

The Social Effects of Typhoon Ophelia (1960) on Ulithi

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On November 30, 1960, Typhoon Ophelia struck Ulithi, an atoll in the southwest Pacific, leaving the island groups a mass of devastation. It was the worst tropical cyclone to strike the atoll since 1907, when a similar catastrophe laid waste the land,¹ but Ophelia differed from this earlier typhoon in being perhaps less intense in surface wind speed and much more violent in the wave action it churned up, resulting in severe damage to nearly all beaches and inundation of the interior of Falapop Island. Moreover, over half a century of change had rendered the human circumstances different.

A disaster of this kind has certain special conditions. When a rotary storm strikes a native community on a small island there is little recourse to defensive measures and no possibility of escape, and there is the danger of unlimited destruction. Immediate help from external sources is not forthcoming and in any event is not available for preventing destruction. The inhabitants have minimal control over the situation. Another special condition is that a typhoon involves a relatively short period of intense impact, followed by a post-impact period of long duration.

The enduring effects of this particular typhoon lie in the impetus it gave to changes inherent in the acculturative situation. Had the people of Ulithi not hitherto been drawn into the world orbit, with inevitable consequences to its economy, political system, religion, and values, the storm would merely have created temporary dislocations without changing the *modus vivendi*. True, there would have been a severe decimation of the population due to the sudden loss of available foodstuffs, but in the precontact setting the typhoon would have been absorbed without appreciably changing the nature of the society or the culture.

This is the thesis of my analysis, and it is my intention to substantiate it with observations made before Ophelia and afterward. In 1947 and again in 1948-1949 I studied Ulithian society as it then was—relatively unchanged and unchanging. Then in the summer of 1960 I examined it largely with an eye to noting the effects of American custodianship. Finally I saw it, albeit lamentably briefly, as it was after the autumn typhoon. Opportunities of this kind rarely present themselves to the social scientist.

¹ The typhoon struck on March 29, 1907, and was accompanied by a tidal wave. The German government dispatched a vessel, SMS *Planet*, which arrived from Saipan on April 14 and helped in the rehabilitation of the atoll. The ship took 100 natives from Ulithi to Yap. See Reichstag, Germany, 1908: 4122.

My return to Ulithi to study the impact of Ophelia was made at the suggestion of the Pacific Science Board and the Disaster Research Group of the National Research Council. I arrived on the atoll on January 18, 1961, in company with Charles G. Johnson of the U.S. Geological Survey in Honolulu and the late David I. Blumenstock of the U.S. Weather Bureau, also in Honolulu. They stayed seven days; I remained fourteen. The islands I visited were Mogmog, Asor, Falalop, Fassarai, and Lossau, as well as the uninhabited island of Potangeras.

Background

Ulithi's location at $10^{\circ}05'30''$ N and $139^{\circ}43'15''$ E (on Mogmog Island) places it geographically in the Caroline Islands archipelago of Micronesia. It is 85 miles east-northeast of Yap and about 380 miles southwest of Guam. Fais, a raised island 45 miles to the east, is its nearest neighbor.

The atoll proper consists of a group of thirty-odd islands of small size, most of which are clustered around a large lagoon about 19 miles long and 10 miles wide. Only five of these islands are at present inhabited. The total land surface of the atoll is a mere 1.80 statute square miles. The largest island is Falalop, but this is only one mile long and less than that wide.²

Being in the doldrum belt near the equator, the atoll has that region's characteristic climatic features of heat, great cloudiness, and high humidity. The velocity of the winds varies greatly: the period from May through July is one of great calms and the rest of the year experiences intermittent trade winds. Typhoons incubate in this general area and sweep on to the Philippines, China, and Japan. Winds rather than temperatures distinguish one season from the other.

Precipitation is heavy, averaging about 120 inches a year, with a pattern of relatively dry winters and wet summers, but there is some inconsistency in this respect. Droughts do not constitute much of a threat, although owing to the porosity of the soil, water drains down through the ground by percolation; hence there can be a shortage of potable water in less than two weeks' time. Wells are few and in any event are brackish, so for their drinking water the natives depend mostly on the flow of rain off the roofs of their dwellings.

The islands are distinctly coralline, with all that this implies for limiting the growth of vegetation. They are low-lying, with a high point of only about 22 feet on Falalop island, although it should be borne in mind that many atolls elsewhere in Micronesia are perceptibly lower than this. Characteristically, the surface of individual islands is slightly higher on the shores bordering the open sea, and lower on the beaches bordering the lagoon. Ulithian villages are always

² Technically, the island of Falalop is a separate element outside the atoll, but for all practical purposes its location makes it an integral part of it. Figure 1 does not show certain Ulithian islands east of the atoll, none of which have been inhabited at least since 1904.

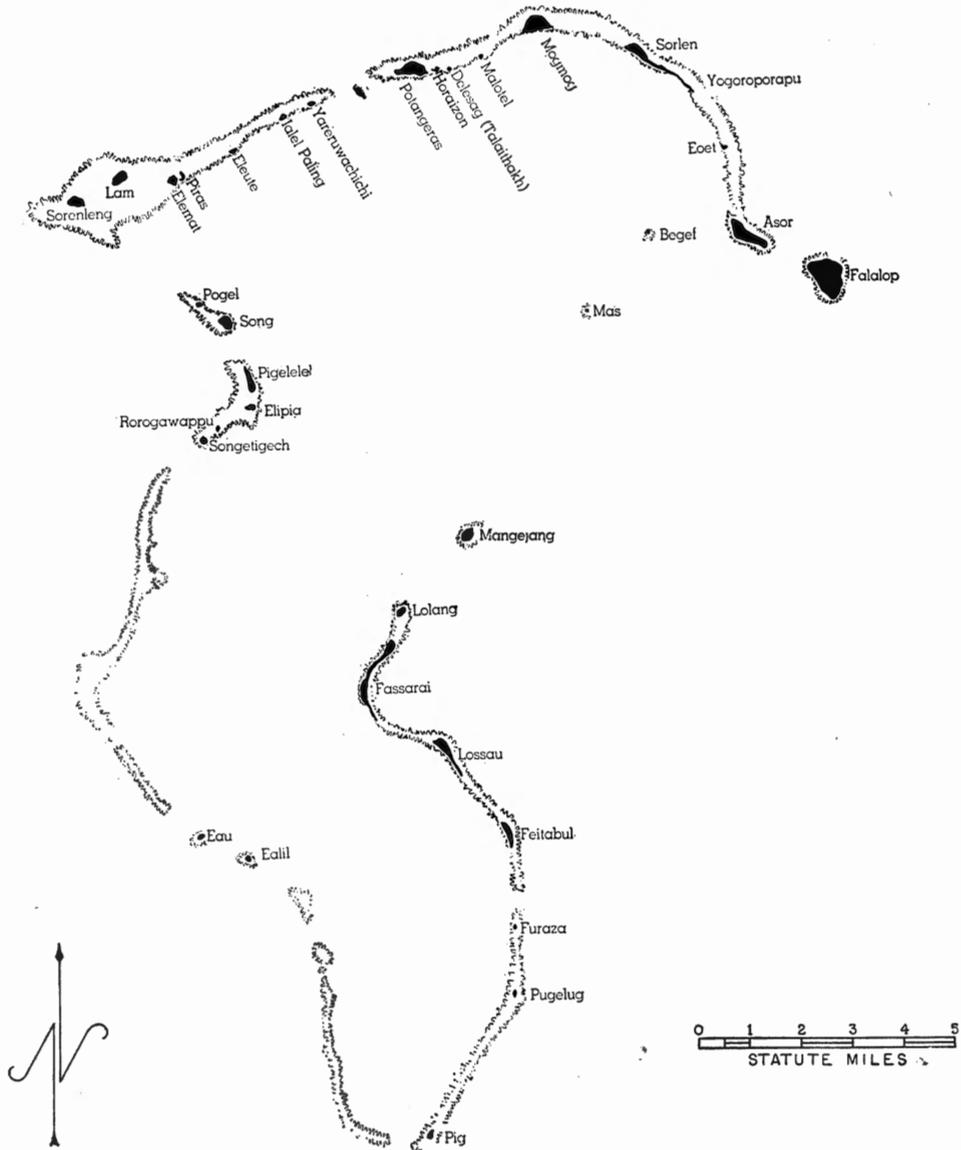


Fig. 1. Map of Ulithi Atoll. The names of some islands are Japanese versions of Ulithian words.

built along the lagoon. Slight depressions producing a certain degree of swampiness are to be found on the islands of Falalop, Mogmog, and Mangejang, thus permitting the cultivation of certain plants that require muddy soil.

The number of cultigens supported on the atoll is relatively small. Coconut palms grow very well indeed. So do two aroids, *Alocasia macrorhiza* and *Cyrtosperma chamissonis*, but another aroid, *Colocasia esculenta* or true taro, can only

be grown in special pits on certain islands. Breadfruit trees grow moderately well, as do banana plants. Three crops that were very common and valued in the early postwar period—squash, sweet potatoes, and papayas—have for some inexplicable reason almost disappeared from the local scene, possibly through neglect, possibly from the salt spray of several typhoons during the 1950's.

Aside from the dog, which is not ordinarily eaten, the only two domesticated animals are the pig and the chicken, with an occasional cat, and a few carabao, which are very recently acquired additions used as draft animals and seemingly out of place. More pigs are needed than are now raised but there are insufficient scraps to support the number required to supply a steady source of pork. Chickens are kept in a semi-feral condition; their eggs are not customarily eaten.

Of the rodents there are only the brown rat, the small gray rat, and the house mouse. The only other mammal is the fruit bat or flying fox, eaten only rarely. Lizards are numerous and on some islands there are monitor lizards introduced by the Japanese to get rid of the rats. There are few species of land birds, but sea birds abound.

Fish, shellfish, and other sea animals are abundant and numerous in species. Such crustaceans as crabs of various species and lobsters are eaten, and so are many kinds of molluscs.

According to a detailed census that I took of the atoll in 1949 (Lessa, 1955), there were 421 inhabitants, with a preponderance of older people and a masculinity ratio of 90.5 males for every 100 females. In 1960 I took another census (Lessa and Myers, 1962) and discovered that the population had risen, after a steady decline since the opening of the century, to 514, the masculinity ratio having changed to 106.4. The following table (Table 1) will be of use in understanding some of the subsequent discussion.

Table 1. Population of Ulithi by sex and residence, July 1, 1960.

| Island | M | F | T |
|----------|-----|-----|-----|
| Mogmog | 86 | 89 | 175 |
| Asor | 28 | 31 | 59 |
| Falalop | 81 | 70 | 151 |
| Fassarai | 64 | 54 | 118 |
| Lossau | 6 | 5 | 11 |
| Total | 265 | 249 | 514 |

Obviously, such pre-existing factors as social structure, kinship, the locus of formal and informal power, work patterns, and the like are pertinent to an understanding of the impact of the disaster. They may be briefly reviewed at this point, with later elaboration when necessary to clarify the process and content of change.

The people of Ulithi constitute a very small society, with inevitable consequences for social and political organization. They are agriculturalists and

fishermen, with some interest in raising chickens and pigs. Women traditionally do the gardening, cooking, weaving, and lighter work, while men do the fishing, coconut gathering, carpentry, sailing, and heavier work.

On the five inhabited islands the people live in small villages. The houses, with plank walls and roofs of plaited coconut leaves, are built on rectangular coral platforms surrounded with pebbles and sand. They are shaped in the form of an elongated hexagon, with the inside area divided by walls into several compartments.

Land is never owned privately; it belongs to lineages which parcel out plots for the use of certain kinds of land-use groups. Although most of the gardening is done by women, men nevertheless spend time in agricultural activity when they are not otherwise engaged in fishing.

Canoes are an extremely important part of the material paraphernalia of the Ulithians, being owned by lineages and used for fishing, transportation, and some recreation. Without them, activities are circumscribed and a source of food almost eliminated, for most fish are caught from them. Like all Carolinian canoes, they are unusually speedy, with outrigger and huge sail-spread.

Social organization, apart from the nuclear family, centers around matrilineal lineages which control much in the way of property, marriage, political activity, social behavior, and, formerly, religion. Each lineage has a male chief, who succeeds to his position by virtue of seniority in the group, and on his death he of course cannot be succeeded by his son, who belongs to his wife's lineage. Some chiefs function as district heads as well as lineage heads. The oldest man from a certain lineage, the Fasilus, automatically succeeds to the "kingship," an office now without great authority except in inter-island matters.

