Hawaiian Turtles PART 1 of 2

HAWAII AND HAWAIIANS 1960s-1990s
G.H. BALAZS FOLDER

Hawaiian Airlines Magazine

January 1991

Diving into Hawaii
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Transfer of Toxic Algal Substances in Marine Food Chains[1]

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ABSTRACT: Alcoholic and ether extracts of obligate herbivores, omnivores, and detritus feeders common on *Caulerpa* or in its communities were found, via comparative, and sometimes quantitative, thin-layer chromatography, to contain varying amounts of caulerpicin, caulerpin, palmitic acid, and β-sitosterol or to lack them. *Cerithium* and soft corals, which may be either omnivores or carnivores, on occasion contain caulerpicin. The crustacean detritus feeders did not seem to preserve either caulerpicin or caulerpin. It seems well demonstrated that caulerpicin and caulerpin, which, as produced by *Caulerpa,* are physiologically active and toxic to rats and mice, respectively, are transferred along the food chains and concentrated in the process at least in some herbivores.

CAULERPICIN (Doty and Santos, 1966) and caulerpin (Santos and Doty, 1968) have been described from various species in the genus *Caulerpa,* a seaweed of the algal phylum, Chlorophyta. The same species also consistently contain palmitic acid and β-sitosterol which are not physiologically active, but on the other hand these two new compounds are toxic or otherwise physiologically active in mice and rats (unpublished results obtained in cooperation with Dr. George W. Read and Mr. Midori Kashiwagi, University of Hawaii Medical School). Other algae are suspected of producing toxins that become concentrated in fish (Banner et al., 1963; Helfrich, Piyakarnchana and Miles, 1968) and thus may cause the fish-poisoning syndrome ciguatera.

Oxynoe panamensis, a sacoglossid mollusk found feeding on *Caulerpa* near La Paz, Baja California, has been described (Lewin, 1970, accompanying paper) as producing an exudate toxic to fish. Elsewhere such herbivorous opisthobranchiate sacoglossan gastropods are regularly described (e.g., Macnae, 1954; Burn, 1960; Gonor, 1961; Keen and Smith, 1961; Kay, 1964; Burn, 1966) as being in a rather close or obligate food relationship with *Caulerpa,* and the authors cited variously illustrate and describe the peculiar feeding apparatus, as well as co-host distribution of these animals. Further in this vein, one chemist, while working with caulerpicin on the present project, became sensitized to substances in crabs and shrimp taken as food from the general area where *Caulerpa* occurs in abundance.

As general information, there is an abundance of detritus feeders such as crabs and shrimp, omnivores or carnivores such as soft corals, and mud-dwelling omnivorous gastropods of the genus *Cerithium* in the natural and cultivated *Caulerpa* communities in the Philippines. In this latter connection, during 1967 Mr. Simplicio Berame, the principal *Caulerpa* pond operator there, showed the senior author damage to the commercial *Caulerpa racemosa* var. *uvifera* crop which he attributed to *Cerithium*. This damage was evidenced by scars or calluses at the ends of unusually short branchlets, or ramulus stubs devoid of their normal spheroidal tips.

Thus, it was decided to test the hypothesis that the chemical products of *Caulerpa* are variously concentrated or used by the animals which obtain their sustenance in the *Caulerpa* community. This work was initiated in the field by collecting and preserving the above-mentioned kinds of living organisms by drying them or by dropping them into ethanol.

[1] This investigation was supported in part by U. S. Public Health Service research grant FD-00101-03 from the Food and Drug Administration, NIH grant 5-R01-GM-151-98-03 and AEC contract AT (04-3)-235. Manuscript received November 21, 1969.

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METHODS AND MATERIALS

Collections of *Cerithium coralium* (Kiener) were made from ponds formed of mangrove mud for the purpose of raising *Caulerpa* on the island of Mactan in the central Philippines. The animal was found only in very small numbers on the alga during the daytime visits to the area. Thus, collections (20276,[4] 20277, 20278) were made of this animal, respectively, from the mud beneath the fronds of *C. racemosa* var. *uvifera* (20272) and *C. lamourouxii* (25299) and from the bottom of a new pond that had as yet no *Caulerpa* in it. The gastropods were broken in the field and the flesh picked out and dried before being transported to the laboratory. In the laboratory the remaining shell material was removed before extraction to reduce contamination, for example, by blue-green algae that might be growing on the shell surfaces.

