obtain fish. In contrast, during the period between January and March less work can be done and food is correspondingly scarce.

Residence

Residence on Truk is matrilineal. The matrilineal extended family is contained in a group of adjacent dwellings built on lineage land. Each family may have its own cookhouse, or two or three nuclear families may share the same one. The total population of Romonum is 240 people who are divided among 13 matrilineages. Immediately after marriage the couple resides for several weeks with the husband's family as a gesture of good will before moving to

land of the wife's lineage for permanent residence (Gladwin 1953:126). In instances where matrilocality is not followed a man lives close enough to his matrilineal kinsmen to be able to contribute resources and labor to both his own and his wife's kinsmen (Murdock 1947:333).

In conclusion, Goodenough has summarized the requirements of matrilocality groups on Truk. First, there must be a sufficient number of women to form an adequately functioning matrilocality extended family. Second there has to be at least one woman of sufficient experience to be head of a household. Third, there must be lineage land on which to build a house. Fourth, the husbands must not be needed for economic tasks by their own lineage sisters. And fifth the husbands must not come from lineages located too far away (1951:128).

Losap

Habitat

Losap is a small atoll some 50 miles southeast of Truk. It has a land area of 0.396 square miles and a lagoon of 10.557 square miles in extent. Average temperature and humidity are in the 80's, as has been common for all of the islands previously mentioned. Rainfall totals nearly 120 inches per year. The seasons are characterized by trade-winds and variable winds as in Truk. An occasional typhoon may reach this area. Only two of the islets of the atoll, Losap and Pis, are inhabited. Concentration of population

on these two islets is due, in part, to environmental factors, since the population is centered on the most protected shore of the island and there is safest from strong winds (Fischer 1955:1025).

Economy

The two principal plant foods of Losap are breadfruit and taro. Men engage in both the production and preparation of these foods, in some cases because of the heavy work involved (Fischer 1955:1027).

Fishing is the second most important aspect of Losap economy. Lagoon and reef fishing are the main activities although some deep sea fishing is also practiced. Men fish the lagoon while women gather marine products from the reef. Fish traps are used by both sexes. Most of these fishing practices are accomplished by individuals or very small groups (Fischer:personal communication).

Women spend a great deal of their time producing handicrafts for trade. This practice was common even in aboriginal times. Because of the close proximity of Losap to Truk it was relatively easy for people of this agriculturally poor atoll to carry on extensive trade with that neighboring volcanic complex. Fischer believes this may have been one reason why women engage in handicrafts and men assume much of the agricultural burden (1955:1030).

Residence

Losap still seems to retain an aboriginal village pattern. This is in contrast to the other islands of the Carolines which possessed an earlier settlement pattern based on lineage lands scattered throughout an island. All of the people of the Losap community live on a single small islet, and consequently no one is more than a couple of minutes walk from any family residence. In part, the village organization on Losap may be due to the high density of population, something over 1,500 persons per square mile (Fischer 1955:1027).

Losap is characterized by an avunculocal residence pattern. One finds, therefore, an unusual form of the extended family which contains the male members of the matrilineal lineage. Under this system the men move to their maternal uncle's house at or before marriage, while the women, when they move at marriage, leave all of their relatives behind (Fischer 1957:132). This, however, is not too sharp a break for the woman since all of the people on Losap live in fairly close proximity. The kin ties between brother and sister remain strong throughout life as a man usually supplies most of the food for his sister and her children.

Although avunculocal residence is the ideal, actual practice does show variation. Fischer counted 53 couples in avunculocal residence, 22 matrilocal, 16 patrilocal,

2 neolocal, and one unknown (1955:1026). Matrilocal residence is encouraged when all surviving members of a lineage are female. Since the men do the bulk of the agricultural work the young women and their guardians will prefer matrilocal residence in order to bring needed workers onto the family land. The same general principle prevails when patrilocal residence is followed. If a man's lineage is lacking in manpower he may encourage his sons to remain on the lineage land.

Ponape

Habitat

The single volcanic island of Ponape lies 380 miles east of Truk at 6° 54' North latitude and 158° 14' East longitude. Ponape is some 129 square miles in area and is exceeded, within the Carolines, only by Babeldaob in Palau. The island is surrounded by a coral reef on which are found several uninhabited low coral islets. The shore of the main island is fringed by a mangrove swamp behind which is a narrow foreplain followed by rapidly rising hills. Some of the shore is simply steep cliff with no level land at all near sea level. The interior is characterized by mountainous terrain, the highest peak reaching 2,595 feet.

Gradations of soil range from a black soil, which is good for yams, bananas, etc., to a sandy soil suitable only for coconuts and some breadfruit. Although water is relatively plentiful, coconut water is preferred for drinking

purposes. Land divisions are made somewhat typically of other high island peoples, with each district containing within it an example of mountainous, forested, coastal, shore, and reef lands.

Ponape's climate is affected by its elevation. Rainfall varies between the windward and leeward sides of the island. A seasonal variation in wind pattern is also noted but this is not as apparent as in other islands to the west. The variation, in Ponape, is not so much in direction of winds as in their force. The months of July through September are marked by calms and short unpredictable squalls. The wind direction is otherwise usually from the northeast. The skies over Ponape are often cloudy, the temperature is in the low 80's, and the humidity averages 86 percent. An annual rainfall of 185 inches is distributed throughout the year with the highest monthly averages in April, May, and December (totals near 20 inches per month) and the driest months being February and March with 10 inch totals (Bascom 1946:1; Freeman 1951:240).

Economy

Breadfruit and yams are the most important garden crops of Ponape, although there is a total of 42 plants which are utilized in the diet at one time or another. Most farming is done on privately owned land in the narrow coastal strip near the house of each family, in fresh-water marshes for cultivation of Cyrtosperma, and on the hillside

areas where yams and Allocasia are grown. The more rocky land is used for breadfruit trees which with pandanus provide fruit from June to August. Yams are harvested in the drier tradewind season.

Every Ponapean meal is supposed to include a starchy food and some protein. The consumption of protein foods, primarily fish, varies with seasonally high tides. Since the reef and coral heads along the shore line provide most of the marine resources of the Ponapean diet, a variation in the water level will make gathering of such foods either easier or more difficult. Some fish and other marine products are preserved, but otherwise breadfruit is the only preserved food (Bascom 1946:77).

At the beginning and the end of the tradewinds season the standard starchy foods in the Ponapean diet, breadfruit and yams, are scarce. The main substitutes during these months are Allocasia, Cyrtosperma, and Colocasia. Coconuts are used mainly as a cooking ingredient and for drinking.

Domesticated animals include pigs, goats, and chickens. Wild animals, such as pigs, birds, and ducks, are hunted.

Both men and women work in the gardens, the more important crops being the responsibility of men. Women are primarily concerned with the hillside plots, while the men concentrate on the nearby farmsteads. Men, however, prepare the hillside areas by clearing and firing the brush during the tradewind season. Occasionally the farmsteads

are similarly prepared. Both sexes engage in fishing although women spend more time in this occupation (Bascom 1946:165). Men prepare the more important foods while the women are responsible for cooking secondary vegetable foods and small fish.

Work groups are composed of members of the same clan or sub-clan, although the total clan membership never participates in economic activity except in larger ventures. Most basic economic tasks are undertaken by individuals from the same household or extended family (Bascom 1946:36,163).

Residence

Ponape has been affected by the same depopulation which has plagued many other Pacific islands. Today its population of 5,462 is only a third of what it was before Europeans made contact with the island in 1800 (Bascom 1946:6).

The basic social unit is an extended family made up of man and wife, their children, and their children's children. This unit alone or together with another, occupies a farmstead. The head of the farmstead is the man who owns the land or the husband of the woman who owns it (Bascom 1946:44). Fischer provides evidence that in the past Ponapeans may have had smaller extended families and more independent units than did other island peoples in the Carolines (1957:132). Marriage has one basis in rank and the marriage to a girl of one's father's clan or to one's

mother's brother's daughter is still preferred. Since descent is matrilineal and inheritance of land rights patrilineal both the clans of the couple benefit (Bascom 1946:33). Residence units are usually matrilocal although extended families formed on father-son ties do exist and are becoming more common (Fischer 1957:131).