Political structure is not exactly simple. The most important everyday institution is the village council, composed of the senior men of the village, who meet frequently to decide matters of everyday concern, as well as to deliberate on questions occasionally raised concerning the whole atoll. Super-village councils are held when the need arises. Each village council is presided over by a *metang*, a kind of chairman who owes his position to his membership of a designated lineage. There is no formal mechanism by which a man becomes a council member.

The island of Yap, 85 miles to the southwest, controls a far-flung empire extending hundreds of miles to the east (Lessa, 1950). It does so through chiefs in Gagil district. Ulithi is part of this domain. Yapese consider Ulithians to be low caste with respect to their own caste system, and require the payment of annual *sawei*, a kind of rent for the use of the Ulithians' own land. Ulithi is also required to contribute religious offerings and political tribute. It holds a special position in the Yapese empire in that it is superordinate to all the other islands, which must pay three-fold tribute not only to Yap but to Ulithi also. These other islands, which we may refer to as The Woleai, are low caste with respect to



Fig. 2. ABOVE: The *serawi*, or typhoon magician, formerly the chief mainstay against the storm. Photo taken 1948.

BELOW: A *tolo*, or wave magician, with two assistants. Formerly he was called upon to soothe the waves. Photo taken 1948.

both Yap and Ulithi, but they are so closely related to the latter by kin, linguistic, and other ties that the relationship is a benign one. For economic reasons their relationship to Yap is often advantageous, but when the Yapese are displeased they are capable of retaliation.

Social control is chiefly through public opinion, gossip, ridicule, and other informal mechanisms. There is no law, in the strict sense. Punishment for transgressions is in the hands of one's kin group, whether the family or the lineage, although it should be noted that physical violence or chastisement is almost absent.

The native religion until recently was a kind of paganism embracing belief in celestial and terrestrial deities; in spirits of minor character but often greatly feared in everyday life; and in ancestral ghosts. In actual practice, the ancestors were the really important spirits, being protective as well as paternal in matters of behavior. When taboos were broken, punishment could come from any supernatural source in the form of illness or other misfortune.

Magic in various forms, and for many purposes, once held an important place in Ulithian life, being especially prevalent in disease, navigation, the weather, fishing, and divination. There used to be numerous part-time specialists in magic, although ordinary persons also had some knowledge of the simpler everyday rituals.

By 1960, however, the native religion has disappeared to such a degree that for all practical purposes it had been replaced by a simple Christianity. Undoubtedly, some magic, both white and black, still persists, but the old recourse to magic for divinatory, meteorological, erotic, horticultural, medical, and other ends is minimal.³

The Typhoon

An appreciable amount of information concerning the history of this cyclone and its physical effects is available from the U.S. Weather Bureau, native informants, Coast Guard personnel stationed on one of the islands, and the studies by Mr. Johnson, the geologist who accompanied me on my trip.

The *Mariners Weather Log* (U.S. Weather Bureau, 1961: 75) gives us the basic essentials. Ophelia started as a small LOW south of Kwajalein and as it

³ One of the major magicians was the *serawi*, who was carefully trained and highly respected by the community, whom he served. He uttered lengthy incantations and defied the wind with gestures involving a spear, a triton shell, and young palm leaves. Another magician, the *tolo*, was used to subdue the waves. As he recited his spell and jabbed at the waves with a ritualistic spear, he was assisted by two men who held a rope tied around his waist to keep him from being engulfed. See figure 2. Specialists in the interpretation of meteorological signs portending a typhoon were called *tohomal*, and used natural clues rather than divinatory ones. They made an appeal to certain spirits, praying over a spider web. A fuller account of Ulithian culture as it existed prior to the typhoon is contained in my mimeographed report to the Pacific Science Board (Lessa, MS).

moved westward it gradually intensified. At 1200 (GMT) on November 21 the cyclone was southwest of Eniwetok and the first tropical depression warning was issued, but soon after this warning the system began to weaken and warnings were discontinued at 0600 (GMT) on the 24th. But when the cyclone reached northwest of Truk and 300 miles southeast of Guam, warnings were resumed at 0000 (GMT) on the 27th. The depression increased to tropical storm intensity by 1800 (GMT) of that same day and to typhoon intensity by 0000 (GMT) on the 29th.

Ophelia's track followed a semi-sinusoidal pattern, and the typhoon passed directly over Ulithi at 1200, local time, on November 30. The pressure reportedly reached a minimum of 939.4 millibars, and maximum gusts attained 125 knots. Thenceforth, the typhoon took a northwest course and later a northward one, but we need not be concerned with its career after leaving the atoll except to say that it ended on December 6.

Ophelia's behavior over Ulithi can be further described from the point of view of the persons on the atoll at the time.⁴

The Coast Guard on the island of Falalop was first notified of a possible tropical disturbance two days prior to the actual typhoon. No action was taken at that time by the personnel other than to observe on a chart of the area the progress of the storm. The next day the station was notified from Guam that it was to take certain safeguarding precautions. While the personnel was engaged in this activity, the winds picked up so noticeably that the local commanding officer notified the Coast Guard section on Guam that it was going to move every last item of equipment, personal gear, and emergency rations into a concrete shelter.

The typhoon hit the following morning, November 30, sometime between 0900 and 1000, local time. The winds were from the northwest or north-northwest, and a reading on the station anemometer seemingly indicated a velocity of 70 knots. The major damage that was to be inflicted on the station took place at this time, owing to the washing away of the nearby seawall, which had been erected during the war by piling up rubble on the west side of the island. The surge of water over this part of Falalop was initially between three and four feet, and then subsided to about two feet. Many trees were downed.

During the period when the eye of the typhoon passed over the atoll, starting about 1500 or 1600 that afternoon, there was no wind and no rain, but the island of Falalop was inundated up to about two feet, at least near the station.

After the eye had passed, the winds began picking up again at about 1700, the velocity now being at its height; but the greatest damage to the station had already occurred, owing to its location on the west shoreline of the island. The

⁴ My chief sources of information are certain natives, especially Hathokhomar, Iamalamai, Ithuerung, and Tathokh, as well as BMC R.L. Tovani of the U.S. Coast Guard LORAN station on Falalop.



Fig 3. Aerial view of Mogmog immediately after the typhoon. The Catholic church at the right held fast.
(Photo courtesy of U. S. Coast Guard.)

anemometer reading indicated a velocity of 74 knots, but later investigation revealed that the rotor had been broken and only one cup was making it revolve. The true velocity was probably between 120 and 135 knots. Further buildings and equipment were lost or damaged, and the small airstrip was badly mauled, a good deal of it being washed away. The winds did not begin to subside until about 2200 hours that night.



Fig. 4. ABOVE: The highest point of the atoll (on Falalop) was fractured by the waves generated by Ophelia.
BELOW: The broken hull of a canoe. Almost all boats were destroyed on Falalop.

The natives did not at all expect the typhoon. Two of the villages had received no warning from the Coast Guard on Falalop, but even the three villages that had been notified were inclined to accept the threat without special anxiety because no sense of urgency had been conveyed to them. The M/V *Errol*, a small vessel belonging to the Trust Territory, had been in the lagoon for three

days and had left for Yap on November 29 without imparting any news of imminent danger. The presence of the ship proved in the end to have had disruptive effects because so many men had been preoccupied with loading copra on it that when they returned to their homes they had almost no time to take precautionary measures. As the wind began to gain in strength some canoes were pulled inland, but most could not be moved in time; nor could dwellings and canoes sheds be secured. Many families were caught with some of their members away on other islands, unable to return.

The chief measure taken to insure safety was to find shelter from flying objects, particularly from corrugated iron sheets ripped from houses and military installations still standing since World War II. When a house was threatened by winds and waves, it would be abandoned in favor of a dwelling that promised greater protection. On Mogmog the villagers had from the start been summoned to the large concrete church by the missionary, who was there at the time. On Asor the people finally retreated to the wooden church there. These two structures stood firm. On Falalop the church, which had barely been completed, was too close to shore to invite refuge, and on Fassarai the wind was not sufficiently menacing to induce the natives to turn to the church. Lossau had only four old people on the island when the hurricane struck, and they managed to find adequate shelter in one of the dwellings.

The only persons who ventured outdoors were some of the younger men, who went from house to house inquiring into the needs of the occupants and helping the aged and weak to move to places of greater safety. During the storm the people usually remained huddled, frequently praying and occasionally commenting on the wind and the wetness. A few people complained of hunger and cold.

Johnson's (MS) field examination of the geomorphology of the atoll indicates that "the major effects of Typhoon Ophelia were the erosion of the lower slopes of beaches, and the deposition of much of the detritus as boulder or sand sheets onto the island slopes of the beach ridges of the islands." Johnson notes that although water crossed some of the islands, erosion by scour action was minor and was seen on only two of the islands he investigated. He states that the net geomorphic effect of the typhoon was to heighten the islands, remove beach materials temporarily exposing the underlying beach rock, steepen temporarily the beach scarps, and slightly lengthen or shorten the ends of the islands.

The islands of Falalop, Asor, and Mogmog, and other islands at the north end of the atoll were most affected, while Fassarai, Lossau, and other islands at the south and east side were least affected.

Waves pushed seawater into the central depression of Falalop by topping the marginal ridges of the island at most points, but at no time was the entire island awash. Great changes took place at the southwest beach of the island, waves having approached from the south during and after the period of the

southwest winds. Waves reached a depth of six feet over the high beach ridges south of the village. The force of the wave action can be further gauged by the fact that sand was moved inland for at least 700 feet at one point, causing several taro pits in the interior of the island to be filled.

Asor was not affected very much by the swells preceding the storm because it was protected on the east by Falalop. The greatest change was produced by

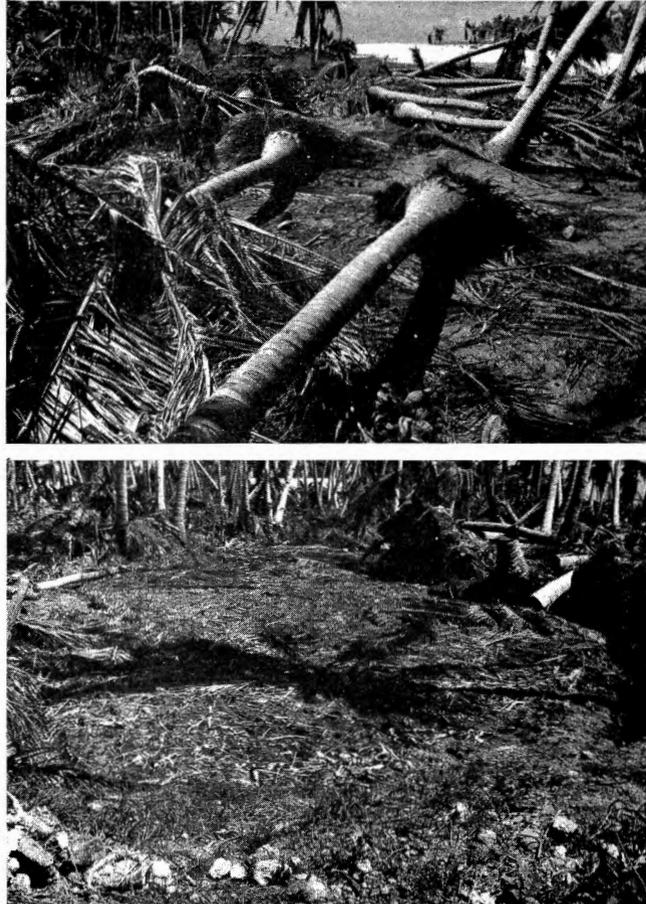


Fig. 5. ABOVE: Trees toppled by the hurricane. Damaged coconut trees recovered in two years.
BELOW: A taro pit ruined by sea water. Rains slowly leached out the salt.

the waves generated by the southwest winds of the second phase of the cyclone. The northern tip of the island was shortened by about 150 feet, with erosion taking place everywhere at the lower slopes of the beaches.

Mogmog, farthest north of the islands composing the atoll, was less damaged than Falalop and Asor; its southerly beaches were protected by the lagoon. The

northern or seaward beach, which reaches up high, was eroded on its lower slopes, with the boulders and cobbles being deposited on the high beach ridge as a boulder sheet up to 100–150 feet wide.

The island of Potangeras was also examined by Johnson, who noted among other observations that the changes made on the lagoon side were less than those on Mogmog and Asor, but as on these islands, sand accumulated at the west end, increasing Potangeras' length by about 200 feet.

The largest of the southern islands, Fassarai, was not greatly affected geomorphologically because its position sheltered it from all the seas except those coming from due east.