One of the major pests in the Philippine *Caulerpa* farms is a shrimp (20578), probably *Alpheus euphrosyne*, of which about 20 specimens, placed alive in alcohol, filled a half-liter bottle. Similarly, collections (20579) of five species of crabs (*Thalamita crenata, T. spinimana, Epixanthus dentatus, Uca annulipes?*, and *U. dussumieri*) were made and preserved in alcohol. The crabs and shrimp were associated with *Caulerpa racemosa* var. *uvifera* (20272) and were not far from *C. lamourouxii* (25299) in the same ponds on the shore of Mactan Island used as a source of the above *Cerithium*.

Soft corals of three kinds (not as yet identified) were collected on Luzon Island in the Philippines and preserved in alcohol. One of these (20451) was on *Caulerpa lentillifera* (20450) obtained at Matabungkay and the other two (20576, 20577) from the same *Caulerpa* species (20490) at Bulusan.

Oxynoe panamensis (20541) was obtained from mats of unusually delicate *Caulerpa sertularioides* (20540) growing near La Paz, Baja California, and immediately preserved in 95 percent alcohol.

All the field collections of the different animals and dried collections of their host *Caulerpa* species were transported to Honolulu. In Honolulu the wet-preserved animals were extracted further with fresh 95 percent alcohol. The pooled alcoholic extract was evaporated, and the residue was taken up with ether and concentrated for comparative chromatography along with similar concentrated ether extracts of the related dry *Caulerpa* collections.

The comparative chromatography was done on thin-layer (=TLC) plates of Camag silica gel G with the four pure substances caulerpicin, caulerpin, palmitic acid, and β-sitosterol. The mobile phase routinely used was an ether-hexane-acetic acid (50:50:1) mixture. The results were the same whether the dried residue from alcoholic extracts of wet alcoholic materials was taken up in ether and used, or whether the specimens were dried in the field and ether-extracted in Honolulu without the alcohol step. All TLC's were made several times and with slight variations to clarify the particular results or assure tenability of the interpretations being made.

In order to obtain estimates of the concentrations of the different *Caulerpa* compounds, the alcoholic extracts were adjusted to the same ratio of dry weight of organism to extract volume. Equivalent amounts of the extracts were then preparatively chromatogrammed on a uniform set of plates on one of which a comparative TLC was run (Fig. 1) to assure the identity of the streaks as revealed in iodine vapor. The TLC streaks were marked; the iodine was allowed to evaporate; the material in the marked areas was scraped off; the chemicals were taken up in ether; and, after evaporating to dryness, the residues were weighed. Thus, the amount of crude substance in terms of percent crude yield of dry weight of source organism could be calculated.

RESULTS AND DISCUSSION

The relative abundance of the chemical contents of the animals (Table 1) is to be considered in relationship to the relative abundance of the same chemicals in the species of *Caulerpa* from the same community. All the species of *Caulerpa* of concern here had the same relative amounts of the four substances except the *Caulerpa racemosa* variety which contained but

[4] Such 5-place numbers identify the voucher specimens among the senior author's and the Smithsonian Institution's collections.