Mokil

Habitat

Mokil, the last area to be included in this study, is an atoll which lies 190 miles east of Ponape at 159° 47' East longitude and 6° 40' North latitude. Total land area of the atoll is a little more than 0.5 square mile. Karlap is the largest of the three principal islands on the reef with an area of 143.2 acres, and is located on the northeast side of the lagoon. Urak island, located on the south, has an area of 110 acres, and Manton island, in the northwest, totals 55.5 acres. The last two islets are used in agricultural production and for stock-breeding. The lagoon is less than two miles from north to south and only three-fourths of a mile from east to west. The highest point of the atoll, found on Karlap, is between 25 and 30 feet above sea level. Heavy vegetation, including coconut and breadfruit trees, is found on all three islands. In addition, the interior of Karlap has a large taro swamp. Little fertile soil is found on Mokil, most of the surface being covered with stony coral material.

The temperature averages between 80 and 85 degrees. Rainfall annually averages over 100 inches, some of which is stored in drums and cisterns. The northeast tradewinds prevail most of the year and reach their strongest force in January and February. Typhoons rarely occur at Mokil (Murphy 1950:59-60).

Economy

Most of the land is covered with coconut and breadfruit trees. Breadfruit and Cyrtosperma are the major subsistence crops. During the breadfruit season very little of the other crop is eaten. Breadfruit is preserved by a process similar to that mentioned for Ifaluk. This crop is best grown on the inland areas of Karlap and Urak. Here the young trees have better soil and protective shade. Pandanus trees are common but the fruit is valued little as food (Bentsen 1949:48).

The inland swamps comprise some 5 percent of the atoll area, and are man-made depressions filled with organic material of various kinds (Murphy 1950:62). Cyrtosperma is the most common crop grown in these swamps; however in the older pits Colocasia is also raised. These are the most intensely cultivated portions of the islands; there is an average of 113 Cyrtosperma plants per person in Mokil. More time is spent in cultivation of Cyrtosperma and Colocasia than in all other foods combined (Bentzen 1949:30).

Cultivation of *Cyrtosperma* is primarily a man's job while the woman is responsible for its preparation as food (Weckler 1948:13). Both sexes, however, may engage in harvesting.

Fishing, well developed among the Mokilese, is a major activity of the men. The relatively small lagoon does not provide many fish so most are obtained on the reef and outside. Shellfish are difficult to obtain and little time is spent in gathering them. Chickens, pigs, and sometimes dogs, are eaten on special occasions.

Residence

Mokil has a population of 450 people all of whom live on Karlap Island. Houses are located near the lagoon and southwest of the ancient taro swamps, and therefore are easy of access to both of these important areas. A line of canoe houses lies back of a sea wall constructed along the lagoon shore in front of the village. Behind the canoe houses runs a coral path lined by a row of dwellings built in native style. Each household has a cook hut nearby.

The older matrilineal clans of Mokil lack importance today, with the principal stress now being patrilineal. The population is divided among 41 patrilocal extended families each of which lives in several houses grouped together. Each house is occupied by a nuclear family of husband, wife, and children (Weckler 1948:9). In some cases the father's younger brothers and their wives, their

sons, and their son's wives may be living together. In families where no sons are produced an oldest daughter and spouse may reside matrilocally. Each patrilocal extended family owns a portion of both wet and dry agriculturally productive land.

CHAPTER III
CLASSIFICATION

Introduction

Any analysis of the patterns of residence, economy, and habitat of a people presents some problems of organization and presentation which will now be examined.

Since this thesis is an attempt to determine the influences exerted on residence rules by the habitat and economy the method of examining these variables is of special importance. There is no assumed lineal connection between habitat, economy, and residence; the reciprocal effect of each on the others is clearly recognized.

In order to make a comparative study of the eight island areas included here it is necessary to establish a uniform set of categories applicable to all areas that will enable them to be compared on an equal basis. In doing this one must first view each of the islands as an independent entity with its individual set of environmental, economic, and residential patterns. A starting and an end point of the discussion must be established. In this case the starting point will be the habitat, the environmental characteristics which the migrants first encountered on their entry into Micronesia; the end point will be the residence patterns, that part of the culture believed to be affected in the adjustment to the habitat.

An initial adaptation had to occur between the habitat and the historical subsistence pattern, or economy, which was part of the people's southeast Asian background. The area of economy, then, is where the interaction of the physical and cultural factors would be greatest. This in turn, would affect other cultural items, and presumably the residence patterns would be among the first.

The remainder of this chapter will explore the interaction and reciprocity, first of economy and habitat, second of residence and habitat, and last of economy and residence. All of the major variables which affect these interactions will be considered in an attempt to establish some limited categories which can then be examined comparatively from area to area in the chapter to follow, and which will aid in pointing out any influences exerted by the habitat and economy on residence patterns.

Economy and Habitat

Agriculture

All of the island populations included in this study have an economy based upon agriculture (horticulture) and fishing. Any island environment presents certain agricultural limitations. All of the Micronesian islands are small, the largest volcanic island in this study being 153 square miles and the largest atoll only 1.8 square miles in land area. Further limitations are apparent in the poor soil of the atoll and the hilly terrain of volcanic islands,

so that even with the smallness of area these and other characteristics further delimit the extent of possible productive land.

Inefficient agricultural practices will lead to depletion of soil resources and eventually will make any cultivation impossible. For example slash and burn agriculture, a common method in the Micronesian's homeland of southeast Asia, is one such inefficient practice, for in this island area where the amount of land available for rotation is limited any one section of land in optimum production must be cultivable for many years, if not indefinitely. Although slash and burn agricultural practices, according to Conklin (1954:141), may not be as soil exhausting as commonly believed, he sees, in the Philippine area of his study, a minimum of 8 to 15 fallow years needed for land recovery. Such a practice in the Carolines would soon deplete the limited areas of most islands and lead to a serious reduction in population numbers. Population density is so high in the Carolines that any practice which would exhaust the land beyond rapid recovery would soon prove impractical for prolonged residence in one area. If there were no other area to move to, continued existence based on the same economy would be impossible.

A second agricultural practice common in southeast Asia also may not be feasible in the Carolines. This is rice cultivation. When one recalls the hypothesized

migrations from southeast Asia and Indonesia into Micronesia and the cultural developments already achieved on the mainland by 2000 B.C., when such migrations are thought to have begun (Spoehr 1956), it is possible that the migrants may have had some experience with rice cultivation before entering Micronesia. If this were true it would seem unusual that such a staple should be missing from the Micronesian diet in more recent times. The limitations of the island habitat may be one explanation. Rice requires extensive irrigation. For an appreciable yield on most high islands this means that some form of terracing would have had to be practiced. Palau shows topographic evidence, in the remnant terraces which still exist, of rice cultivation possibly occurring in the past (Osborne 1958); however, if it were once present it has since been abandoned. Rice cultivation on a low island would prove even more difficult with the extremely poor water supply and the porous soils.

Carolinian agriculture, as documented in the preceding chapter, is based upon two general types of crops--tree and root. The common tree crops, such as breadfruit, coconut, pandanus, and banana, seem suited to the limiting circumstances of small islands. They are perennial plants although breadfruit and pandanus are seasonal producers, and they do not require extremely fertile soil. Other than initial planting little care is necessary to make them productive. A minimum of labor is required during the periodic harvesting

of banana, breadfruit, and pandanus, or with coconuts whenever the nut is desired.

Most of the root crops (Colocasia, Cyrtosperma, Alocasia) are continual producers, since any of these plants may be left in the ground with no ill effects for fifteen to twenty years before harvesting. They are, therefore, complementary to the tree crops; that is, in many islands the root crops are used primarily during that season when tree crops, such as breadfruit and pandanus, are not producing.

A low island, if it is to support Cyrtosperma or Colocasia, must have either natural or artificial swamps. The atoll usually does not present as serious a drawback to cultivation of these aroids as one might suspect since fresh water is never far beneath the surface of the ground in the center of the islands. The only difficulty is in providing enough organic material as humus to enrich the coralline soils. High islands, on the other hand, provide better access to fertile soils but the ground water supply lies deeper. Cultivation pits are commonly located in natural depressions, by streams, or near the shore. Of the three aroids, only Alocasia need not be grown in swampy areas; its water requirements are met by the more than 100 inches of rain per year that the Carolines receive.