Johnson was unable to visit Lossau, the most southerly of the inhabited islands, but I can state from my own brief visit there that the wave action was small; in fact, the sandy beach facing the lagoon seemed to be intact.

The effect of the typhoon on the ground water of the island of Falalop was studied by Johnson, who observed that the low central basin was inundated by several feet of seawater diluted to some extent by rainwater. By draining to the water table it mixed with or displaced the fresh water of the Ghyben-Herzberg lens, causing a salinity that Johnson reckons must have ranged upwards to near seawater.

After the typhoon, during the period from December 1, 1960, to January 20, 1961, 6.25 inches of rain was recorded at the LORAN station, and samples of water taken by Johnson from six wells on January 20 and from a taro pit on January 21 indicated a chloride content of from 960 ppm to 4,200 ppm, as compared to about 35,000 ppm for seawater. However, these wells have little importance for the natives, who do not depend on them. The damaging effects of salinity were therefore confined to taro pits, as far as the natives were concerned, and it is significant that the chloride content of the ground water in the lone taro pit sampled by Johnson was very high—3,790 ppm.

Circumstances did not permit a precise inventory of the damage to property created by Ophelia. However, I did come to a crude estimate through interviews and my own visual assessment, and these are presented in Table 2. I must emphasize that this table includes many approximations, although it is not without value.

Casualties were relatively slight: two small boys of the ages of nine-and-a-half and eight were killed when the house in which they were staying collapsed and pinned them down so that they were unable to flee from the huge waves coming in from the south shore of the island of Falalop. Their bodies were washed inland. Flying sheets of corrugated iron injured a man on Mogmog and another on Asor, neither injury being serious. On Falalop there were three slight injuries.

But damage to property was enormous for a population so reliant on its own limited resources. There is no doubt that without outside assistance the greater

Table 2. Damage to inhabited islands by Typhoon Ophelia, 1960.

| Category | | Mogmog | Asor | Falalop | Fassarai | Lossau | Total |
|-----------------------------------|--------------------|----------|----------|----------|----------|----------|------------|
| Deaths | | 0 | 0 | 2 | 0 | 0 | 2 |
| Injuries | | 1 | 1 | 3 | 0 | 0 | 5 |
| Pigs (58): | lost | 1 | 1 | 0 | 0 | — | 2 |
| | saved | 20 | 6 | 20 | 10 | — | 56 |
| Chickens: | lost | 10 | 4-5 | most | few | few | few |
| | saved | most | most | few | most | most | most |
| Carabao (2): saved | | — | — | 2 | — | — | all |
| Dwellings (126): | destroyed | 7 | 3 | 8 | 8 | 3 | 29 |
| | repairable | 27 | 12 | 6 | 13 | 6 | 64 |
| | intact | 8 | 6 | 12 | 4 | 3 | 33 |
| Council houses (6): | destroyed | 1 | 1 | 2 | 1 | 0 | 5 |
| | repairable | 0 | 0 | 0 | 0 | 1 | 1 |
| Menstrual houses (7) destroyed | | 1 | 2 | 2 | 1 | 1 | all |
| Stores (4): destroyed | | 1 | 1 | 1 | 1 | — | all |
| Canoe houses (44): | destroyed | 14 | 6 | 13 | 4 | 3 | 40 |
| | repairable | 0 | 0 | 0 | 3 | 0 | 3 |
| | intact | 0 | 0 | 0 | 1 | 0 | 1 |
| Canoes (59): | destroyed | 3 | 3 | 11 | 3 | 1 | 21 |
| | repairable | 13 | 2 | 3 | 4 | 0 | 22 |
| | intact | 6 | 2 | 1 | 4 | 3 | 16 |
| Dispensaries (4): destroyed | | 1 | 1 | 1 | 1 | — | all |
| Medical supplies: destroyed | | 75% | 100% | 100% | 100% | — | 75-100% |
| Schools (4): destroyed | | 1 | 1 | 1 | 1 | — | all |
| Coconut trees: | destroyed | 20% | 20% | 25% | 20% | 15% | ca. 23% |
| | severely damaged | 40% | 40% | 50% | 40% | 30% | ca. 45% |
| | moderately damaged | 40% | 40% | 25% | 40% | 55% | ca. 32% |
| Taro: destroyed | | 100% | 100% | 100% | 25% | — | almost all |
| Other plant foods: destroyed | | <100% | <100% | <75% | >50% | ? | most |
| Fresh water sources: availability | | moderate | moderate | moderate | moderate | moderate | moderate |

portion of the population would have perished from starvation because of the great ruin to crops and the destruction of so many of the canoes so vital to fishing.

The domesticated animals fared well. I did not make a check on Ulithi's dogs and cats, but feel confident they rode out the storm.

Damage to building structures was severe. One fourth of the houses were wrecked entirely, one half were damaged severely but repairable, and one fourth were left habitable. All the council houses, except a small one on Lossau, and

all the menstrual houses, dispensaries, and schools were lost.

Well over two thirds of the outrigger canoes were completely destroyed or severely damaged; only sixteen remained operable for transportation and fishing. Falalop was hardest hit, being left with but a single canoe for about 150 people. Of the six big ocean-going canoes included in the above atoll-wide totals, one was lost, three damaged and two saved—a stroke of fortune for a people so dependent on them for making distant voyages and carrying heavy cargo.

The damage to economically useful plants varied from island to island, but some general estimates can be made. Almost all growing sources of food were either destroyed or temporarily eliminated. Coconuts were wrenched by the wind from the trees and those in mature condition were immediately laid aside for eating; but about two thirds of the trees were totally destroyed or severely damaged, with only one third left reasonably intact, except for their blossoms and nuts. Severe ocean spray, inundation by waves, and burial by sand ruined almost all the taro (*Colocasia esculenta*), which was concentrated on Falalop, Mogmog, and Asor. Other aroids, namely *Alocasia macrorhiza* and *Cyrtosperma chamissonis*, survived to a minor degree. Banana plants and breadfruit trees were rendered temporarily useless, although for the most part in a recoverable condition.

Fresh water for drinking and cooking remained available. With the considerable amount of rain coming on the heels of the storm there was an adequate supply for all villages.

Two months after the typhoon the economically useful plants that seemed to be making the quickest recovery were the *iabwuch* (*Allophylus* sp.), a tree used for food, medicine, and loom shuttles; the *iar* (*Premna integrifolia*), a tree used for leis, medicine, amulets, and firewood; and the banana. None of these has much economic value and they contribute little to the diet. Those coconut trees that had been damaged by *Ophelia* but not destroyed had begun to show signs of slow recovery, with the possibility that by September, 1961, some coconuts would have grown to maturity, although the prediction for a return to normalcy was two years in all—an estimate by the natives which I learned from later correspondence to have been accurate.

Leaching-out of the salt water in the taro pits had not progressed far enough in January of 1961 to permit the replanting of any crops. Part of the delay may have been due to lack of time needed for removing debris and silt.

Reactions under Stress

In the face of imminent danger the people of a community are emotionally agitated, but the manner in which they react is not always predictable, being dependent on the circumstances. Certainly they are jarred out of their customary routines and patterns of interaction. When the danger strikes, and after it has passed, there is a drastic alteration in behavior patterns on both the individual

and societal level. The form assumed by the human experience cannot always be known in advance, but observation has taught us that certain possibilities may be looked for.

Ideally, the psychological effects of stress should be analyzed according to differential behavior among various status groups; practically, this is not possible where a population is small and relatively undifferentiated. For the most part, therefore, we shall be constrained to treat the stress reactions to Ophelia as generalized rather than individual reactions. Our attention will be devoted to community-oriented questions rather than individually-oriented ones.

Not unexpectedly, there was a diffuse kind of fear among the people, except for the children, who were generally unable to comprehend the gravity of the situation. Some of the older women confided their apprehension over the possibility of dying, although for the most part there was little verbalization of the concern that was felt by the adult portion of the population.

The effects of fear on behavior in the kind of situation with which we are dealing can be multiple in form and varied in intensity. One psychological phenomenon whose possibility immediately comes to mind in connection with disaster is shock, and it was my particular concern to explore the incidence of this reaction.

The first reference to shock came unexpectedly in the course of an interview with an intelligent young man whose nine-and-a-half-year-old son had died during the typhoon. He volunteered the information that he could recall little about the storm as it raged about him on the island of Falalop, where he huddled with his family in his dwelling on the south shore. He said it was as if he were in a dream. Questioning brought out the existence of a native term, *samawel*, for the state he felt. The term suggests a kind of paralysis, but only in the sense that one might black out from fright. Discussion with an older informant present during the interview brought out another term, *ruschealokh*, allegedly a "bigger" word for the same thing. Examples were elicited and it seemed to be borne out that both native terms refer similarly to a state of shock. Ulithians do not speculate on the mechanism producing this state.

Having been directed by my first informant to other natives whom he said had had an experience similar to his own, I interviewed the father of the other young Falalop boy who had died in the storm. This man, forty-one years old, said he had been forewarned of the typhoon, and when it struck he was told that his son, who had been staying with his adoptive parents, was missing. He wanted to go out and search but became confused out of concern for his pregnant wife, who was very ill during the storm. Moreover, his six other children were crying. He was unable to decide whether to look for his missing boy or stay and look after his wife and children. He strained to think out the best course but was unable to do anything.

A third man, also of Falalop, who was said to have been stunned was seventy-

five years of age and had experienced the great storm of 1907. It is not clear from my notes when it was that he felt the state of *ruschealokh*, although he did recall taking his wife and the rest of the family to another man's house farther inland after he saw a huge wave coming up on land, followed by another. But at some point he was distinctly unable to think or act. Parenthetically, it should be remarked that at the time of the interview he felt concern that another typhoon might be brewing because the weather had not cleared up as he thought it should. His worry was evidenced by his scanning the skies each morning after he arose. He said he had lived through five bad typhoons, including not only the great one of 1907 but another going back to the time of the famous trader Captain O'Keefe during the Spanish period. One might speculate that he had been so sensitized to the dangers of typhoons that this latest one caused him to experience shock, but this is too simple an explanation, for others of his age had not had the same sensation.

Interviews with two or three other Falalop men confirmed that they too had experienced a degree of *ruschealokh*, but nothing indicated that the community as a whole underwent shock. No instances at all were reported for the other islands of the atoll. It is interesting that no women were known to have gone into shock, but this may in part reflect the fact that in this society women are not expected to show much initiative and consequently would not be put to the test as much as a man.

If that explosive psychological state, panic, overtook anyone, it has not been revealed through an examination of the interview records. Everyone, as might be expected, experienced some degree of concern, but it was not panic fear and apparently no one lost control of himself. Father William Walter, the missionary for this area, who was on Mogmog during the typhoon, says that about 175 people gathered in his church and during the storm only one eleven-year-old girl cried, demanding food and not reacting ostensibly to fright. Elsewhere in the atoll, hunger and cold similarly caused some children to cry. Some adults, too, are reported to have cried, but out of fear for the safety of the boys who had just departed on the *Erroll*. It is true that everywhere men ran from house to house shouting, but they did so deliberately and systematically. Says one informant: "Some of the men hollered because they want to take care of people in the typhoon, and maybe they say, 'Let's us go there!', and, 'Maybe I think will be safe there!', or maybe, 'This much people go to there and live [stay] there!'"

If you do not shout in a typhoon, you are apt not to make yourself heard, and if you do not move when your roof collapses or your floor is awash, you are inviting trouble. Of course, there is not much room for flight on a small island, and it would have been madness to have set out to sea. So movement could in no event have been manifested by the kind of exodus we usually associate with the word "flight." But even if we ignore the factor of distance, the fact remains that those who fled did not do so in panic.

The lack of panic may be attributed to a variety of causes, one being that in the several typhoons since the war there was always the realization that the Coast Guard station on the island of Falalop had contact with the outside world, including the Navy and Trust Territory, so that the events on Ulithi would not remain unnoticed. The presence of the missionary, with his access to both material resources and a powerful and protective God, provided further and substantial reassurance. Added to all this, the natives had experienced enough storms to realize that there was nothing to be gained from panic. Many Ulithians have expressed themselves on this matter, so my statements are not so much speculation on my part as a repetition of interview remarks.

Spontaneous leadership will of course emerge in most disasters, depending among other things on the need for leadership. During the impact period of the typhoon there was a relative absence of leadership because the situation was such that it was not needed. Self-preservation depended more on individual or family measures than on concerted action under a leader. No leader was necessary to give direction to the whole community, even in the pre-impact stage. During the storm, individuals emerged with attributes of initiative, force, and confidence. For the most part they were situational rather than institutional leaders. Their roles were limited to maintaining communication and giving directions for moving to places of safety, although their ability to take charge undoubtedly inspired calm and confidence in the rest of the people.