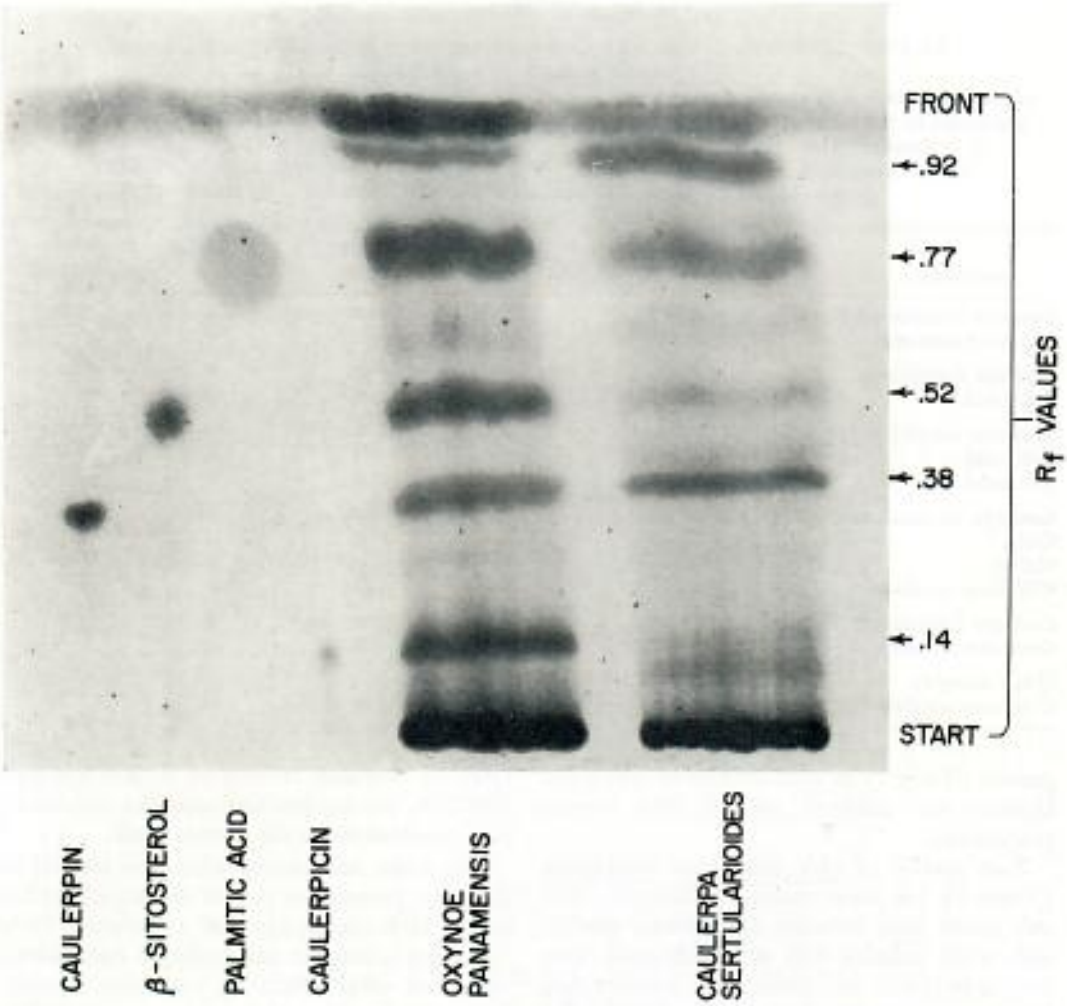


FIG. 1. Preparative thin-layer chromatogram of the ether exact from *Oxynoe panamensis* (20541) and *Caulerpa sertularioides* (20540), with a comparative chromatogram of the four pure or authentic substances on the left. The solvent used on this Camag silica gel G chromatogram was a 50:50:1 solution of ether, hexane, and acetic acid.

traces of caulerpicin and no caulerpin. As an aside, other varieties of this species contain normal amounts of caulerpin and caulerpicin.

It would seem (Table 1) that *Oxynoe* contains caulerpicin and caulerpin, and in addition, like the *Caulerpa* on which it was growing, both palmitic acid and β-sitosterol. Based on proportionate dry weight of the sources, the *Oxynoe* had (Table 2) caulerpicin and caulerpin concentrations in excess of, respectively, 3.4 and 2.3 times those in *Caulerpa*. How this concentration takes place or where it occurs in the animals, we cannot decide from the present materials. Co-chromatograms of the *Oxynoe* extract with crystalline caulerpicin were used to demonstrate the concentrated material to be caulerpicin. Further collections should be made with gut and flesh separated, and it is hoped that when this is done the toxic exudate reported on by Lewin (1970, accompanying paper) can also be separated and examined. In the *Oxynoe* extracts, palmitic acid and β-sitosterol were proportionately in lower concentrations than in the *Caulerpa* extracts (Fig. 1). All four chemicals were

TABLE 1

RELATIVE ABUNDANCE OF THE FOUR *Caulerpa* COMPOUNDS IN *Caulerpa* SPECIES AND IN ANIMALS ASSOCIATED WITH THEM

(Each horizontally distinct data group represents a set of samples from one community, each of which was dominated by the different *Caulerpa* species named, except for the last in which there was no *Caulerpa*. + = Concentrations above the proportions normal for most species of *Caulerpa*, n = the normal protection, − = less than the normal, 0 = absence. The five-place numbers are those on the voucher specimens. The animal identities are discussed in the text.)