Root crops have the additional advantage of being relatively impervious to damage from wind and rain during storms. If high winds happen to destroy the tree foods,

reliance can be placed on the root crops. One of the few real dangers these crops are subject to is rare inundation by salt water from tidal waves.

Fishing

Some variations in fishing techniques on high and low islands are apparent. In most cases the bulk of the marine food is taken from or near the reef. Atoll islands naturally have a reef in close proximity to the inhabited areas; high islands may also have such a resource area in a fringing or barrier reef near which the population is concentrated. Atolls and many of the high islands considered have lagoons from which marine resources may be taken. In lagoon areas, which are protected from high seas and currents, canoe and net fishing can be profitably practiced. On several of the islands previously described the people rely on yet another method of fishing. If there is no reef or lagoon near at hand or if fishes in these two areas are scarce, open sea fishing may be necessary. The more treacherous open water requires larger, more seaworthy canoes and the cooperation of numbers of persons in the fishing expedition if a profitable return is to result.

Hunting and Gathering

Subsistence economies in other parts of the world are often based upon hunting and gathering practices; but just as an island environment proves inadequate for some

forms of agriculture it is even less suited for these types of economic livelihood. Hunting and gathering systems are dependent upon undomesticated animal and plant resources. If one reviews the descriptive material in the preceding chapter it is easy to note the sparsity of wild fauna, with the exception of birds and shellfish. Wild plant forms providing edible material are even more scarce, most of the food plants having had to be introduced by the first migrants. These two factors make the economic pursuits of land hunting and plant gathering negligible. The relatively concentrated populations in the Caroline Islands (up to 1,500 persons per square mile) could not be supported by primary dependence on these sources of food.

Water Supply

Drinking water is a necessity for human survival and its effect on an economy is often vital. On the high islands described, water from streams and wells meets this need. Porous soils and the small size of islands in an atoll eliminate the possibility of streams. All atoll islands present the possibility of fresh-water wells due to the source of ground water in the sub-surface lens (Arnow 1955:8). Fresh water, being less dense than salt water, floats on top of the latter and collects beneath the surface of the island. Toward the center of the island the lens effect makes relatively fresh water more easily obtainable. Rainfall provides an opportunity for islanders to catch

and store fresh water, and this is often done. Most of the water obtained by the above methods, however, is used for cooking or in washing and bathing. An islander procures most of his drinking supply from green coconuts. The coconut tree, therefore, proves doubly vital to his economy--providing food and a source of water. Since coconut trees are plentiful and distributed widely throughout all of the islands, the water factor in Carolinian economy is not as vital as it might otherwise prove to be.

Residence and Habitat

Definition of Residence

At marriage one of several different patterns of residence may be followed. In ethnological terminology, matri-local residence has the newly married couple living with or near the parents of the wife. Patrilocal residence requires that the couple settle with or near the husband's parents. When residence may be taken with the parents of either of the newly married couple the practice is referred to as bilocal, and when the couple moves into surroundings where neither of the couple's relatives exerts influence, the pattern is termed neolocal. Avunculocal residence is followed if the couple lives with or near a maternal uncle of the husband (Murdock 1949:16-17).

Some anthropologists have felt that residence terminology as outlined above is inadequate for precise description. Fischer (1958:513) has proposed a more extensive

terminology for residence description in which he recognizes some thirteen different choices available for culturally prescribed residence patterns. However for the present study it is felt that the terminology as defined by Murdock and others will be sufficiently precise. Furthermore since the cultural descriptions drawn from the literature almost always are presented in terms of the more established tradition, it will not be possible to utilize any of the advantages of the newer terminology.

Factors of Land Area, Topography, and Climate

Population density is usually high in the Carolines because of the assured food supply of an agricultural economy combined with the very small land areas. As previously mentioned, the coral islands are small, the largest atoll in the Carolines being only 1.8 square miles in total area. The proximity of one residence to another in the same island community is therefore close. On the larger high islands where a single island may reach 153 square miles in area, desirable living area is restricted by the hilly terrain of the interior. Residences are usually concentrated in the low-lying foreplain.

Climatic conditions, too, contribute to population concentration. The lagoon side of an atoll island provides shelter from the high seas and, incidentally, gives direct access to the lagoon for fishing. The centers of settlement

on a high island may be the areas of sheltered access to the fishing grounds of fringing reef or narrow lagoon.

One can see that environmental factors, such as areal, topographic, and climatic, tend to restrict the amount of acceptable living area.

When population density is high, change of residence within the community is often not as disruptive as in areas where residences are dispersed and change at marriage requires moving a great distance away from relatives and friends. On many of the Caroline Islands a spouse moves only from one section to another of the same village. Even transfer from one village to another on the same island usually does not remove the individual from daily face-to-face contacts with relatives and friends.

Settlement Patterns

Murdock (1957:669) has proposed a classification of settlement patterns and community organization which, in part, will be followed in this study. Since the Carolinian cultures are all agricultural and sedentary several of his patterns are not relevant. Those which will prove useful in later analysis are the following. 1) Compound settlements, consisting of a town or village and outlying homesteads or hamlets. In this study the terms village and hamlet may be difficult to understand if the traditional sociological definitions, based on Western patterns, are adhered to, since such definitions concern primarily size

and density of settlements. The sole determinants of a village in the Carolines are not the actual number of residents nor the concentration of population although these factors are not to be ignored. Land utilization is also a realistic determinant. While much of the land used for agricultural production in a homestead pattern lies nearby, productive land in a village pattern is located at a greater distance from the workers' homes. The term hamlet will be used here to refer to a intermediate type of residence grouping between the relatively independent homestead and the concentrated village. The hamlet, in addition to having a greater concentration of housesites than appears in a homestead pattern, has some, but not all of its agriculturally productive land in the near vicinity of individual residences. 2) Clusters of separated hamlets. 3) Neighborhoods of dispersed homesteads. 4) Compact villages or towns.

Murdock goes on to consider these settlement patterns in terms of associated marriage practices, which would reflect inner cohesion and relationships with other communities. 1) Agamous communities have neither localized clans nor tend toward exogamy or endogamy. 2) Exogamous hamlets or localized lineages form part of a community which itself is not exogamous. 3) Clan-communities are localized, exogamous lineages or sibs. 4) Exogamous communities are those units having the structure of clans and revealing a

tendency toward local exogamy.

The regional examination of these categories in the next chapter will provide illustrations of these settlement types.

Economy and Residence

Agriculture

Settlement pattern may be affected by economic factors as well as those factors inherent in the habitat itself. If one particular area of an island is especially productive in breadfruit, and this crop has been selected by the inhabitants to make up an integral part of their economy, population distribution may reflect this advantage if the settlements coincide fairly well with the productive area. This type of influence is also apparent in respect to the location of settlements close by areas where wet root crops can be grown. Such areas are usually limited to the interior of an atoll island and at the edge of or in some natural inland depression on a high island.

Besides these physical factors of the economy which tend to influence the settlement and residence patterns one must consider other economic aspects. Thus, in many cases agriculturally productive land for any one family may be located at various places throughout the area of an island. If so, the degree of control over such land may be correlated with one's proximity to it.

We have noted two types of land holdings in the Carolines--tree and swamp. It is likely that the restricted location of the taro swamp, and the owned plots therein, would exert the greater influence on residence patterns. Tree land is the more common type, comprising virtually all cultivable land other than swamp land. In addition many of the island peoples have developed a system of usufruct, whereby one may own trees and grow them on someone else's land. In this manner it is relatively simple for one to own trees on another's land near his place of residence thus making actual ownership of this type of land less important.

Fishing

Fishing, the second major sphere of the economy, may exert an influence on the settlement pattern equal to that of agricultural practices. The place of easiest access to the sheltered lagoon in the atoll situation or to the area of best fishing in the high island setting can influence residence location as much as the distribution of agriculturally important land.