Leadership was more important during the period of rehabilitation, for during that time it could play a more effective role than in the impact situation when it was less vital for survival. Spontaneous leaders were as important as institutional ones even though the force of tradition tended to deny recognition of their informal status. Leadership in this phase of the disaster will, however, best be analyzed in a subsequent discussion of the effects of the storm on the social system.

The emergence of altruistic leaders was not a manifestation of the kind of diametrically opposed reactions often referred to as "polarization." It is true that under conditions of severe stress, where overwhelming danger or severe deprivation assail the individual, latent characteristics may become intensified in opposite directions, but on Ulithi the catastrophe was not seen as insurmountable. The absence of panic and the deeply ingrained feeling of responsibility toward one's kinsmen and neighbors precluded the development of unreasonable egocentrism. Conversely, the situation did not call for heroic sacrifice. People went about their business in accordance with their basic patterns of motivation, even though their responses were not uniformly conditioned by a sense of social responsibility.

The behavior of Ulithi's four psychotics under the impact of the storm has some interesting facets. I ought to preface my remarks by saying that cultural conditioning seems to be strongly reflected in psychosis on Ulithi and that the

psychotics I have known do not seem to have lost complete touch with reality.⁵ Of the four psychotics living in 1960, I saw and had pleasant relations with two whom I had known since 1947. A third was a blind man whom I had known only slightly in the past and who had deteriorated as he approached old age, and I sensed that the natives thought it just as well that I not see him. The fourth was a youth who was the only clearly violent psychotic I had known about, and here again it was obvious that the people were not especially anxious that I should meet him, although I had seen him when he was a boy.

The subject of the behavior of the psychotics during the storm was volunteered by a reliable informant, leading me to feel that his remarks were prompted by a conviction that here was something of special merit for my study. Another good informant corroborated and enlarged upon his observations.

It appears that during the storm a sudden improvement was seen in Mai, a thirty-three-year-old man.⁶ In the wet church where the people of Mogmog were huddled against the wind and rain he acted quietly and rationally—praying, inquiring about the weather, acting solicitously toward the women and children, and showing no signs of aggression. The first informant comments: "After the typhoon I saw Mai working hard and also help people for their work [on their] house, and going to fishing. And he eat with people and also once a while he came to each family and ask how they are. He's been all right." The other informant imparted the information that Mai had only twice "hollered" since the typhoon, and had done so with some restraint, in his own house instead of in the village as he customarily did. He had become a hard worker in the ranks of the men's work groups, and begun to carry on conversations. No one claimed that he had rid himself of his dementia, but obviously it was felt that the shock of the storm had had a salutary effect.

Improvement of a gradual rather than a quick nature appeared in Iourmar, an older man of fifty-seven. When I had first known him in 1947 he had appeared outwardly rational and very friendly, but soon after that, while I was gone, he had had a sudden collapse, and when I saw him in 1948 he was pale, immobile, and withdrawn, hardly recognizing me. In 1960, before the storm, I again saw him after a lapse of several years and he had so improved that he was active in the community. Iourmar's behaviour during the crisis itself was even more lucid and cooperative. He helped other people. He prayed, and unlike a few people who said the typhoon was a punishment sent by God for the people's misconduct, he made no attempt to place the blame. During the post-

⁵ One young man who used to experience manic periods knew well enough, when passing by my house outside the village proper, to pause in his shouts of defiance and pass by quietly, only to start up again when at a little distance beyond. This was in 1947-1949. The strong hand of conformity shows itself in many ways on psychotics, who are treated almost as if they were normals, although of course the people know the difference and never misapply the term *bwuch*, which is used to designate them.

⁶ He is the man alluded to in note 5.

impact period he gradually slipped back in the direction of his former but improved condition, once again becoming highly critical of the way people did their work and making bungling efforts to correct it. His recovery, then, was not sustained.⁷

The blind old psychotic, Iakhomo, living on Fassarai was moved during the storm to a certain house for safety, and then he steadfastly refused to leave it when the others with him took refuge elsewhere. Although he had shown some violence about four years previously, during the crisis he was merely recalcitrant. He insisted on meeting the storm in his own way, alone, and apparently emerged from it none the worse for the experience. No enduring improvement in his condition was reported.

The only truly dangerous psychotic in the atoll had in 1949 at the age of eighteen killed two men on the island of Asor with a carbine left behind by American troops after the war. Up to then, no one within living memory had ever been murdered on Ulithi. The unfortunate young man had been taken away for treatment and then had been returned to his family when it was realized that his case was hopeless. On Asor he was always dangerous and was kept in a barred hut, but during the storm he was removed and taken by his sturdy brother to his father's house as a protection against the typhoon. No one fled from him but the children were nevertheless afraid. He told everyone to pray. He showed no fear of the typhoon and was fairly quiet. He asked for food and tobacco, which was given him by his brother. His mollification did not persist, however, for after the crisis he reverted to his old condition.

Thus the typhoon served as a kind of shock therapy, being unevenly beneficial and unevenly enduring.

No apparent increase in sex activity, marital or otherwise, took place as a result of the disaster. In their anxieties and pressures there apparently had been no effort by the people to turn to sexual outlets. One informant attributed this to the weariness experienced from the hard work of rehabilitation. There may have been a practical deterrent, too, for the storm removed much of the protective concealment in the form of trees and shrubs needed by clandestine lovers for their nocturnal encounters.

Reference has been made to the question of blame for the storm, but the nature of the disaster precluded the encouragement of blaming. In the old days one could always attribute the storm to the machinations of the Yapese. The currently accepted view that typhoons are natural phenomena left no place for scapegoating; at most there was a diffuse feeling that God might be punishing

⁷ It is interesting that Jourmar was one of a party of six men who lost their way in an effort to sail eastward to nearby Fais in April, 1963, and eventually landed almost a thousand miles westward on the island of Samar in the Philippines. It is noteworthy that he was even taken along on the trip, on which a much younger kinsman served as the navigator. Apparently Jourmar emerged none the worse for the harrowing six weeks at sea. For an account of the voyage, see Boykin, 1963.

the people for their sins. It would have been easy to blame the Coast Guard for not having provided more positive assurance that a major storm was impending, but apparently no one thought that their troubles lay in this direction, especially since it was obvious to everyone that the Coast Guard itself had been taken by surprise despite some earlier radio warnings from Guam.

One might expect that the typhoon, coming on the heels of two severe tropical cyclones in 1953 and 1958, with lesser ones before and after, would have prompted some desire for relocation. Inquiry brought out the fact that a few people had indeed spoken loosely about moving to Yap, Palau, or Saipan, and even the Philippines—the last being remembered with fondness by Ulithians who had on several occasions been canoewrecked there—but such talk quickly died down. It was mostly the younger men who had thought of the possibility of leaving, preferably to a place where they felt they would be welcomed by the inhabitants. The older men and women did not wish to bestir themselves. It is interesting that in 1948, when I tried to ascertain if any sentiment prevailed for resettlement in a place where there was a greater abundance of land, food, facilities, and opportunities, it appeared that the younger people were willing, provided the entire population left in a body. Similar questioning after the storm made it clear that the people did not wish to budge. I was not able to establish if the events of the ensuing dozen years had given them a glimpse of the outer world that was not altogether rosy, or if the typhoon had drawn them closer to their cherished homeland. A combination of these two alternatives as well as others is course possible. Ulithians have often expressed to me a sentimental pride in their islands, and I cannot help but feel that the typhoon caused them to rally around their land rather than abandon it.

The Acceleration of Incipient Changes

Interesting as the psychological consequences of Typhoon Ophelia may be, its greater importance lies in the field of social and cultural dynamics. The storm did not initiate change as much as it accelerated processes already under way. Most likely if there had been no acculturative influences or contacts with the outside world, the disaster would have had little effect in altering the existing way of life. In a system essentially closed in character the condition of equilibrium to which the society would tend to return would be essentially the old one. Direct data are not at hand to test this assumption against the consequences of the great typhoon of 1907, but there is every reason to believe that aside from the relocation at that time of some of the inhabitants to other islands, there was no introduction of new elements and therefore no achievement of a new type of homeostatic condition. Ophelia disturbed a system that now was no longer closed—a system already off balance by virtue of its enmeshment with the great world beyond the seas. The catastrophe increased the imbalance and dictated that any return to a state of equilibrium or near-equilibrium would have to be

on a different level.

The shattering of the atoll's isolation had at first been trivial, then moderate, and finally rapid and irrevocable, as a brief survey of the history of contact will reveal.

Early European explorers arrived in the western Carolines over four centuries ago, and it may be that Ulithi was discovered either in 1525 or 1543. Except for an ill-fated mission established on the atoll in 1731 and wiped out six months later, there was virtually no contact with the outside world until the last century. The extent of cultural influence on the people of the atoll was minimal. During the German administration of the Caroline Islands from 1899 to 1914 there was still only weak influence, but somewhat more when the Japanese took over in the latter year. Yet even then the natives were left much to their own devices until the arrival of the American armed forces in September, 1944. In a year's time more than one million men passed through Ulithi, which had become a secret advance base for the invasion of Okinawa and the Philippines. The isolation of the island was shattered severely and dramatically, yet there was little contact between the people and the military personnel because of a deliberate governmental policy of protective segregation. Thus the population was saved from being overwhelmed. After the withdrawal of the military a LORAN station was left behind, operating until 1952 on the island of Potan-geras, and since 1949 a Jesuit American missionary, Father William Walter, has made his headquarters on the atoll (but he spends much of his time visiting other islands of the west central Carolines).

The acculturative process, which had been relatively slow during the Spanish, German, and Japanese regimes, gathered great momentum only after World War II. The typhoon did not so much introduce change as speed up and consolidate what already had been initiated.

The most obvious indications of acculturation are ordinarily seen in the material items adopted by a native population, and so we may start with them. They are overt and scarcely open to the kind of conjecture necessary in dealing with ideologies, values, and other imponderables. Moreover, on Ulithi they were innovations that for the most part had been deliberately and consciously embraced, whereas economic, political, and other social changes had come about almost unwittingly, despite the reverberations they were destined to cause.

In precontact Ulithi the clothing of the people had been fairly scant. Men had worn loincloths woven out of banana fibers on a true loom. Starting with German and Japanese contact, but especially after the United States took over the administration of the atoll, cotton loincloths had largely but not entirely replaced the native ones. Women had worn no more than a brief wraparound skirt woven out of a mixture of hibiscus and banana fibers. This was kept in place with a belt, usually constructed with much care out of hundreds of small beads carved from coconut and sea shells. Up to the time of the typhoon, no



Fig. 6. ABOVE: Women were still forbidden to wear upper garments in 1960 before the storm.
BELOW: Men wore no upper garments prior to Ophelia. In 1948 these men were wearing young coconut leaves for ritualistic purposes.

women beyond her early 'teens had worn a skirt made of the foreigner's cloth, although occasionally women would wear a skirt woven on a native loom but employing nylon threads. Prepubertal girls were still wearing "grass" skirts made of shredded coconut leaves, but it was becoming increasingly common for such children to adopt a simple cotton cloth wraparound, held in place by a twist of the upper border.

Almost furtively both men and women had begun after the war to drape a shirt of cotton cloth over their shoulders when out at sea in a canoe and exposed to the sun and wind. While stopping at uninhabited islands they would often cover themselves in the same way and for the same reasons, with the additional incentive of protecting themselves against mosquitoes. But it was forbidden for anyone—man, woman, or child—to wear an upper garment while in a village.

There undoubtedly was a growing recognition that the foreigner's garments and cloth had their advantages but no one was willing to concede that an open break should be made with tradition. The prestige and at the same time the unacceptability of Western clothing was brought home to me in 1948 when two young men who had just returned to Ulithi after a period of schooling on Guam asked to have their photos taken wearing their shirts, ties, trousers, belts, and shoes. It was necessary to retire to an isolated spot on the island of Mogmog to take the pictures. Although the older people of the atoll would not permit open capitulation in matters of dress, they had already begun to breach tradition when away from the villages. The king himself set the example. He seemed to relish the military shirts he donned at sea.

The incipient use of clothing was not at all inspired by growing modesty, for the missionaries had never deprecated the native dress and certainly not encouraged the belief that it was indecent for women to expose their upper bodies. Women have always attended Mass wearing no more than their customary wraparounds. Protection, then, has been most responsible for the trend toward Western clothing, and to it must be added the desire to emulate the prestigious foreigner, who is seen in his full splendor in magazines and the occasional motion pictures viewed by the natives.