ORGANISM	COLLECTION NUMBER	CAULERPICIN	CAULERPIN	PALMITIC ACID	β-SITOSTEROL
Caulerpa sertularioides	20540	n	n	n	n
Oxynoe panamensis	20541	+	n	−	−
Caulerpa lentillifera	20450	n	n	n	n
Soft coral	20451	0	0	−	−
Caulerpa lentillifera	20490	n	n	n	n
Soft coral	20576	−	0	n	n
Soft coral	20577	−	0	?	?
Caulerpa racemosa var.	20272	−	0	n	n
Crabs	20579	0	0	n	+
Shrimp	20578	0	0	n	n
Cerithium coralium	20276	−	0	n	n
Caulerpa lamouroux ii	25299	n	n	n	n
Cerithium coralium	20277	−	0	n	n
(No *Caulerpa*)					
Cerithium coralium	20278	0	0	n	n

present (Table 1) in the *Caulerpa* on which the *Oxynoe* was collected, and in their normal proportions.

Two species of soft coral bore caulerpicin (Table 1) but none contained caulerpin. The soft corals were certainly of different species, and, while palmitic acid and β-sitosterol were present in two, it was questionable whether they were present in the third species tested. The extract of the Bulusan soft coral produced one of the most dense and sharply defined TLC spots we obtained. Having an R_f just less than caulerpin, this unidentified substance was, therefore, troublesome in the present work.

TABLE 2

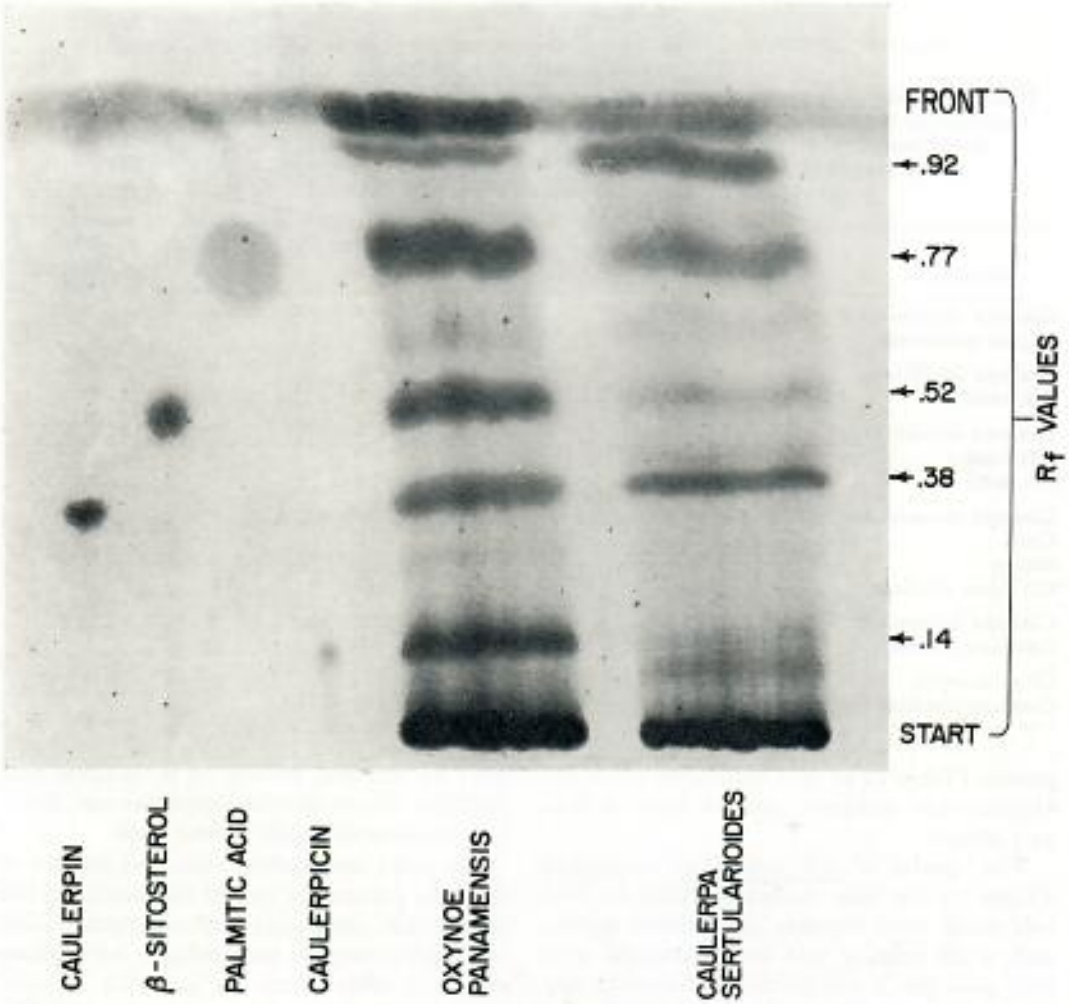
RELATIVE CONCENTRATION OF FOUR SUBSTANCES PRODUCED BY *Caulerpa sertularioides* AND FOUND IN THE HERBIVORE *Oxynoe panamensis*