Carolinian land rights are often paralleled by rights to certain marine resources. Sections of the reef, and exclusive access to the products thereof, may be assigned to an individual, lineage, or clan. Such an individual or group may be influenced in choice of residence by the desire to be in proximity to these areas in order to more effectively exercise rights of ownership. In some cases the lagoon may

not be segmented into owned areas, but all or some of one resource taken from it or the nearby sea, such as turtles or tuna, may be reserved for an individual or group of a privileged status. In some areas, therefore, it is important to note not only the method of fishing (lagoon, reef, ocean) but also the rules of ownership regarding fishing areas and its products as this may affect residence.

Labor Division and Units

The sexual division of labor in subsistence economic tasks may affect residence rules. The question of which sex is responsible for the production and preparation of particular subsistence crops and marine products may be intimately connected with the residence patterns. If the economy is based extensively on a single crop, such as breadfruit or taro, the fact that it is the woman's or the man's duty to care for this crop may possibly have significant influence on the choice of residence location at marriage. For in this way the individual who has worked a particular crop throughout life will continue working it among familiar individuals after marriage. Therefore, no great disruption in subsistence patterns will occur after marriage. If agriculture is multiple-crop based an equal influence could be felt if the majority of the labor were in the hands of one particular sex.

Many subsistence economic tasks must be accomplished by several individuals working together as a unit. It is

possible that a correlation exists between those individuals who make up these mutual assistance groups and their residence according to patterns prevalent in the society. A society may choose to form these assistance units simply of consanguineal relatives. On the other hand, affinal relatives or unrelated individuals on a neighborliness basis may be chosen.

Descent and Inheritance

Although residence rules throughout the Carolines vary, descent and inheritance practices seem somewhat more universal. Each of the subject island groups has a history of, or at present possesses, some system of matrilineal descent or inheritance. Some of the islanders, as at Yap, now place more emphasis on patrilineality, but there is evidence of a formerly important matrilineal system (e.g., the Yapese matri-sib).

Inheritance of productive land in conjunction with the sex division of labor may affect residence patterns. For example, if lands are inherited matrilineally and women traditionally work the land, matrilineal residence patterns may be expected in order that the woman can continue working on her own land. A combination of inheritance patterns often occurs within one area, as when some types of land are matrilineally inherited while others are obtained patrilineally.

In analyzing the influence of one cultural aspect (economy) upon another (residence patterns) special caution

is needed, for it is probable that such influences are frequently reciprocal.

Summary

In the chapter to follow the descriptive material of Chapter II will be examined in terms of the classification categories established in this chapter. The inter-action of habitat, economy, and residence should be best determined in this way. This means that the analysis to follow will include an investigation of the five sets of categories listed below:

1. Agriculture: types of crops grown, tree or root, and their ecologic setting.
2. Fishing practices: lagoon, reef, or open sea.
3. Settlement patterns and related marriage practices: villages, homesteads, etc.; endogamous, exogamous.
4. Division of labor and composition of labor units: men's work, women's work; consanguineal units, affinal units, etc.
5. Descent and inheritance patterns: matrilineal, patrilineal.

CHAPTER IV

CORRELATION

In the discussion to follow, the eight island areas, grouped according to their prevalent residence patterns, will be examined by means of the categories of other cultural features which were established in the preceding chapter. In this way it should be easier to perceive the interrelationships of the variables thus reviewed and the residence rule by which each island is classified.

Matrilocality

Agricultural Resources

All three of the islands characterized by matrilocal residence--the two high island groups of Ponape and Truk and the atoll of Ifaluk--have a multiple-crop economy. Breadfruit is the most important crop, being preserved for future use as well as eaten fresh in season. In this way it is available during all seasons of the year. The root crops of Cyrtosperma, Colocasia, and Alocaasia constitute the second major staple to the multiple-crop system. Ponape, in addition, places great value on yams, although this root crop is considered to be more of a prestige than a subsistence item.

The distribution of breadfruit trees is consistently more widespread than that of root crops since breadfruit can be grown in nearly any area supplied by relatively

fresh ground water.

Cyrtosperma and Colocasia require swampy conditions for growth and are therefore more restricted in area. On the high islands of Ponape and Truk both crops are grown in natural fresh-water depressions on the coastal lowlands. Alocasia on the other hand, being a dry-land crop, is grown on hillside farms farther inland, usually at a distance from settlement areas.

On Ifaluk atoll the wet root crops are restricted to a natural depression at the interior of the larger island. Alocasia is found bordering the wet gardens if soil and water conditions permit.

Agriculturally, therefore, all areas with matrilocal residence patterns share certain features. Each depends on a multiple-crop economy, with breadfruit, Cyrtosperma, and Colocasia of primary importance. These crops together tend to be spatially dispersed, although swampy areas necessary for Cyrtosperma and Colocasia are relatively limited in extent and occurrence. A greater proportion of an island is more likely to be exploited where two types of crops of differing physical growth requirements are raised than when a single crop is relied upon.

Fishing Resources

Ponapeans and Trukese secure most of their marine food from nearby reefs and acquisition relies mainly on gathering methods. Ifalukians, however, because of poor

resources derive little marine food from their reef; lagoon fishing or expeditions to neighboring reefs, therefore, must be relied upon for a dependable protein supply. This type of fishing emphasizes the use of canoes, nets, hooks and lines.

Truk with its abundant reef resource shows the least elaboration of technique. Ponape, though adequately supplied with marine food, experiences a seasonal variation in quantity due to the tides and winds which sometimes make the reef inaccessible; during this season the people resort to open water methods of fishing. On Ifaluk, where marine food is neither abundant nor assured, fishing techniques are most highly elaborated and diversified.

These three island groups, therefore, have little in common in regard to fishing activity, each having adjusted independently to local peculiarities of the habitat.

Settlement Pattern

The settlement areas on these islands, as in all of the Carolines, is affected by two factors: limitation of land area, and restrictive topographic features. The limited living space tends to negate some of the distinctions drawn by Murdock in his classification of settlement types as applied to areas where more extensive habitation sites are available. Since one cannot always rely on the physical proximity of residences as an accurate criterion of settlement type, characteristics of the pattern of daily

living must be examined in search of additional useful diagnostic criteria. The cultivation of land near rather than far from a homestead appears to be important in distinguishing a homestead from a village pattern. Some consideration may also be given to the manner in which residents themselves view a certain series of house-sites, as either cohesive groups or discrete residential units (or homesteads), regardless of their actual physical relationship.

Ponape is characterized by a homestead settlement pattern. Here an extended family unit resides on lineage land which is identical with or adjacent to land cultivated by members of the lineage.

Trukese on Romonum Island display a compound settlement pattern of village and related homesteads dispersed along the coast. In earlier times the dispersion of settlements was more evident (Goodenough 1951:133-34), extending even into the interior which is now unsettled. Trukese homesteads and associated garden areas are, like those on Ponape, directly identified with lineage land.

Ifaluk, even though its total area is much more limited, has a dispersed pattern of hamlet settlement. House sites are found all along the lagoon shore of Falarik and around the northern end of Falalap. These residences are locally recognized by the inhabitants as belonging to three loosely organized hamlets. Bates and Abbott were told that in pre-European times the residential units were

even more dispersed in homestead fashion over the island (1958:182). Here is a case where distance between residences may be less important in determining classification than the use to which the residence together with the surrounding land are put. If the concept of homestead is viewed in this manner it is just as conceivable to have such a settlement type appearing on the small atoll island as on the more spacious volcanic island. Although some of the present-day settlements are concentrated, each house-site is named and lineages are localized. Ifaluk, here, should be designated as having a compound settlement pattern made up of hamlets and associated homesteads.

In these matrilineal areas, where some form of dispersed settlement is the trend, marriage is usually prohibited within the homestead unit. The rule of exogamy also applies to marriage within the lineage. In Murdock's terminology, therefore, all three islands would fit his classification as localized exogamous lineages. Although most marriages on Ifaluk are within the limits of each of the two inhabited islands, this tendency toward endogamy is probably a matter of convenience.

In summary, Ponape, Truk, and Ifaluk have two settlement characteristics in common. First, all are based on either a dispersed homestead pattern or a combination of dispersed homesteads with a small village or a hamlet. Second, along with this settlement type there is a general

tendency toward exogamous homesteads with a degree of endogamy occurring only because of possibly limiting geographic factors.