After the typhoon the women are said to have petitioned the chiefs to be allowed to wear an upper covering.⁸ Perhaps this was not a complete innovation, for apparently in old times a covering in the form of a pandanus cape was sometimes employed by men and perhaps women. The argument used by the women was that since most of the trees and virtually all of the leaves had been blown down, they could find no shelter from the sun while working outdoors, particularly in the moving of debris, the digging of pits, and other work connected with rehabilitation. The chiefs quickly gave their assent. It does not take too much to suppose that the people were already on the verge of open flaunting of the old standards and that this provided an easy justification for the transition. And so, six weeks after the typhoon, young women and old ones alike were wearing whatever shirt or cloth they could lay their hands upon, and in this respect had available some upper garments that had been obtained largely through the local missionary. Men now began to wear shoes and trousers without feeling guilt.

⁸ There is some disagreement as to whether the women actually requested permission to wear shirts. Coast Guard personnel maintain that they were told King Malefich had given his consent, but in view of his virtual withdrawal from the community the story does not ring true. One of my most reliable informants says it is his feeling that after the storm some of the more prestigious members of the men's council on Mogmog began wearing hats and otherwise breaking with tradition within the village limits, and that other people, including women, took this as a cue. I am inclined to accept this explanation, for although it is possible that the events on Falalop were as depicted by the men at the LORAN station, anything happening on Mogmog, the "capital" of the atoll, would most likely give sanction to changes elsewhere.

A process that otherwise might have been slow and painful thus suddenly became quick and easy. The grass skirt now disappeared among young girls in favor of cotton wraparounds. Women continued to wear their woven fiber skirts, but I can report that among some gifts I received from Ulithi in 1963 there was not, for the first time, a single skirt of hibiscus or banana fiber; all had been woven out of nylon threads. It requires no clairvoyance to predict that it will not be too long before the native loom falls into disuse. Should it do so, it would release women from a good deal of time spent in preparing fibers and laboriously weaving them.

Hats had never been worn by Ulithians except when outside the village, although ethnohistorical sources do indicate that in the past an umbrella-shaped pandanus covering for the head had been worn. After World War II some of the younger men would occasionally don a European hat to protect themselves, as they explained, from the sun; but again I feel that the hat was prized more as a symbol of Westernization than as a source of shade, for it was seldom that a man lacking a Western hat would bother to make a substitute out of palm leaves, which can be done with ease.

Suddenly, after the typhoon, both men and women began to wear whatever European-style hats were available. In keeping with the spirit of things, the young children now began to wear palm leaf hats, although adults continued to avoid such hats even when they would have been their only means of protection. Palm leaf hats are, admittedly, bulky and cumbersome, yet, if the need for shade had been as pressing as the natives maintained, they ought to have been more common; after all, together with pandanus hats they had served Ulithians and other South Sea Islanders for centuries.

The traditional barefootedness persisted until shortly after the war, when on rare occasion a man could be seen wearing a pair of military shoes while walking on the reef. In the course of time, some of the younger men who had been on Palau, Yap, and other centers of American influence began sporadically to wear Japanese sandals or *zoris*, made of rubber. Now suddenly with the typhoon such footgear became almost *de rigueur*, owing partly to the increased danger from rusty nails and corrugated iron and partly to the discomfort from walking on the gravel and coral rubble that had been churned up in unaccustomed places. Under the old conditions the soles of the feet were tough enough to withstand any threatened laceration or abrasion, so one is led to wonder if the already established trend had not received an impetus from the desire to emulate the foreigner.

The native-style hut had persisted without change for centuries, but when I first visited the atoll in 1947 some inroads had already been made. This was especially true of the island of Falalop, and the way this came about is interesting. A disaster in the form of a firebombing of the native village by American planes in 1944 had leveled many houses, and in rebuilding, the people had adopted a

crude bungalow-like rectangular design that bore little resemblance to the traditional hexagonal hut. To what extent they had been influenced by Japanese or other outside influences I cannot say. Even the island's two new council houses, rebuilt after the fire, though retaining some flavor of the Ulithian style, had nevertheless for the first time used milled lumber, nails, corrugated iron, and paint. Elsewhere in the atoll the changeover was slow. After the American forces had left Ulithi in 1946, abandoning a good many supplies, the natives took every opportunity to roof both their old and new houses with the abundant corrugated iron that had been left behind. The change was slow because there had been virtually no damage from the war. When I made a survey in 1948 of all the dwelling structures on the island of Mogmog twenty-four were of basic



Fig. 7. ABOVE: Men cleaning up on Falalop. Dangerous sheets of corrugated iron are being dumped into the sea. BELOW: A warehouse being constructed on Mogmog along modern lines in January, after the storm.

Carolinian design and sixteen were partly or entirely of the Westernized style; but when I revisited the same island in 1960 virtually every new house that had been built during the ensuing twelve years had capitulated to the new trend. Traditionalism, then, had succumbed with hardly a struggle even before the typhoon.

The tropical cyclone blew down most of the houses, old and modern alike, and when the population began to occupy itself with the reconstruction of new shelters, it turned out that the native design had been abandoned for good. All recent houses have iron roofs and are built in a rectangular rather than hexagonal shape. They are no longer built on stone platforms, although many are raised on piles for protection against ground moisture. Admittedly, the materials brought in by the government and the missionary are all of European type, but there is no doubt that enduring seeds of change had been planted long before. The natives are of the conviction that their traditional houses do not have the strength, efficiency, and comfort of the new ones, so they willingly embrace the change. However, I am not entirely sure that the old houses did not have some special merits, especially in their utilization of local materials. One of the main drawbacks was that it took so long to build them. It may well be that the typhoon proved the strength of concrete in the eyes of the natives, for the two concrete-block churches built by Father Walter withstood the wind and floods. After the storm there was an expressed desire on the part of the people, the government, and the missionary to exploit the possibility of building with concrete.

Ophelia hastened what will be a permanent change in dietary characteristics. During the war when the American forces were in Ulithi there had been a temporary but significant alteration in the diet. The natives had been kept alive largely through military rations, so they had already experienced some of the changes that were to come later. But for a large part of the period when the Americans occupied Ulithi, most of the able-bodied men were on Yap, having been forcibly moved there by the Japanese to work on military installations. A number of Ulithian students had also been stranded on Yap during the war. Thus the new foods of the Americans had not been available to a large segment of the population. Moreover, children born after the war had not seen much of this kind of food because military rations were no longer being dispensed. However, trading ships offered some continuity, and in addition those young men either working at the local LORAN station or staying at government installations on other islands of the Carolines were able to experience a new diet.

But habituation to new foods was by no means the result of the military period alone. Rice had already been introduced by at least the time of the Japanese regime and was especially familiar to boys who had gone to Japanese schools on Yap. Well after the war flour had been introduced, apparently having been encouraged by the local missionary. By the summer of 1960 corned beef

and such other canned foods as tuna, sardines, and evaporated milk had become popular. Soda drinks, although expensive, were purchased when possible, adding free sugar to the diet.

Refined sugar had steadily gained in importance over the postwar years; in fact, by 1960 it was painfully obvious that it had brought about an appalling incidence of dental decay among a people whose teeth I had examined in 1947 and found to be singularly free of caries. The postwar use of sugar found application in a variety of ways, of which the most pernicious from the point of view of health was in the manufacture of a beverage called *fifi*. Traditionally, *fifi*, which is a drink consumed daily in large quantities by children and adults alike, uses a coconut sap base to which various herbs and other plants are added. Ulithians claim that it is their main food. But the important thing is that nowadays sugar has largely replaced this palm toddy as the basic ingredient.

By 1960 sugar had also come to have widespread use in sweetening bread. It was being used as a frequent substitute for fresh palm toddy in preserving leftover foods, in making a kind of coconut candy, and in taking the bitterness out of aroids, breadfruit, and *iabwuch* (*Allophylus* sp.). Three or four years previously it had come to be used in a newly manufactured alcoholic beverage called *habwolokh*, or "yeast" (one of its ingredients), which, however, was not so popular as fermented palm toddy. Even though the natives were paying seventeen cents a pound for sugar, they eagerly sought it, largely because it saved considerable time as compared with the procurement of palm toddy.

Now, suddenly, as a result of the typhoon virtually all traditional foods were denied the people and they had to depend on the foreigners' foods, to which they of course had already become somewhat accustomed. A few days after the storm the M/V *Erroll* arrived with 290 cases of "C" rations from military stores on Guam. These contained canned meat stews, sugar, candy, coffee or chocolate, chewing gum, cigarettes, and biscuits. At the same time the ship left sixty 100-lb. sacks of rice, twenty-seven 60-lb. sacks of sugar, and twelve 50-lb. sacks of flour. Evaporated milk for babies had become common after the war; now it was being imported, along with dried milk, in increasingly large amounts.

Undoubtedly, this impact on the diet could not be sustained at its original pitch. Many natives came to express some distaste for the new foods, particularly the military rations, and yearned for the coconuts, aroids, breadfruit, and fish that pleased their palates. To some extent their appetites were soothed by the importation, largely through missionary efforts, of traditional foods from nearby Yap.

There can be no doubt, however, that permanent changes have taken place, and rice, sugar, flour, condensed milk, canned meats and canned fish have found a wider usage than ever. For the first time coffee became a beverage through its introduction in the "C" rations. Natives have expressed a liking for this drink and it most likely will remain. This would be a minor blessing if it replaced

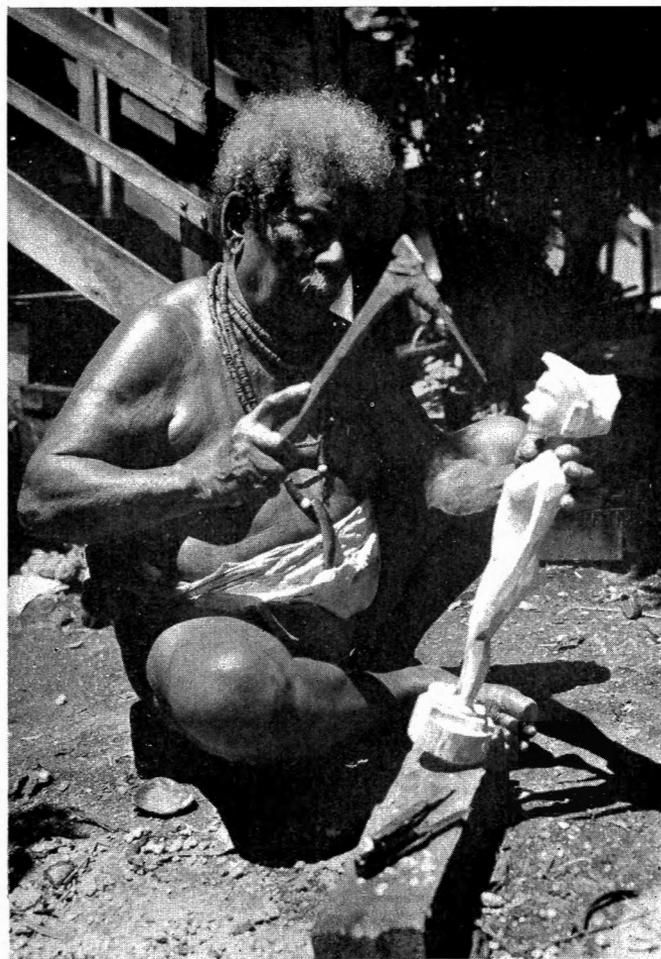


Fig. 8. LEFT: Women were working in 1960 before the storm to earn cash through the sale of copra. RIGHT: After World War II men found a source of cash in the sale of handicrafts.

toddy, either sweet or fermented; unfortunately, however, a good deal of sugar is stirred into it.

Eating in traditional commensal units was temporarily suspended by Ophelia. Customarily, even though a nuclear family may be domiciled under one roof, its members may eat separately in other units. In 1948 I ascertained that in the village of Mogmog there were twenty-six commensal units averaging 5.2 persons in each group. The composition of these units varied from complete nuclear families to mixed and extended families, with occasional non-relatives included. As soon as the storm subsided, the natives gathered together what food supplies they could muster. For about a week, on Mogmog at least, they would assemble as one community in front of the church and partake of their meals in common. There was no hoarding or effort to conceal supplies; instead, cooperative sharing dominated the consumption of food. After a week had passed, the people reverted to the old eating patterns, for by this time sufficient supplies had begun to arrive from outside sources.