(The values given are in terms of percent crude yield of the dry sample of *Caulerpa* or, for *Oxynoe*, as a multiple (*f*) of the concentration in *Caulerpa*.)

SUBSTANCE	*Caulerpa* %	*Oxynoe* f
Caulerpin	0.85	2.3
Caulerpicin	0.87	3.4
Palmitic acid	1.20	1.0
β-sitosterol	1.00	1.2

The crabs and shrimp examined seemed to show the presence of two of the substances but lacked both caulerpicin and caulerpin (Table 1). Since caulerpicin and caulerpin have deleterious and other effects on mammals (unpublished results obtained in cooperation with Dr. George W. Read and Mr. Midori Kashiwagi), including, it would seem, being allergenic to people, this lack of concentration is perhaps fortunate, for the shrimp, if not the crabs, would seem to be potentially a commercially important food organism for the Philippine people or for export.

No caulerpin was found (Table 1) in any of the three collections of *Cerithium coralium* and only in the case of those animals from the mud under *Caulerpa racemosa* var. *uvifera* and under *C. lamouroux ii* were there faint spots indicating the presence of caulerpicin. In this case, special variations in thickness of the layer and ratio of the solvent mixture used in the chromatographic process were required to make sure of cauler-



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picin's presence. Both palmitic acid and β-sitosterol were consistently present and, if anything, unusually concentrated. The lack of caulerpicin and caulerpin in *Cerithium* (20278) from the pond having no *Caulerpa* is not surprising. Though these 2-cm-long, slender-shelled gastropods might accumulate these compounds when feeding on a *Caulerpa* species containing significant concentrations of them, these animals in themselves are too small to be an attractive human food source, and so their content of these two chemicals would not be, directly at least, a human problem.

In all these cases the whole animals were ground and extracted so that the gut contents were included. Since the gut volume was small in each of the cases, the gut contents are not thought to have been responsible for the strong *Caulerpa*-chemical spots obtained. In the quantitative work with *Oxynoe* the yields in relation to the dry weight would seem to negate the gut contents as having had a significant influence on the results.

ACKNOWLEDGMENTS

The authors acknowledge with thanks the assistance of Dr. Alison Kay of the University of Hawaii who identified the mollusks. The shrimp was identified by F. A. Chace, Jr., and the crabs by H. B. Roberts, both of the Smithsonian Institution, and to them the authors are grateful. We appreciate the perseverance of James E. Doty and Alina Szmart and the staff of the Estacion de Biologia Pesquera, La Paz, Baja California, especially Mr. Jose Paez Barrera, necessary to obtain the 300 grams of *Oxynoe panamensis* used in this study. We also appreciate the recommendation of this site by Dr. Ralph Lewin who worked with the toxin of *O. panamensis* collected here earlier.

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Toxin Secretion and Tail Autotomy by Irritated *Oxynoe panamensis* (Opisthobranchiata; Sacoglossa)[1]

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ABSTRACT: The green sacoglossan gastropod *Oxynoe panamensis* occurs in mangrove swamps on the coasts of Baja California, Mexico, apparently feeding exclusively on the green siphonaceous alga *Caulerpa sertularioides*. When irritated, it secretes an astringent, milky mucus, which contains a toxin lethal to fish. Continued molestation may induce autotomy of the tail.

THE ORIGINAL DESCRIPTION of *Oxynoe panamensis* (Mollusca: Opisthobranchiata) by Pilsbry and Olsson (1942) was based on empty shells collected in Panama. Living animals identified as this species were first reported by Smith (1961), who collected specimens near La Paz, Baja California, Mexico. The sluglike animals may reach 3 cm in length. They have paired tentacles (rhinophores) and paired eyes; a visceral hump enclosed in a lightly calcified, globular shell, partly covered by pallial folds; and a relatively long, muscular tail (Figs. 1–4).