Division of Labor and Organization of Work

The division of labor in economic production is patterned variously in Ponape, Truk, and Ifaluk. On Ponape most of the farming on land near the homestead is performed by men, while the more distant hillside plots of Alocasia are cared for by women. The original clearing of hillside areas was done by male labor. Ifalukian division of labor is somewhat comparable to that of Ponape, since men are responsible for the gathering of tree crops while women do most of the cultivation of root species. Trukese are more restrictive in that men work in the production and preparation of all plant foods while women contribute very little to agricultural projects.

In fishing activities the three island groups are similarly diverse with respect to the assignment of work to the sexes. Although both men and women on Ponape participate in fishing, most of the catch is taken by the latter from the reef and it is this group which spends the greater amount of time and energy in fishing. Truk is as restrictive in sex division of work in fishing as in agriculture, only in this activity the women are the more active. Most of the marine food of Truk is taken by women from the reef near the island, not greatly different from

the situation on Ponape. On Ifaluk, where the supply is unreliable, men are primarily engaged in marine activities and must spend a great deal of time in lagoon and reef fishing. The women's contribution, therefore, is relatively unimportant.

The organization of work groups in Ponape, Truk, and Ifaluk show certain similarities. Most of the activities involving mutual assistance do not require large numbers of individuals. The cooperating group is usually made up of family members and closely related kin. Larger tasks on Ponape are accomplished by clan groups. Throughout the area additional labor may also be supplied by non-related individuals on a neighborly basis.

Descent and Inheritance

All of these island peoples who practice matrilocality also demonstrate some degree of matrilineality. Ponape has a system of matrilineal descent, although inheritance of property is patrilineal and patrilocal residence occurs more frequently than before. Trukese base both inheritance and descent upon matrilineality, as do also the people of Ifaluk. Land tenure in both places is controlled by the matrilineage and inheritance of rights to land is affiliated with membership in the lineage.

Patrilocality

Agricultural Resources

Of the four island areas with patrilocal residence

patterns--the two high island groups of Yap and Palau and the two atolls of Ulithi and Mokil--three have a generally similar agricultural economy based on primary production of a single crop. The major subsistence crop of Yap and Palau is a root crop. Cyrtosperma, Colocasia, and some Alocasia are grown in these areas. Ulithians, in addition to primary dependence upon Colocasia and Cyrtosperma, place secondary emphasis upon breadfruit which is consumed, however, only when it is in season. Mokil is the only area of patrilocality which can be said truly to have a multiple-crop economy similar to that described above for the matriloal areas. Mokilese use breadfruit not only in season but also as a preserve at other times of the year. The majority of the breadfruit trees in Mokil, however, are not dispersed but grow around or near the wet gardens which are the areas of Cyrto-
sperma and Colocasia production.

Principal aroid production on Yap and Palau is found in swamp land near the villages. More distant hillside farms provide the less important Alocasia. The central areas of the islands of Ulithi, like those of Mokil, are swampy depressions suitable for Colocasia and Cyrtosperma production.

The emphasis in this patriloal group, therefore, appears to be upon an agricultural economy based on a single major crop cultivated in restricted areas. Where more than one crop type is utilized the area of cultivation

remains equally restricted.

Fishing Resources

In general, fishing among the inhabitants of these islands is carried on by small groups within the lagoon and on the reef. However, Palauans and Yapese utilize the reef resource only occasionally.

In the past the Yapese engaged in lengthy fishing expeditions beyond the reef which required techniques and equipment of some elaboration. The Mokilese, because of the limited size of their lagoon, place more dependence on the reef while Ulithians, possessing a large lagoon, often form fishing groups of large size to exploit this resource.

The inhabitants of these four island groups characterized by patrilocality vary in several aspects of their marine economy. Although all rely on the cooperation of a few individuals to procure the majority of such products, all have had to adjust to the peculiarities of the local environment. Where the lagoon is small more emphasis is placed on reef fishing, and where both lagoon and reef prove to be inadequate open sea fishing may result.

Settlement Pattern

The residents of this group of patrilocal islands possess what is essentially a concentrated village and hamlet settlement pattern. Yap and Palau display village patterns while Ulithi and Mokil are closer to hamlet

organization; in all cases the settlements are found along the coastline or lagoon shore of each island with little or no inland settlement.

Yap, more than the other areas, has felt the effects of severe depopulation within the last 100 years and many of its previously existing villages are now extinct. The population, however, has not dispersed as a result, and its village pattern still prevails. Residences within each village are located on patrilineally owned tabinauw land. In the villages of Yap and Palau there is a tendency toward localization of lineages. Mokilese extended families are localized in clusters of residences about a common cook house. Ulithians often fluctuate in their residence location from patrilocal to matrilocal. The degree of variation from patrilocality is difficult to determine.

In these areas of concentrated settlement there is a tendency toward village endogamy. Incest prohibitions in a homestead system, as observed in the matrilocal island groups, forced one to marry outside of the local residence unit. Although similar restrictions will prevail within the residence group in a concentrated village situation, the out-marrying individual does not have to move as far from his family of origin because of the closer proximity of one residence unit to another.

Local endogamy is often reinforced by social restrictions prohibiting marriage to individuals of a differing

social status. Such restrictions are often as binding as exogamous restrictions forcing marriage of non-consanguineal relatives. On Yap, status restrictions contribute to a village endogamy pattern since each village is inhabited by members of one class within a certain caste and it is usual for an individual to marry within his own class or, on occasion, a class no more than one level above or below his own.

Division of Labor and Organization of Work

With the exception of Mokil, primary agricultural production in this group of islands is the responsibility of women. Mokil differs in that the aroids are cultivated by men, who also tend the breadfruit. Dryland farming on Palau is engaged in by both sexes and the tree crops of both Palau and Ulithi are gathered by men.

Men are the primary fishers. The lagoon is the first source of marine food for all areas except Mokil which, being limited in lagoon area, places more emphasis on reef products. At one time Yapese formed fishing expeditions of larger size to exploit the areas outside of the lagoon. Today, however, it conforms to the rest of the area in utilizing smaller groups of men or individuals in marine exploitation.

Mutual assistance units in support of subsistence tasks need not be large, two or three individuals working together being sufficient. In this group of patrilocal

islands Ulithi and Mokil rely mainly on consanguineal ties, whereas in Yap and Palau work groups are formed of neighbors and friends for most duties.

The village settlement pattern discussed in the previous section may have some bearing on the formation of work groups. When a population is concentrated in a village the lack of available space for new residences may be partly responsible for non-localization of the lineage and, possibly, the extended family. A family unit, as it expands tends to disperse its membership within the village owing to difficulties in maintaining a larger group in the same limited territory. As dispersal takes place small work groups can more easily be organized from nearby neighbors or close affinal relatives than with more distantly located consanguineal kin. On the other hand, in a hamlet where residence is not as dense as in a village, the usual residence unit is the extended family, and the lineage is at least partially localized. Consanguineal relatives in a hamlet, as in a homestead, find it easier to unite to form small labor units.

Descent and Inheritance

All of the islands with patrilocal residence rules show some evidence of matrilineality. The least matrilineal influence appears on Yap where only a vestigial matrilineal sib remains; inheritance is controlled largely by the patrilineal tabinauw. Mokil, too, emphasizes patrilineal inheritance, although matrilineal sibs are still in

existence. Ulithi and Palau, on the other hand, place primary importance on matrilineal inheritance and descent.

While all of the islands are primarily patrilocal, some evidence exists that Palau and Ulithi may tend toward bilocality, a development, at least in the former, which may be influenced more by contact with western culture than any ecologic adjustment.

Avunculocality

Agricultural Resources

Losap, the only island in this study which follows the rule of avunculocal residence, has an agricultural subsistence economy based upon two crops--breadfruit and taro. Breadfruit trees are found over the islands wherever it is possible to grow them and the taro pits are often nearby the village. This multiple-crop system is similar to that of the matrilocal group.

Fishing Resources

Marine products are important to the Losap economy. The majority of techniques are connected with lagoon and reef fishing. Small groups are sufficient to practice these methods since little deep sea fishing is carried on.

Settlement Pattern

The population of Losap resides in a concentrated village which, in contrast to the neighboring regions, is believed by Fischer to be an old or original pattern (1955:1027).