Less objectively identifiable than the foregoing are the effects of the typhoon in the economic and social spheres. It can be stated from the outset that certain social institutions either underwent little or no change as a result of the storm, or at least were not susceptible to detection in the two-month period following the disaster. For instance, there is nothing to show that the family and lineage systems underwent immediate change, as indeed they had not to any appreciable extent previously, despite the impingement of the outside world. The system of land tenure, enormously complex, remained steadfast, despite the fact that forces had long ago been set in motion that must inevitably transform its character. Patterns of social control were in some respects superficially changed for the moment but gave no indication of being transformed.

Since it is with change rather than stability that we are concerned, we ought to turn to this aspect of our survey, and a fruitful way to begin is by considering what Ophelia did in the economic sphere.

Traditionally, goods within the atoll had always been distributed through gift and ritualistic exchange, and outside the atoll barter had customarily been resorted to in addition to these methods. Cash began to make an appearance during the Japanese administration, although even then and for several years after the war it was never used within the community, except occasionally, as in the purchase of a pig. Most income came from the sale of copra, with a trickle coming in from the sale of handicrafts and employment with American governmental and military units. A great and sudden increase resulted from the collecting of trochus (*Trochus niloticus*, Linné), a mother-of-pearl shell of value in the manufacture of buttons. This happened in 1956, after the local missionary announced to the people that the shells were present on the reef and should be sold to traders. Trochus had been seeded several years before by the Japanese, who had never had the opportunity to return to gather the shells. The foreign

goods that were in demand were rice, canned meats and fish, tools, textiles, kerosene, matches, flashlights, soap, dyes, fishline and fishhooks. A great impetus to the use of cash in the community came about when local stores were set up about 1956 on Mogmog, Asor, Falalop, and Fassarai. Money was sometimes used when a person wanted to rent a canoe to transport his copra. By 1960 Ulithians were using cash to purchase canoes from other islands, and it appears probable that some occasional selling of canoes was taking place within the atoll itself. In addition to all this, the people were making sporadic purchases from Guam and the United States through the good offices of the missionary and Coast Guard personnel.

All these stores were wiped out by the storm, but it is easy to see that they had become so deeply entrenched in the economic structure that nothing could stop their reappearance. They had become not only a symbol of change but an instrument as well. The storm dramatized the importance and indispensability of the local stores in the new order of things, and if they had not been reinstated by February of 1961, it was only because there had not been time to do so.

A digression into the origin and subsequent history of the stores is not without interest and will help make clear the role they will play in the future. A forerunner was set up in 1945 at the instigation of the Navy medical officer who was staying on Fassarai to look after the people of the atoll who had been placed there. It was designed to assist the natives in selling their handicrafts to the military personnel who visited there once a week. Afterward, owing to the conservatism of the king, all efforts on the part of the Trust Territory to induce the natives to maintain stores failed. On January 3, 1949, for example, an atoll-wide meeting of the chiefs was held on Mogmog to consider the invitation of the Trust Territory to institute local stores. My advice was sought, and although I endeavored to show the advantages and disadvantages of the idea, it was apparent that the traditionalist elements resisted the proposal. No action was taken. After Wegeleamar, the king, died on September 26, 1953, new efforts to institute stores succeeded, the first one being opened on Mogmog around 1954. It was owned by about a dozen or more "stockholders" who had accumulated enough capital through the sale of copra. The chief of the island headed the company, and two storekeepers took turns in conducting sales at sporadic hours. Prices were set by the Island Trading Company, a government-operated firm which sold merchandise to the store. Other goods were acquired through the kindness of the missionary and Coast Guard personnel, and other means. Sales were excellent, with profits varying between ten and fifteen percent. In time, however, some suspicion of dishonesty arose. Later, the islands of Asor, Falalop, and Fassarai started their own stores. The two on Asor and Falalop were cooperatively owned and were successful and the one on Fassarai that had been established along the lines of the one on Mogmog ran into much difficulty and mistrust. Eventually, Mogmog gave up its privately owned store and replaced

it with a cooperative one, which in 1960 was operating in a highly satisfactory manner, having accumulated about \$2,000 in profits for its sixty-odd owners, who constitute the adult male population. The cooperatives apparently solved the two problems of profit and honesty, probably because they fit into the strong pattern of community cooperation that had always been a dominant characteristic of the society.

The adjustment that Ulithians have made to cash purchasing in these stores has necessitated an alteration in native values and patterns of exchange. There is general agreement, even among the older people, that the stores permit wares to be more readily available and more varied than heretofore, and at the same time have ended the long delays and shortages attendant upon direct purchases from the infrequent ships that stop briefly to pick up local copra. In 1960 there was a move to supplant the private Yap Trading Company, which had replaced the government Island Trading Company, with a Ulithian organization that would make it possible to make direct purchases from Guam and thus eliminate the profits of the Yapese middlemen.

The typhoon merely stopped temporarily a development that the storm itself could only accelerate by creating a shortage of goods. The demand for replacement of supplies lost in the wind and water became acute, and at the same time pointed up the need for a local retail outlet that would expedite purchasing. The typhoon gave the new stores, once they could come into being, an opportunity, owing to new needs, to stock a greater variety of goods. Overcoming the objections of the conservatives, the younger men had already by 1960 been very successful in their introduction of such new items as scissors, knives, penknives, watches, cigarette lighters, and carpentry tools. These young managers could now take advantage of a fluid situation further to implement their policy of providing any goods that might be in demand.

Another effect of the trend away from the native system of exchange and toward the new cash economy was in the alteration of old work rhythms. The urge for money constrained the natives to employ greater speed and energy in all their work activities, thus reducing the time for lounging about in the canoe sheds and council houses. An amusing example of the new spirit was the pronouncement of the chief of Mogmog that the women of that island must return home sooner from the menstrual houses after their periods had terminated. (Women often spent an inordinate amount of time there.) Contrasting the situation in 1947 with that in 1960, one could readily observe that the manufacture of copra had suddenly become an energetically pursued activity rather than a desultory one, with large kin groups hacking away and gouging at an unaccustomed pace. Some of the older men complained about the frenetic tempo that had begun to push aside the leisurely attitudes of the past, wondering out loud if it were at all worth while.

The traditional role of women in the economy was conspicuously altered

by the new economic order. In the summer of 1960, before the storm, I made specific observations on this score. The most obvious change was the active participation of women in the manufacture of copra. Indeed, on one island four women were each operating alone, and even though two of them were married, none of them worked as part of a family team, as had been customary. Each sold her copra directly to the trading company and received payment for herself. The husbands of these women seemed to be content with the arrangement and made no complaints about any possible neglect of their spouses' domestic responsibilities. We can assume that any cash acquired in this fashion went into the family pool, but it is nevertheless interesting that a certain degree of independence must have resulted from the women's enterprise.

Women had also begun to turn to other cash-producing activities. They found it especially lucrative to gather the trochus, a valuable income-producing shell. Unmarried women rather than married ones took up the fishing. Mostly the shells were collected on the reefs, but some women undertook to dive down deep for them, always separated from the men, however, for reasons of modesty. Women had also turned to the making of handicrafts for sale to the Yap Trading Company, the Coast Guard, and occasional visitors. The motivation behind all this was always the desire to purchase trade goods, especially after the local stores had opened and made items at once available; it had nothing to do with any drive for female emancipation.

The new striving for money helped produce changed attitudes toward sharing. By 1960 the great force of kinship had already been diminished to the extent that people questioned their obligation to support individuals who were lazy and therefore unproductive. A trend toward advancing the interest of the nuclear family had begun to develop, although it would be a mistake to suppose this had been brought about by economic factors alone.

Another effect of the drive for cash was the creation of inequalities in wealth hitherto suppressed by kinship patterns. The ability of some men to accumulate more cash than others through the manufacture of copra and the gathering of trochus became readily apparent. Actually, most men worked in cooperative economic groups of no fixed composition, and they divided their incomes; but it is nevertheless true that some men showed an ability to participate more actively than others, and these were the ones who had gained a reputation for being better off than others.

Still another effect was to heighten the value of land. The traditional system of land tenure does not allow individual ownership of land but it does convey usufruct tenure to men and women. With coconuts in greater demand than before, efforts to control parcels of land became greater than ever, with disputes increasing noticeably.

There is an obvious circularity in the whole process of acquiring cash. Ulithians work for money to enable them to purchase trade goods. This with-

draws them from their customary economy so that they reduce their usual fishing, gardening, weaving, and other economic pursuits, thus creating a vacuum which can be filled by purchasing foreign goods, and so on and on. Having been drawn irrevocably into the world orbit, the natives now have a suddenly increased commitment to extend changes that some of the older folk had already begun to view with misgivings. At any rate, when the typhoon struck it hit an island community that had already taken more than the first tentative steps toward a new economy. And the way in which the natives dealt with the storm reflected many of the changes that had taken place in recent years.

These, then, were some of the economic changes that were underway at the time the typhoon roared in from the east, and it seems apparent that they were hastened perceptibly by it.



Fig. 9. ABOVE; Ophelia caused women to do unaccustomed heavy work. Note upper garments. BELOW: A work party of children at rest. Garments were popularized by the storm.

After the storm, women began to do unaccustomed heavy work—digging, chopping, hauling, and even carpentering. Somewhat clumsy in their efforts, and obviously unused to such sustained exertion, they nevertheless showed considerable zest in the restoration of their lands and reconstruction of their houses. To the younger women, this activity was something of a pleasurable game, but whatever their motives, both they and the more mature women cast aside the restraints of centuries and often put some of the men to shame with their doggedness. No doubt to a large extent they had been conditioned by their recent entry into the manufacture of copra and the collecting of trochus shells, but the typhoon broke wide open what had hitherto been a modest incursion into new avenues of activity. One used to seeing Ulithian women, seemingly glued to the ground after reaching adulthood, never again to arise, could not help but be astonished at seeing them on their feet in the performance of their work.

The work of the women was part of a larger, unprecedented plan in which three kinds of fatigue parties, composed separately of men, women, and children, gave their services to the community for three days of the week. Communal labor has always been traditional on Ulithi but the uses to which it was now being put after the typhoon were novel. The plan had been deliberately conceived by some of the younger men and had found widespread acceptance. Children for the first time performed labor, and were made to look upon their contribution as not only a useful obligation but a sport. The atmosphere in which everyone worked was characterized by a gaiety never before manifested so openly, unless it was at the group dances. Singing, chanting, and laughing were exercised without the usual restraints of propriety. Pre-existing hostility patterns could not help but be repressed in the pervading spirit of *camaraderie*.

Some of the new work patterns are probably among the more evanescent of the changes wrought by Ophelia. With the reestablishment of orderliness, the re-building of shelter, and the return of gardening and fishing, children will undoubtedly have reverted to their old carefree days, although it is possible that their new-found energies may be directed toward helping in the making of copra, an activity in which they had already begun to play a small part. Women will have returned to the less strenuous aspects of the daily round, but again there is the possibility that they will direct their new emancipation toward intensification of their cash-producing activities. The obligation for adults to donate three days of labor a week for the common good will by now have vanished into thin air, without implying, however, that the private and the community labor parties of tradition will be abandoned. Most likely the force of tradition will cause a return to some of the decorum of the past, with children especially being enjoined from shouting and racing through the villages; yet it is probable that a less restrained atmosphere during work will henceforth prevail throughout the society.

One effect of the storm on the economy—a changing agricultural procedure—had not had time to manifest itself by 1961, but there can be no doubt that

impetus was given to a better conceived and implemented agricultural improvement program. Since the advent of the American administration, and to a lesser extent that of the Japanese before it, efforts had been made on the part of the government agriculturists to improve the variety and yield of the local plant crops. It is doubtful that these had ever had more than superficial effect. When, after the typhoon, the Trust Territory administration sent in a special agricultural advisor and he remained for some weeks, returning again at a later time, he naturally was in a better position to provide more specific, detailed advice than had previously been available from either the Yap administrative district or the central administration on Guam. This agriculturalist planned a systematic revision that without doubt must by now not only have helped in recovery but produced a lasting imprint on the nature and quality of the crops.

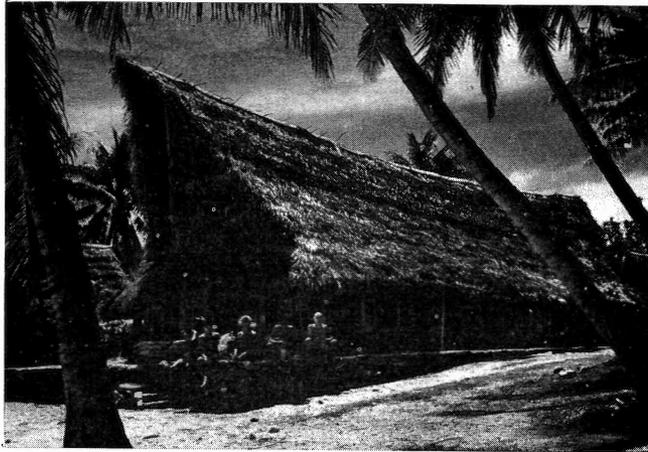


Fig. 10. ABOVE: The men's council house on Mogmog in 1948. It symbolized political authority. BELOW: The same house in 1960 just before the typhoon. It was already weakening, and collapsed during the storm.