We found them in the same area in 1967 and 1969, usually in mangrove swamps, and always associated with mats of *Caulerpa sertularioides* (Gmelin) Howe (Chlorophyceae; Siphonales). In May 1969, these animals were relatively abundant (about one individual found per square meter) in a dense mat of *C. sertularioides* overlying calcareous ooze, at depths of less than 1 meter, in a shallow bay at the south end of Isla Partida. They are green, with white papillae, and are particularly well camouflaged among the fronds of *Caulerpa*, on which they feed by puncturing the wall and sucking up cytoplasm, including whole chloroplasts. *Oxynoe antillarum* was reported to feed almost exclusively on *Caulerpa* (Warmke and Almodóvar, 1963). Certain other sacoglossans are generally found living on species of siphonaceous algae such as *Caulerpa, Bryopsis, Codium* (Kay, 1964; Burn, 1966; Doty, 1966; Taylor, 1968).

O. panamensis copulated readily in our aquaria, and laid coils of yellow eggs which hatched as veligers within 13 days (at 21° C). Their subsequent development was not followed.

TOXIN SECRETION

When the animal is molested or irritated mechanically or chemically, for example, with alcohol, it begins within a few seconds to secrete a mucoid, milky exudate from its skin. Several hours after such a discharge, further secretion can be produced if the animal is again irritated. This can be attributed to biosynthesis of fresh exudate, since animals incubated for a day in the presence of $C^{14}O_2$ secrete a milky exudate labeled with C^{14}. The mucus is initially tasteless, but within a few seconds it tastes caustic and astringent to the tongue. This secretion is presumably a defence mechanism, since it is not only irritant but also poisonous to fish (and, probably, to other animals).

ACTION AND NATURE OF THE TOXIN

One-quarter of the discharge from a single adult, mixed in 100 ml of seawater, is sufficient to kill a 5-gm specimen of the herring *Harengula thryssina* (Clupeidae) within 15 minutes. One-fiftieth of a discharge dispersed in 2 ml of pond water is sufficient to kill a 40-mg guppy, *Lebistes reticulatus* (Cyprinodontidae), within 30 minutes. The symptoms exhibited by these fishes include convulsive movements of the body, irregular activity of the gill opercula, paroxysms, and a few seconds of tremor leading to death.

The exudate from *Oxynoe* may contain a neurotoxin, perhaps ultimately of pharmaceutical interest. The toxic factor passes through dialysis

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augmentation of thrombolytic activity and thus accelerated vascular clearing.

Further investigation of the phenomenon may make available more detailed knowledge of the mechanism of plasminogen activation.

Plasminogen, streptokinase and ε-aminocaproic acid were provided by Dr. Hans Dahlstrom of A. B. Kabi, Stockholm, and urokinase by Dr. R. Herting of Abbott Laboratories, Illinois. The work was supported financially by the Ministry of Overseas Development, Ministry of Health, Kenya, and Merck, Sharp and Dohme Research Laboratories (Dr. M. Tishler).

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BIOLOGY

Caulerpicin, a Toxic Constituent of *Caulerpa*

IT has long been known that the marine green alga *Caulerpa* has a peppery taste. Yet varieties of this species are used as a salad delicacy in the Philippines and lack it. We have attempted to discover the nature of the flavour-giving substance, having in mind its recognition for chemotaxonomic purposes. One of us (G. A.-S.) was able to obtain from ether extracts adsorbed on and then eluted from alumina crystalline material which melts at 95° C. We have named this material "caulerpicin". Mass spectrometry indicates that caulerpicin has a molecular weight of 649 with a possible formula of $C_{43}H_{87}O_2N$ and properties unlike those of any other compound of which we are aware. The infra-red spectrum indicates that caulerpicin may be a long-chain saturated hydroxy amide. So far it has been found in several *Caulerpa* species or varieties in different concentrations; as much as 600 mg have been isolated from 1,500 g dry weight of one variety of *Caulerpa racemosa* (Forsskal) J. Agardh.

Different people respond differently to caulerpicin. Some merely obtain a mild anaesthetizing sensation which is not immediate but is delayed for a minute or two. Others also obtain a numbness of the tongue or lips. In one subject exposed to the substance at various times truly toxic symptoms have become stronger and stronger following each contact. Almost immediately on chewing the raw dried *Caulerpa* material, the subject felt a numbness at the tip of the tongue. This has developed to a point at which the reaction is one of numbness of the extremities coupled with a cold sensation in the feet and fingers, rapid and difficult breathing, slight depression and, finally, loss of balance requiring the subject to lie down. The symptoms wear off, depending on the dosage, in a few hours to a day. Coupled with these reactions to the impure and pure substance, the same subject has developed a sensitivity to oysters and crabs and eating them produces the same symptoms.