The density of population on Losap is estimated at 1,500 persons per square mile, concentrated on Losap Island which is one of the two inhabited islets of the atoll. Fischer hypothesizes that this concentration of population is a result of the people's attempting to settle in the limited area best protected from storms (1955:1025,29). In settlement pattern the avunculocal island has more in common with the patrilocal islands.

Division of Labor and Organization of Work

The majority of the subsistence economic labor on Losap is the responsibility of men, who have charge of production and preparation of most plant foods as well as lagoon fishing. Women devote most of their labor in the manufacture of handicrafts, but spend some of their time in reef fishing.

Mutual assistance groups are usually small in the number of individuals involved. However, no information is available as to their usual composition, e.g., consanguineal, affinal, or other.

Descent and Inheritance

Like many of the islands in this study, Losap society has a matrilineal base. In this case the matri-lineage determines descent and inheritance. Although residence is generally avunculocal there is some tendency to matrilocality and patrilocality.

Fischer suggests that a partial explanation of

avunculocal residence lies in the presence of a concentrated village pattern. In this case, where residence is close, a man and his sister are able to maintain strong ties despite their residence in separate households. This fact along with an increasing importance of men in economic pursuits may have caused a shift away from an original pattern of matrilocal residence (1955:1031-32). Fischer sees one weakness of the avunculocal system in that it requires the birth of an equal number of boys and girls in the family in each generation for continued maintenance. When this ratio is not maintained the residence group is twice as likely to fail as in a matrilocal or patrilocal society where a family is able to maintain itself with the birth of children of only one sex, female or male respectively (1955:1028).

Summary

Sharp contrasts within the categories examined appear among the three groups of differing residence patterns.

1. Agriculturally, the inhabitants of the matrilocal islands display a multiple-crop subsistence agriculture with such crops, as a group, tending to be dispersed in location. Although the patrilocal societies are not as consistent in their agricultural character, the economy in general is based upon a single major crop. Even in areas where it is not, the crops again as a group, are still restricted to a specific locality. A multiple-crop economy appears on the avunculocal island of Losap, but because

of the restricted area of this atoll it is impossible for the crops to be truly dispersed in location.

2. Fishing shows little or no consistency among the three groups. All rely, in equal diversity, on some combination of reef, lagoon, and ocean fishing. Each culture reflects a tendency to adjustment to the local situation, endowed with certain advantages and shortcomings; the kind of fishing and gathering which is locally most productive is emphasized.

3. Settlement patterns of the matrilocal cultures exhibit a frequency of dispersed homesteads or of homesteads appearing with a compound grouping of villages or hamlets. On the other hand, the patrilocal societies, as well as avunculocal Losap, display a trend toward concentrated villages with hamlets also appearing; homesteads are much less in evidence. Localized lineages occur in both groups although they appear to be stronger among the matrilocal societies. Homestead settlements and localized lineages promote the occurrence of local exogamy. The concentrated villages are somewhat endogamous.

4. No consistent trends in the sexual division of labor distinguish the residence categories. Within the group of matrilocal societies one finds variation in the participation of the sexes in agriculture and fishing. In the patrilocal societies men do most of the fishing but practice varies in regard to tasks in the agricultural

economy. Avunculocal Losap emphasizes male subsistence labor.

Mutual assistance groups exhibit a slight difference in the relationship of the individuals normally contained in their membership. In part, this appears to reflect the influence of the settlement type. Among the matrilocal cultures, where dispersed homesteads and localized lineages occur, there is a tendency for work groups to be made up of consanguineal relatives. Among the patrilocal societies, whose settlement patterns are of the concentrated village or hamlet type and lineages are of less importance, mutual assistance groups are composed of friends, neighbors, or affinal relatives as often as of consanguineal kin.

5. Descent and inheritance rules are more consistently linked with the prevalent residence practice among the matrilocal cultures than among the patrilocal groups. Most of the islands with matrilocal residence are matrilineal in inheritance and descent. The patrilocal societies have some characteristic of matrilineality present, although patri-lineality may now be of primary importance. Avunculocal Losap exhibits a pattern of matrilineality.

CHAPTER V

CONCLUSIONS

As stated in Chapter I the purpose of this thesis is to determine if a relationship exists between (1) the habitat of a group of islands and atolls in Micronesia and (2) the economic basis of their societies and (3) the residence patterns of these societies. On the basis of the information and analysis presented in the preceding chapters certain relationships are seen to exist.

Steward, as quoted in Chapter I, believes that the environment not only provides limitations to the type of adjustment a people must make, but that creative processes are also involved in such an adjustment. He holds that the cultural core--which is made up of subsistence practices and closely related non-economic elements--will be that part of the culture which is first affected by environmental and cultural changes (Steward 1955:37).

Settlement patterns will be considered as a first aspect of the cultural core as affected by subsistence practices. These patterns in the Carolines appear to be correlated with the type of crop or crops grown which, themselves in turn, are dependent upon factors of topography and climate. In areas where homestead settlement occurs land is both abundant and diverse in physical character. Such an area has a relatively large dispersed population subsisting on a diversified agricultural base, including

among others taro, a crop extremely restricted in its growth area, and breadfruit, a crop with fewer limitations in growth requirements. Therefore, where such a multiple-crop subsistence system exists the crops are often spatially scattered, as illustrated among the matrilineal islands by the co-existence of taro swamps, hillside farms, and other garden types. On the other hand, if a single crop is relied upon, as is the case in this study where taro is the basis in the agricultural economy, the growing area of the crop is more restricted. One can see that the settlement patterns in these Micronesian islands tend to be ecologically adjusted to the agricultural crops, for a dispersed multiple-crop agricultural economy is more often accompanied by homestead settlement whereas a concentrated single-crop economy exhibits more compact localized settlements.

A second aspect of the cultural core which is affected by this ecologic adjustment is the size of the family within the residence unit. Sahlins (1957) in his study of ecologic adjustment in the Fijian area found that extended families were associated with areas of spatially separated agriculture while nuclear families tended to be associated with areas of localized agricultural systems. Within the Carolines there is a tendency for localized lineages and extended family units to form the homestead or dispersed settlement group while it is localized extended and nuclear family units which make up the concentrated villages.

As a third aspect of the cultural core, the organized work groups in the areas of dispersed settlement are more often made up of members of the lineage or extended family. While in the areas of concentrated settlement where fewer consanguineal relatives are apt to be living in the immediate vicinity, affinal relatives or neighbors are often turned to for assistance.

Throughout an analysis of this type the investigator is made aware of the inapplicability of the standard sociological definitions of settlement types of a non-western community, and also of the lack of precision of the anthropological definitions presently in use. The sociological definitions place major emphasis on size, density, and specialized services in the community. Hamlet and village are defined primarily as service centers for outlying homesteads. Such definitions are not useful in the Carolines for two reasons. First, villages and hamlets in the island area do exist without associated homesteads; and second, the residents of these concentrated settlements are not engaged primarily in servicing activities. Most of these residents are agriculturalists just as are homestead residents. The major difference between the village and homestead lies in their relative proximity to productive land. Murdock's anthropological definitions of residence groupings are not sufficiently precise with respect to the distinguishing characteristics of hamlet and village. In this study,

therefore, these terms have been used with some alteration of meaning.

The Caroline Islands have a tradition of matrilineality. Historically, the people may have entered the area with a matrilineal organization or have developed it following settlement of some islands of the group and before moving on to others. Matrilineality today seems to be a tradition which is mainly associated with a pattern of homesteads and dispersed farming. In these areas of dispersed agriculture the large extended family unit is well suited to work the land profitably. Historically, this organization was most likely accompanied throughout the Carolines by a matrilocal family unit which provided sufficient labor to work the lands belonging to a matrilineage. Carolinean areas of dispersed homestead settlement do have matrilocal patterns which correspond with the tradition of matrilineality. In those island groups which developed a settlement pattern associated with more centralized resources and population concentration the extended family would not be needed to work the land. In such instances the garden area was either close at hand or, if at some distance, still of an undiversified nature, and a smaller family unit could profitably work it. Under such conditions a variation in family composition in relation to the residence unit could more easily occur. In areas of concentrated settlement in the Carolines residence rules often vary from the matrilocal tradition, and in some cases

only a remnant of the original matrilineality remains.