A partial realignment of political power resulted from the disaster. The political structure and hierarchy of authority prevalent for centuries had been perceptibly altered under the German and Japanese administrations, although the changes were principally in external relationships, especially in the necessary accommodation to foreign authority and the concomitant weakening of the bonds to Yap. Internally, the form and function of the native political system had not undergone great change, unless it was in the prestige of the king, who now no longer enjoyed the kind of support he had formerly enjoyed when paganism held full sway.

To appreciate the nature of the changes to come it is necessary to review the traditional system. Each Ulithian village has a council of elders made up of men who are close to middle age or older. Men are admitted to membership in a completely informal way, the only implicit criteria for membership aside from age being a reasonable sense of responsibility and degree of intelligence. Those who are excluded, again aside from age, sense that they are not encouraged and so refrain from attending council meetings except as observers sitting discreetly in the background. Young men accept the fact that power is in the hands of the elders and do not particularly resent the situation.

With the typhoon, informal leadership dramatically encroached on the formal authority of the men's council. During the storm itself, younger men took a good deal of initiative in supervising aid and organizing evacuations. After the storm it was again young men who showed the way to reconstruction and rehabilitation. The older men seemed to accept and even welcome the assistance of the younger ones, especially since it was felt that the new generation was wiser in the ways of the outside world on which so much reliance was now being placed, especially in providing material assistance. Thus an old pattern became weakened. To the credit of the younger men it should be pointed out that they assumed their authority with great tact and little disturbance. They continued to show the traditional deference required toward older people. But when for the first time they began to speak up in council meetings, as I observed in 1961, it was obvious that an old order was passing for good. New criteria, only superficially reflecting youth but in reality fashioned ultimately by experience with the outside world and all that this implies, are forcing the change. In addition I would suggest that younger men, with their preoccupation with copra-making and trochus-fishing, have attained an overall economic position that cannot help but be reflected in the council meetings.

The typhoon did much to lessen the authority of the reigning king, Malefich. To understand how this came about it is necessary to understand the background of his assumption to office. When the former king, Wegeleamar, died in 1953 there was for the first time an inclination to depart from the traditional line of succession to the position, which was filled by the oldest competent member of the Fasilus lineage. The old man who technically headed the lineage

had pleaded to be released from his obligation on the grounds that he felt incapable of meeting the exigencies of the office. His lineage mate, Malefich, was next in line but similarly begged off. As a consequence, a man who was highly respected for his navigational skills and general competence, but belonging to another lineage, was selected by an inner circle of elders, and he agreed somewhat reluctantly to assume the position. But at the last moment, before the decision could be communicated to Yap for approval by the Gagil chiefs, Malefich had a change of heart and agreed to become king after all. The previously selected candidate, who was a pagan, retired gracefully.

Malefich was weak from the start, and in 1960 it could be observed that his authority had long before been taken over by the old *metang* on Mogmog. When the typhoon came raging over the island, Malefich showed considerable ineptness. At this time the old *metang* was hospitalized on Yap, but a high chief on Falalop, where Malefich lived, became the de facto king, at least as far as that island was concerned. This man, named Mara and belonging to the Limat lineage, was the one with whom the Coast Guard and other authorities came to deal. Fairly young at forty-one years of age, he showed quiet confidence and initiative, contrasting markedly with the king, who was conveniently indisposed after the storm with an infected foot and went into virtual seclusion.

Thus, it can be seen that prior to the typhoon the first tentative steps away from the traditional succession to the kingship had been taken, but the typhoon, with its demand for vigorous and effective leadership, forever shattered the notion that the heads of the atoll had to be drawn from the Fasilus lineage.

A somewhat parallel replacement of a de jure chief by a de facto one took place a few years ago on the island of Asor, where the head of the village had become so functionless, through senility and ineptitude, that a man in his thirties took over his responsibilities. The acting chief admittedly belongs to the same lineage as the retired one, but he is not next in the line of succession. However, he is a man of some force and intelligence, and as a youth not only attended Japanese schools on Yap but acted as a canteen clerk there. In 1961 the acting chief had solid authority on his island, undoubtedly due in part to his ability to command the situation during and after the storm. This example reinforces the view that a new type of person is needed to hold political office.

Although the storm did not strike all communities equally, there can be no doubt that much of the difference in recovery on one island as compared with another was the result of leadership. Mogmog, long known for its strong political chiefs and councils, fared far better than Falalop or Asor, where the men holding positions of authority are traditionally reputed to exercise it less effectively. Fassarai was hit less hard than the others but in any event not only had a competent chief to supervise recovery but also several young men capable of initiating practical steps toward rehabilitation.

How did the typhoon effect relations with Yap, the traditional overlord of

Ulithi and a string of other islands extending farther east? The complex relationships in the miniature empire controlled by Gagil district chiefs in Yap has withstood the concerted disapproval of three successive foreign administrations, including the American, and it seems obvious that something more than the threat of force has kept the system together, even though on a greatly diminished scale. Now Yap must be seen as having little political control; instead, it retains a strong economic and sentimental influence over its subjects. Viewed from the point of view of an American, the system is contrary to democratic principles, but the economic advantages of being in good favor with Gagil are substantial enough to cause Ulithi to go along with the arrangement, much as it may be deprecated by officialdom. Yap, as the "parent" of Ulithi, has obligations toward its "child" in the east. This was dramatically brought out on January 7, only five weeks after the storm, when the M/V *Erroll* arrived in the lagoon with 200 baskets of taro, yams, and Polynesian chestnuts sent by the people of Gagil to the people of Ulithi. Accompanying the cargo were two Yapese, one of them actually part Ulithian. The food was distributed to all the islands of the atoll without regard to the complicated *sawei* system, involving as it does a reciprocal relationship between lineages on the respective islands. The elders of Gagil had held a meeting in Gatchapar village and made the decision to assemble and ship food. The gesture was a humanitarian one but it had overtones of moral obligation.

Ophelia, then, did nothing to hasten the deterioration of the traditional vassal-like linkage, but rather allowed it to express itself in a new form and thereby gain continued life. The *sawei* system of reciprocity was based on the notion of an upper caste landlord lineage dominating a lower caste tenant. It carried many benefits to the tenant, for reasons that are too involved to go into here. Under American administration it had perhaps become outmoded. Yet Ulithians have need to turn to Yap for some of their important supplies, and in addition to this they are bound by diffuse ties originating in a variety of factors. The dispatching of foodstuffs to Ulithi on an island-to-island basis rather than a lineage one had more the character of the strictly political relationship known as *pitigil tamol* than *sawei*. It must be obvious, however, that whatever the form, the obligation of Yap to help its "child" was still being exercised. Ulithians are not apt to forget soon the expression of assistance made by Gagil.

Without doubt the place of Christianity in the lives of the people was considerably enhanced by the typhoon.⁹ The church structures, where possible, were used as both shelters and rallying places and stood firm against the elements. The people, no matter where they were, kept praying aloud, throughout the

⁹ The old paganism had begun to decline in the late 'thirties, when two missionaries based on Yap began to make periodic visits to Ulithi. During the war they were beheaded as spies by the Japanese. The spiritual needs of the people were attended to during the time of the military occupation by Father James E. Norton of the Marine Corps. In 1949, about eighty percent of the people were Christians, and in 1960 the figure had risen to ninety-seven percent.

storm, and gained considerable comfort thereby. The presence of Father Walter on the atoll did much to reassure the people that they would be protected by Providence, and his subsequent help in obtaining food and materials, as well as interceding with the Trust Territory and Coast Guard, could scarcely have gone unnoticed.

One may assume on principle that some magical beliefs and practices were still extant at the time of the typhoon, but certainly they were minimal. People refused to concede that sorcerers on Yap might have caused the typhoon, and if a few old people persisted in this belief, they did not give voice to it. Recourse to magic in the treatment of illness had virtually disappeared; in fact, the rapidity with which modern medicine had replaced it was little short of phenomenal. The white man's medicine worked—that was obvious. During the war it had wholly eradicated all the cases of yaws in the atoll. After the cyclonic storm, when the dispensaries had been destroyed and the drug supply virtually ruined, the main concern of the male nurse and the "corpsmen" had been the procurement of penicillin, sulfa drugs, aspirin, and other drugs to which the people had become accustomed. If the storm did not visibly increase faith in modern science in the treatment of disease, it certainly gave testimony of the extent to which it had come to be embraced.

The way in which Ophelia modified centuries-old taboos is interesting. Ulithians refer to any prohibition as an *etap*, a word etymologically related to "taboo," but used in so loose a sense as to include secular interdicts. Some of these restrictions are hardly more than ritualistic expressions of decorum, while others are derived from religious considerations lingering on from pagan times. Their origins frequently are obscure or completely forgotten, although it should be noted that often an *etap* may be instigated by highly practical and sensible considerations, such as a desire to protect the food supply or to regulate the presence of outsiders arriving from other islands within or without the atoll. Some loosening of the old taboos had begun after the war and even before that, but most *etap* had continued in force even where their original basis was no longer clear. The typhoon had a varying effect on the observance of taboos. We have already noted that the attitudes toward garments were so changed as to permit the use of items previously frowned upon.

Taboos relative to menstruation were noticeably relaxed. Changes had already begun to take place before Ophelia. By the summer of 1960 women were being allowed to leave the menstrual house to attend services at the church and to visit the dispensary. All but a few had ceased to remain there for the customary three full lunar months after delivering a baby; indeed, some were having babies delivered by the native male nurse at the dispensary, where they would remain eight or nine days and then fill out one postpartum lunar month at the menstrual hut. Men, previously enjoined from visiting their wives or seeing their babies because of the proscription against trespassing on the grounds

surrounding the hut, were now able to enter the area to speak to their spouses and look at their infants. Schoolgirls were already being allowed to attend school during their menstrual periods, although to reach the building they had to be sure to avoid the village and walk along the beach to get there.

The long postpartum sex taboo between a woman and her husband had in recent years gradually been lifted, so that instead of waiting for the child to be able to walk to the beach and dip its head in the water before they could resume coitus, the parents were at liberty to do as they pleased. The old belief had been that if marital relations were to be resumed sooner than this it would make the infant weak, thin, diarrheic, and unable to walk. Other restrictions between spouses had broken down completely, and as a consequence it is said that coition between them was more frequent.

The effect of the storm was to consolidate and still further encourage the erosion of the sexual taboos. All the menstrual houses had been either partly or completely destroyed, although some semblance of segregation was still in effect six weeks after the disaster. On Mogmog women were continuing to use a hut that had collapsed and was resting precariously on its eaves. On Fassarai a small new hut had quickly been built, and on Falalop two were in the process of reconstruction. There was no talk of abandoning menstrual houses, but it was obvious that the old order was being flouted in many ways, especially since women were badly needed to help in the work of rehabilitation and could not be allowed the luxury of lounging about in the huts. Apparently only a few of the older generation seemed to mind the loss of the old restrictions. Men moved about freely in the vicinity of the huts, and women moved unselfconsciously away from it. The sense of boundary had faded even before this, when the menstruants in the huts had been led during the storm into the churches for protection and had for the first time mingled freely with the other villagers. Before this typhoon, women in the houses used to be moved to safety by following a prescribed path to previously selected houses, where they continued to live in isolation, but the new attitude probably forever precluded this.

Some taboos relating to canoes continued to be maintained in force after Ophelia. While these may seem to be mere courtesies, they have practical applications and will therefore be continued in use. One of these requires that a canoe arriving at the reef off an island shall lower and dismantle its sail and mast. This certainly prevents rash young men from wrecking their craft. As the canoe is being poled or paddled in, no one may stand—a taboo that has no apparent rationale but which may in some way be more than a gesture of courtesy to the “old men” who lounge about in the great council houses always located near the shore. On coming ashore, the leader of the canoe, or his representative, must go to the men’s house and make a formal declaration of any “news” that the canoe may bring, as well as a statement as to the composition of the passengers. Failure to make this declaration is viewed as a grave offense,

punishable by the destruction of the canoe.