The toxic effects are somewhat similar to those reported[1] for ciguatera fish poisoning in the Tropical Pacific. According to Banner's investigations ciguatera poisoning is caused most frequently by eating the red snapper (*Lutjanus bohar* Forsskal) which in turn feeds on herbivorous acanthurids such as *Acanthurus triostegus* Linnaeus. Dawson *et al.*[2] reported that *Caulerpa serrulata* (Forsskal) J. Agardh was found in the alimentary tracts of reef fishes from Palmyra Island in the Central Pacific. One of these, *Arothron hispidus* Linnaeus, was found to be poisonous; another, *Acanthurus triostegus*, is often poisonous.

In so far as we have been able to determine from Banner and Helfrich[3] and from questioning, ciguatera is unknown in the Philippines, although it is widespread in the Tropical Pacific. However, it is possible that the toxic response to shellfish on the part of our subject in the Philippines was due to substances such as caulerpicin being passed to the human food organisms, oysters and crabs, through a detritus food chain rather than through the herbivore fish to carnivorous fish food chain. We do not believe the effects of caulerpicin which we observed to be identical to those of ciguatera, but there is little information on this point.

The fishes and algae mentioned are common and generally distributed throughout the Philippines. Forsskal's authorship of so many of their names is an indication of their abundance and presence at the Red Sea end of their general biogeographic distribution across the Pacific. Since *Caulerpa* is a genus very widely spread in the tropics and also occurs in cold water in South Australia, for example, it would seem that if it is related to fish poisoning this would already be known. That *Caulerpa* is not so conspicuous a genus in the Eastern Pacific and perhaps the Eastern Atlantic as it is in the western reaches of these same oceans, may account for the lack of literature on this subject. We would appreciate any information relating *Caulerpa* to toxicity in marine products or to food chains either as detritus or directly-grazed material.

The field work for this project was supported in part by contracts with the U.S. Office of Naval Research and the U.S. Atomic Energy Commission.

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Flower Apices cultured *in vitro*

ALTHOUGH there are numerous reports dealing with the culture of plant tissues *in vitro*, there have been few successful attempts to culture isolated flower primordia. A suitable technique would, however, be valuable for many morphogenetic investigations, and therefore attempts have been made to culture buds of two species of *Viscaria*.

Dissection of flower apices was carried out by aseptic methods which yielded sterile cultures without difficulty. The excised apex was placed on a filter paper 'bridge' dipping into liquid nutrient medium in a 1 in. diameter 'Monax' tube covered with polypropylene film. The cultures were grown at 24° C under a 16 h daylength at an intensity of about 600 lumens per sq. ft. The nutrient medium was based on that of Murashige and Skoog[1]; the concentrations of the major elements and the ferrous sulphate–ethylenediamine tetraacetic acid (EDTA) complex were those recommended and, of the minor elements, one-tenth of those quoted. Other constituents (of which some were derived from Goodwin[2] and some from Vasil[3]) were as follows (quantities per litre): sucrose, 20 g; coconut milk, 100 ml.; casein hydrolysate, 1 g; inositol,

ANON.
From MAK Doty

TABLE II. The results of feed analyses of air-dried samples of various brown algae collected around Oahu. The values are given as a per cent of the air-dried weight. The paired values are values obtained from duplicate subsamples of the same sample and are included here merely to indicate the replication of measurement obtained from different subsamples. Collection numbers are those of the author.

Crop	Moisture in air-dried weed	Ether sols. (crude fat)	Amino-nitrogen	Protein (calc.)	Fiber	Ash	Acid-base sols. by difference
Dictyopteris plagiogramma	14.1	1.84	1.50	9.36	--	39.0	--
	13.7	1.92	1.40	8.74	8.24	43.3	24.1
Sargassum echinocarpum[a] #10695	15.0	1.27	1.12	6.99	6.57	38.0	32.2
	14.4	1.58	1.14	7.14	6.28	39.0	31.6
Sargassum obtusifolium #8633	16.2	0.83	0.58	3.65	6.00[b]	39.4	33.9[b]
Sargassum polyphyllum #12483	12.5	1.07	0.71	4.43	8.24	43.4	30.0
Sargassum sp. #12482	15.5	0.73	0.68	4.23	7.45	51.4	20.0
Turbinaria ornata #1014		0.61	0.86	5.37	8.43	33.2	37.7
	14.7	0.64	--	--	8.74	--	--

a/ Used fresh as turtle food at the Hawaii Institute of Marine Biology.

b/ Approximate value.