When considering the changes manifested in a culture in the course of ecologic adjustment one cannot ignore the historical character of that culture. History, in part, shapes the changes which take place. But even when considering the above aspects of the cultural core (settlement type, family size, work group composition), which are among the first to be affected in ecologic adjustments, evidence of cultural lag occurs. Within the Carolines there are islands illustrative of different stages of adjustment. Two extreme types representative of possible stages are illustrated today: (1) a homestead group depending on dispersed and/or multiple-crop agriculture and following matrilineal inheritance and matrilocal residence rules, and (2) a concentrated village group with centralized and/or a single-crop economy together with patrilocal residence and patrilineal inheritance.

Why the difference in residence rules? No economic reason for this distinction among Carolinian societies is readily apparent. A male or female emphasis in the division of labor in subsistence tasks shows no consistent pattern such as would tend to promote a change from matrilocal to patrilocal residence rules. It is more likely that the answer lies outside the field of economics. In an ecologic adjustment the economy certainly is an important medium through which the society interacts with its environment.

However economic factors are not the only ones which stimulate change. Once survival has been assured by a certain minimal economic adjustment a greater degree of variance in the relationship between residence rule and economic organization is permissible without upsetting the balance. In a situation where the importance of economic factors is lessened, residence rules are more likely to be affected by other cultural characteristics.

Where the agricultural system in the Carolines no longer requires large family units for efficient production of dispersed crops, those units historically having been matrilocal, the way is open for other forms of family organization to develop. Such an alteration in the agricultural base could have been due to several factors, e.g., changes in population numbers, crops, location of productive areas, etc. A separate investigation would be needed to determine the true reasons.

A change in residence patterns may lead eventually to changes in the descent and inheritance patterns. In the Carolines variations from the matri-patterns have generally been in the direction of patrilocality and patrilineality. Losap is avunculocal and thereby exhibits some of the matrilineal aspect while giving recognition to a degree of male predominance. However, Murdock is of the opinion that the same factors which result in a change from matrilocality to patrilocality are at work in a change to avunculocality: "the patrilocal and avunculocal rules are completely alternative

to each other" (1949:207). Fischer believed that this shift at Losap was due to a male emphasis in the division of labor in relation to the subsistence economy, since men are responsible for the production and preparation of all plant and marine products (1955:1030). Although residence rules in the other island areas are not correlated with sex participation in labor it is possible that sexual division of labor may have been an influencing factor in the extremity of the Losap situation. However, other characteristics (e.g., settlement type, agricultural basis) in Losap accord with those apparent in islands which have become patrilocal. The male emphasis in avunculocalism may be the result of some political or religious forces and is simply reinforced by this labor aspect. Such an explanation as applied to both patrilocal and avunculocal islands requires additional study.

The conclusions reached in this thesis must remain tentative. They were reached after analysis of the factual material presented in Chapter II. The majority of the material substantiated the conclusions reached; however, evidence exists that does not lend this support. In some cases such seemingly conflicting evidence may be the result of differences in the quality of observation and/or reporting. Very often the necessary data for comparison simply do not exist. A high correlation between the conditions of habitat and the rules of residence was not expected to appear, the

variables being too numerous and difficult to control; however, most of the discrepancies may well be explained by one or more of the following conditions:

1) Diverse culture history and migrations. In order for the ecologic adjustment of two or more groups to proceed in the same manner the cultural baseline and all of the contributing variables would have to be the same. This is virtually impossible. In Micronesia the means and routes by which peoples entered the area are far from being well understood. It is quite conceivable that at least two different traditions are represented: one from Indonesia directly and another by way of eastern Melanesia.

2) Adjustment and cultural lag. The problem of cultural lag is of historical importance. Changes which are required in a group's adjustment to a new environment do not occur immediately. Length of settlement, then, is an important variable. Some workers have proposed that Yap and Palau were settled substantially earlier than the other Caroline Islands. Some of the differences apparent in the comparison of groups in this study may be due to this fact, and represent, in the western islands, an adjustment of longer standing. The process of adjustment in the eastern area may not yet have provoked changes in certain aspects peripheral to the cultural core.

3) Population numbers. The need for adjustment is related to population size. Relative adjustment is achieved

as a group of a certain maximum size becomes integrated with the environment in terms of the group's methods of exploitation. Much of the Micronesian area suffered a setback to such an adjustment through severe depopulation in historic times. Yap, for example, which once was heavily populated, suffered from this problem. The atolls, on the other hand, are becoming increasingly more densely inhabited.

4) Diffusion. Ethnographic reporting of aboriginal conditions can never be fully free of the influence from the process of westernization which has been in progress in varying degree throughout the Carolines for some time. Moreover, influences from areas like Indonesia, Melanesia, and Polynesia, it is now becoming more apparent, occurred after initial settlement of Micronesia (Osborne 1956:40). Even in an isolated island area like the Carolines, man is never truly lacking in communication with his neighbors.

Summary

An investigation of the ecologic adjustment which has occurred among agricultural societies in the Caroline Islands suggests that:

1. The presumed differences in the influence of natural conditions as represented in high volcanic islands and low coral atolls are not as significant to ecologic adjustment as are the choice of crops being grown and the distribution of population.

2. Settlement types are correlated with the agricultural basis of the society and are altered as the agricultural emphasis changes.

3. Rules of residence have changed from the traditional matrilocality in response to modification of the settlement type.

4. Family structure, both in size and rule of descent, has altered with changes in settlement pattern and residence rules.

5. The composition of mutual assistance groups is correlated with the type of family structure and settlement plan.

6. Sexual division of labor does not play a decisive role in the determination of residence after marriage.

A P P E N D I X

In the previous analysis occasional mention was made of some of the difficulties encountered in the survey. Many of these were of a mechanical nature and most of them would probably be inherent in any cross-cultural study. However a brief discussion of the major difficulties will be presented with the hope that subsequent workers in the same type of material will be partially aided, or at least forewarned.

One of the best aids to the researcher lies in the Human Relations Area Files system. The HRAF material places a wealth of carefully catalogued information literally at one's finger tips. This author believes that subsequent analyses could most efficiently be pursued in using these files for source material. Unfortunately, at this time, they are still limited in the number of cultures covered.

A basis fundamental to the whole study is perceptiveness-- not only of the author but of the field worker who gathered the material on the basis of which the comparative analysis was made. A single individual could not have been asked, in the interest of comparability of data, to have done the field work in the several cultures needed for this study. The researcher who attempts a similar analysis, therefore, must rely on the available library sources. In the majority of cases it is probable that the objective of the cross-cultural study will not be the same as the original objectives of the field worker. The researcher, therefore, is forced to

interpolate a great deal or to leave many, often fundamental, gaps in his information. In some cases the necessary information will be available but in a place not known to the comparative worker. In other cases the information has never been published and is often lacking even in the experience of those who have worked in the area. Here the only solution lies in additional field work.

Perhaps a few personal suggestions for future work in this type of study are also in order.

Probably the most valuable study is that which is limited in scope--which investigates a few aspects intensively rather than many superficially. In the time allowed for most studies at the Master's level this provides two alternate choices: (1) the investigation of several cultural aspects in a limited number of societies, or (2) the investigation of a limited number of cultural items in a larger number of societies. Fundamental to both, however, is the fact that the variables should be controlled as much as possible. In most instances this means keeping them to a minimum.

In the Micronesian area three cultural aspects seem in special need of investigation to answer some of the questions left unanswered in this thesis. The first was mentioned briefly during the investigation. A cross-cultural study of the developing political system may shed light on changes in residence patterns and on patterns of inheritance. A

similar comparison of the land tenure systems and descent patterns would be useful. Lastly, an investigation of the existence and function of sodalities may clear up some of the problems concerning settlement patterns. Men's societies and associations, centered around a canoe house, are one of the most common aspects of Micronesian cultures. The importance of these institutions may increase as the population becomes more concentrated, thus exerting more influence on other aspects of culture. Knowledge of the interrelationships of the society, the political system, and the descent or inheritance patterns would prove highly enlightening.