It would be interesting to see how other taboos have fared. Women who have not borne a child have traditionally been forbidden to enter the sacred taro patch, probably because their barrenness might affect the crops. Those persons who have defecated during the morning or had sexual congress during the night are similarly excluded, for reasons never made explicit. The taro patches were temporarily ruined by the inundation of waves and salt spray, and I would venture to guess that with their reconstruction the attitudes toward them will have become greatly altered. Christianity has already alleviated any fear of punishment by the female spirit, Lachokklubwol, and so if the observance of the taboos had in 1960 become merely routine it could scarcely survive this latest assault. Another taboo, minor in importance but previously observed assiduously, forbids the carrying of a certain large shell fish through the village, ostensibly because it suggests the female pudenda; it will probably persist for reasons of delicacy.

The site of the former atoll-wide council house has up to now been considered sacrosanct and had to be avoided by all persons not performing some ritualistic obligation. The house itself was not rebuilt after its collapse many years ago, but the location continued to be used to invest new kings, as well as to perform the ritualistic killing and distribution of sea turtles. Its political and religious implications have persisted for some time, even though the original basis for these had been destroyed by the undermining of the old religion. The outward forms, at least, continued to be observed with respect to the site until 1960, when I observed a turtle ritual there (Lessa, 1962). Probably the destruction of the buildings in the area, including the council house that had still been standing alongside the site of the old house, will cause a reconsideration of the taboo. Among other considerations, the appreciable expansion of the population of the village on Mogmog may demand that the unused land be turned over to new housing.

The effect of Ophelia on the children of the atoll was to provide them with unaccustomed opportunities for gaiety and freedom, and at the same time inculcate a certain degree of discipline, cooperation, and responsibility. Two months after the devastation they could be observed shouting, laughing, and singing in unwonted fashion. The landscape had been considerably altered, creating a novelty to be exploited much in the fashion of an American child playing in the snow after a blizzard. Dwellings had to be repaired and rebuilt and in assisting their elders the children went about their work as an exciting game. Trash had to be removed, but this was viewed as play rather than work. All the atoll seemed to be alive with hyperactive children, for without doubt their elders had not communicated to them any feeling of despondency or concern. For the moment, at least, life had assumed the character of a prolonged holiday, embellished with the gay colored clothing and frilly foods of the foreigner.

If one were to guess at the long-term effects of the storm on the children, one might say that perhaps the freedom from traditional behaviour that they had already begun to experience through schooling, church influence, and contacts with the Coast Guard station on Falalop, where they could see motion pictures, was further promoted by the storm. In the old days, although children had been raised with much permissiveness and solicitude, they had nevertheless been required to observe proper decorum by keeping down their voices and not racing through the villages. Now silence was no longer so demanded of them, and they could move about more freely from one place to another. This is not to imply that control over them had broken down; instead, it means that greater tolerance of their animal spirits was assumed by their elders. Another enduring effect might come from their "regimentation" in the work parties that were established formally and for the first time after the windstorm. Even though the children regarded their projects as a kind of sport, they willingly submitted to the necessary restrictions attendant upon them. Finally, the general plasticity in the social behavior of the adults could hardly have escaped influencing the children's conditioning.

A kind of "urbanization" that has been taking place over the years in Ulithi, in that the population has been tending to concentrate on fewer and fewer islands, is worthy of comment. Once, twelve islands were inhabited, but by 1904 only nine. Then a general depopulation set in, and by 1949 only five islands were inhabited. After that there was a sudden and steady upsurge in population, yet the villages on Asor and Lossau began to diminish in numbers, with those on Mogmog, Fassarai, and Falalop increasing. Mogmog is steadily becoming the center of population, even though it is not the largest of the islands; in 1904 it had 95 inhabitants, and in 1960 it had 175. There appears to be no single reason for the population shifts. Sorlen and Pigelelel, which once supported 70 and 79 persons, respectively, are reasonably fertile and comfortable, yet both have been unpeopled for decades.¹⁰ If impressions have any value, I would like to venture the suggestion that the places being abandoned are villages with little opportunity, activity, and excitement, whereas those that are expanding offer advantages in trade, education, medical facilities, and recreation. Some of this new focus on certain islands is due to historical factors and some to geographical ones. Yet a place such as Falalop, where an air strip is located and a Coast Guard station is maintained, continues to decline in numbers, despite the fact that it is easily the largest of the islands and has a big taro field, while smaller Mogmog becomes more crowded than ever. In any event, the fact is that after the typhoon one more island, Lossau, was abandoned. Mogmog showed signs of expanding more than ever.

These, then, were the overt manifestations of Ophelia's impact on the atoll.

¹⁰ For details on the distribution of the population by islands for the years 1904, 1949, and 1960, see Lessa and Myers, 1962: 246.

They are manifestations observed during a brief period of two weeks, but they gain greater significance by our knowledge of the 1947-1949 baseline as a means of gauging the degree and direction of change. It now remains to see what wider implications can be derived from their interpretation.

Conclusions: Disaster Theory

The foregoing is an essentially empirical report on a collectively experienced stress situation, and it is hoped that it may in some measure contribute to the urgently needed kind of cross-cultural and interdisciplinary research necessary for the emergence of a theoretical frame and conceptualization of disaster. If nothing else, it emphasizes that individual and group reactions to situations of extreme shared stress must be studied in their particular context.

While the psychological effects of the 1960 typhoon on Ulithi have been described, the consequences to custom and social pattern have been given greater emphasis because from the anthropological point of view they were clearly more important. Anthropology as a discipline is more concerned with cultural and social dynamics than with individual or social psychology.

The function of disaster as a catalyst of change is not a newly recognized role, having been emphasized by Prince, Carr, Sorokin, and to a lesser extent Spillius; but perhaps specific recognition of it has seldom been given for a tribal society. Catastrophe does not, however, always lead to permanent social change, for in any system that is virtually closed, a great impact in the form of disaster will simply mean that after recovery there will be more or less of a complete return to the old pattern without enduring change. But where a society is already undergoing change, a disaster will accelerate the already existing processes. This is true of the modern industrial community, and in attenuated form it is true of a society such as Ulithi, which has now been linked irrevocably with the outside world beyond the Carolines. At the time that Ophelia hit the atoll, the society was already in a state of mild flux. It had lost the approximate homeostasis that had endured for centuries when exposure to the great nations had not intruded. When calamity came, disequilibrium came with it, but since the social system was no longer a relatively static one, it regained an approximation to equilibrium within a new context.

The innovations that the people of Ulithi had already begun to accept in the pre-impact period were seen by them as not simply change for the sake of change but as an aspect of progress. The natives envisioned the adoption of certain foreign ways as not merely inevitable but desirable as well. True, some of the older people counselled against the abandonment of the old way of life, but the majority of the population saw merit in change and welcomed the typhoon as an instrument for more readily achieving their goals. The principal aspect of the new orientation centered on economics and material things.

Our discussion has suggested the importance of knowing the social system

involved in a given disaster, not only for an understanding of how it adapts to the catastrophe but also how it influences the emergence of a new social system. Thus, for example, the strong cooperation during the post-impact phase had its roots in the strong sharing and cooperative pattern dominating Ulithian economic effort. To give another example, the acceleration of the acculturation process could only be understood from a knowledge of the dynamic factors that were conducive to change.

The questions that we have dealt with on a psychological level have been essentially social, but some individually-oriented reactions have been given notice. No pretense can be made that the psychological reactions to Ophelia reflect universal human reactions, as the following review of our findings will affirm.

In a disaster any intense feeling of helplessness and disability will sometimes paralyze either or both the individual and the community. Obviously, no such sensation gripped the Ulithians, except for a few individuals who found the pressure too great to cope with in their particular situations. We see that personally disorganized behavior occurs only under special conditions and is not a frequent consequence of disaster.

The intensification of basic values and consequent division of behavior into diametrically opposed forms, under stress, has been called by some writers "the polarization of behavior" and by others "U curve reaction." The latter designation graphically symbolizes the statistical distribution of this phenomenon. In other words, crises tend to bring out the best in some persons and the worst in others. Ophelia, however, did not elicit any polar reactions, probably because cultural conditioning by recurrent typhoons appeared to have minimized fear, panic, and despair. Instead, the basic values of cooperation, interdependence, and mutual trust, which are so imperative for survival, prevailed in the stressful situation, so that if anything behavior was pushed in the direction of only one of the possible polar extremes.

The spontaneous leadership so often reported in the literature in connection with disaster did not emerge during the course of the typhoon itself, mostly because there was no need for it beyond the level of the household. Young, emergent leaders did appear in the post-impact period when the hurricane had passed and task-oriented leadership was more important than formal leadership. The new leaders did not emerge haphazardly and unexpectedly, for they had already been partially prepared by virtue of their education, mechanical skills, and experience with the world of the foreigner, on whom so much of rehabilitation depended. It can be assumed that given the changing situation in which succession to chieftainship finds itself, the formal leaders will reassert their authority only nominally and will relinquish it to the younger men with good grace, if not through the attrition of death and old age. In the wider context of disaster studies, the Ulithian example demonstrates that situation factors are

all-important in the emergence of spontaneous leadership and will determine whether such leadership will indeed arise at all, and if it will be enduring or transitory. It would be difficult to envision any spontaneous leaders of the 1907 typhoon, for example, as having had permanent effects on the political system as it was in those relatively static times.

As a reaction to disaster an effort may be made to fix blame, but as the example of the Ulithians' feelings about Ophelia shows, such a reaction does not necessarily arise nowadays. A few individuals on Ulithi suggested that the storm was the work of a displeased God; but most accepted it as a natural event. In the old days, the misfortune would have been attributed to the machinations of Yapese sorcerers commissioned by their chiefs to wreak retribution on their recalcitrant underlings on Ulithi. Fixing blame can of course be a logical process without overtones of illogic or hostility; it depends on a variety of factors, including the way in which the cause of the disaster is regarded. The people of Ulithi saw Ophelia as something beyond their power, because they regarded it as an impersonal act of nature in the tradition of the many typhoons besetting the Carolines annually.

If we think of scapegoating as a way of transferring blame to others, then this too was obviously absent in the reaction of the people. Scapegoating is an irrational process that thrives in the presence of latent aggression and social tension. Such factors were not present on the atoll to any serious extent; moreover, in the absence of any idea of blame itself, there could be no effort to transfer it.

Psychiatrists would be better qualified than I to decide if the typhoon acted as a kind of shock therapy. In gross terms, all four psychotics on Ulithi appeared to have been jarred temporarily to a greater or lesser degree out of their condition. It would require long and expert study to reveal the mechanisms involved.

The winds and waves of the November typhoon, then, not only caused widespread physical changes on the tiny atoll but also dramatically transformed the social organization and traditions of the islands. They swept away old ways as well as trees. In doing so they stimulated social changes already in progress before the storm and at the same time provided a more dynamic way of life to cope with the program of reconstruction.¹¹

References

- BOYKIN, J. 1963. "The Voyage of the Ulithians." *Micronesian Reporter* 11: 18-20.
 JOHNSON, C. MS. "Typhoon Effects of Typhoon Ophelia, 1960, on Ulithi Atoll, Caroline Islands."

¹¹ I acknowledge with gratitude the assistance and hospitality shown me during my field work by Lt. George P. Vance of the local Coast Guard detachment, as well as several men under his command. The natives of the atoll cooperated in the same generous fashion as always. The manuscript has benefitted by readings on the part of Geoffrey Ashton and Rita Ventura Loeb.

- LESSA, W.** 1950. "Ulithi and the Outer Native World." *American Anthropologist* **52**: 27-52.
- LESSA, W.** 1955. "Depopulation on Ulithi." *Human Biology* **27**: 161-183.
- LESSA, W.** 1962. "The Decreasing Power of Myth on Ulithi." *Journal of American Folklore* **75**: 153-159.
- LESSA, W. MS.** "The Ethnography of Ulithi Atoll."
- LESSA, W.** and **G. MYERS.** 1962. "Population Dynamics of an Atoll Community." *Population Studies* **15**: 244-257.
- REICHSTAG, GERMANY.** 1908. "Denkschrift über die Entwicklung der Schutzgebiete in Afrika und der Südsee, 1906-1907," *Verhandlungen des Reichstages*, XII. Legislaturperiode, I. Session, Vol. 245, Anlagen zu den Stenographischen Berichten No. 622, pp. 4117-4126, 4137. Berlin: J. Sittenfeld, 1908.
- U. S. WEATHER BUREAU.** 1961. "Typhoons of the Western North Pacific, 1960." *Mariners Weather Log* **5**: 67-76.