Such investigations not only would contribute to the knowledge of Micronesian cultures but may even help to clear up some of the problems confronting anthropology as a whole. Among these is the problem of definitions. The more widely the world's cultures are investigated the more valid universal definitions will prove to be. This thesis was hindered by the imprecision of definitions of residence, settlement, tenure, and work groups. Subsequent studies may help to develop a more acceptable terminology in these fields.

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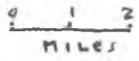
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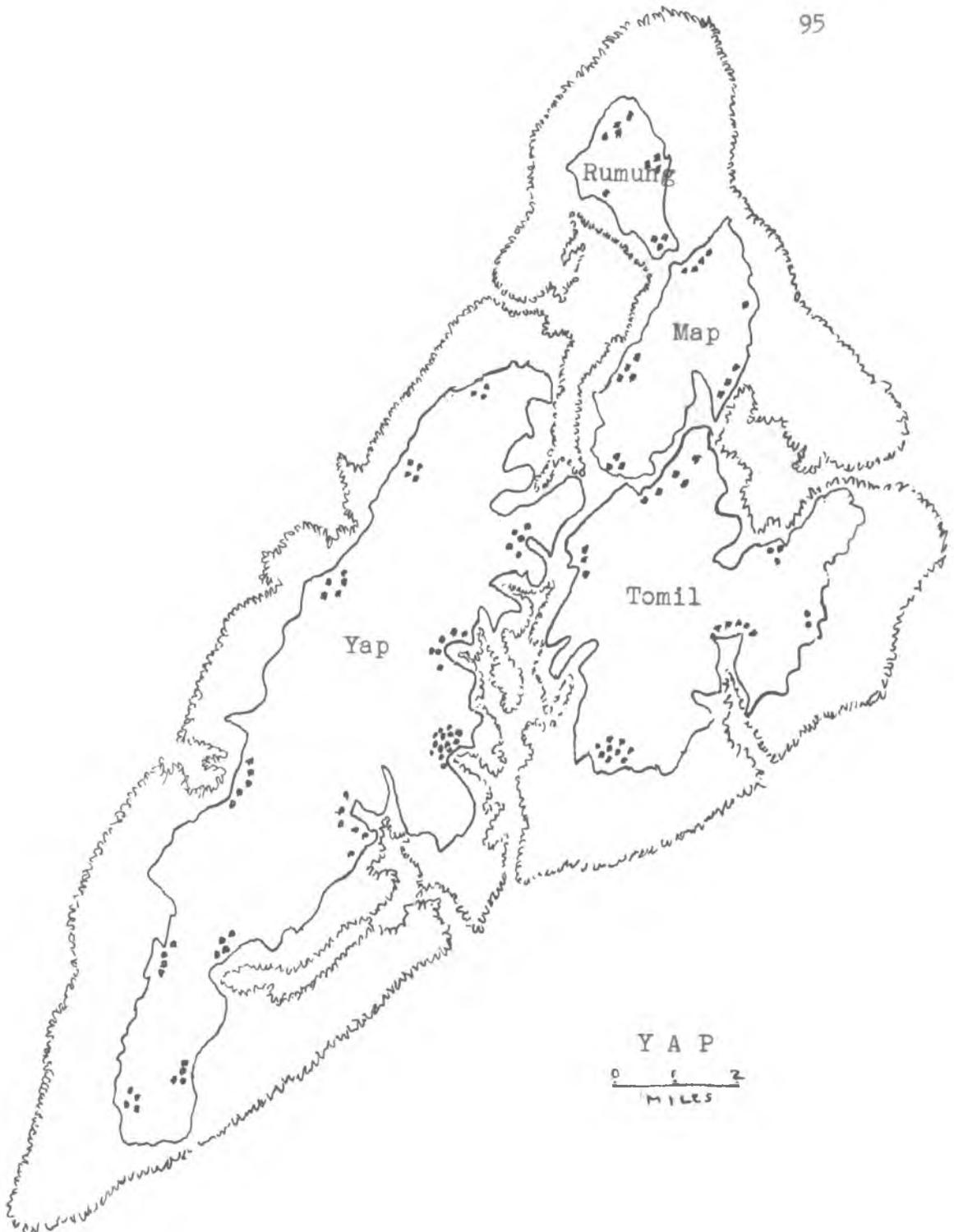
KEY TO MAPS

- Centers of population
- ▨ Breadfruit areas
- ▩ Taro areas
- ▧ Reef

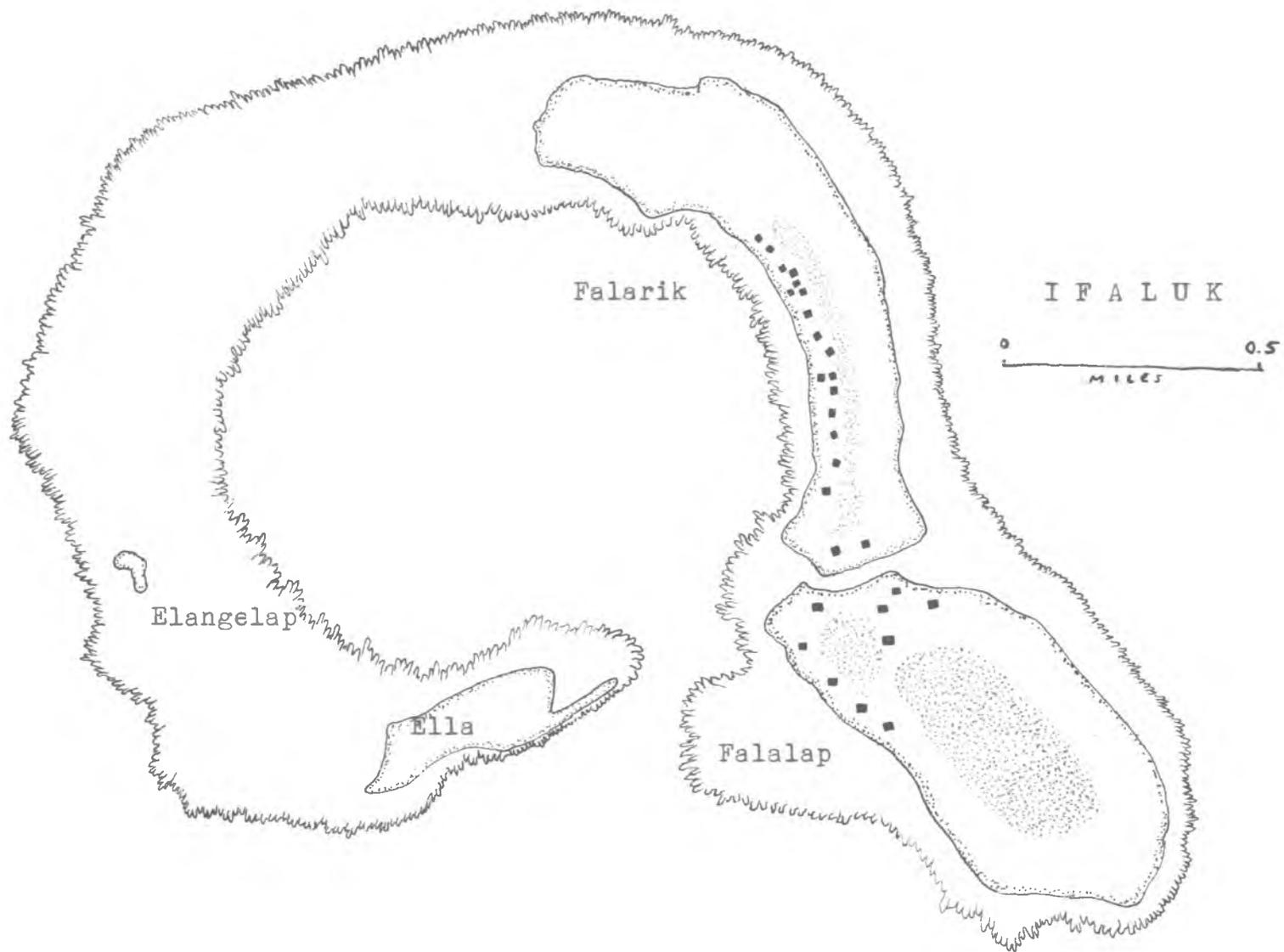
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L O S A P