Sea Turtles

TURTLE TALK

There are three turtles found in Hawaii, the Green, the Hawksbill and the Leatherback. The Hawksbill is found on the Big Island and Molokai where it uses its pointed snout to poke for sponges and invertebrates. The Leatherback is an open ocean turtle often reaching 1500lbs. It feeds primarily on jelly fish and is the only turtle to have a soft shell.

The Green turtle (Honu) is found off all the main islands feeding on pastures of seaweed or limu. Often reaching 100 lbs., the Green turtle's population was decimated by hunting for it's "green" steaks. These turtles take 25 years to reach maturity and it's estimated that there are only 750 breeding females in Hawaii. The life span of the Green turtle remains unknown but could be upwards of 100 years.

While active, Green turtles breathe every 2 to 3 minutes. While resting in caves or under small ledges, these turtles can remain submerged for over 2 hours. Nesting occurs 800 miles away in the Northwest Hawaiian Islands mostly on French Frigate Shoals.

Only 2 predators are big enough and fast enough to attack mature green turtles, Man and the Tiger shark. Let us hope it is not man's fate to determine the fate of the Green turtle.

TURTLE RIDES

After 3 days of beautiful weather, flat water and too much work to do, I'm anxious to get some mid-March early season North Shore diving in. The next day, my brother John, a couple of friends and I launch our Boston Whaler from Haleiwa. The trade winds have failed and only a few clouds mar the blue sky. Just outside of the harbor, John jumps in with the waterski and I gun the boat towards Kaena point. Looking down into the water, I can clearly see sand ripples at 80 ft. as we speed by.

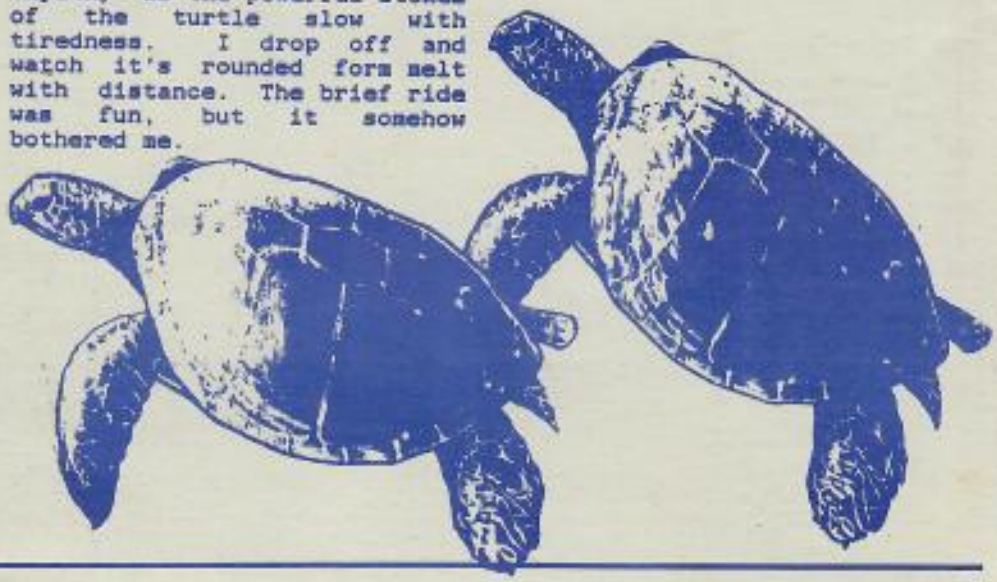
After a half hour of skiing, I drag behind the boat with snorkeling gear searching for new spots. The water is unseasonably warm this year and feels good as I slide on unencumbered by a wet suit. Looking for likely lobster terrain, I see lots of fish, some small Ulua and even a small group of Eagle rays. Soon we find a nice big overhang with lots of crevices. I signal the boat and moments afterwards we are gliding through the blue to the 70' ledge.

I'm always amazed by the abundance of coral and life on the North Shore. Such a contrast to the too often dived locations on the South and West shores. Within minutes of reaching the overhang, we notice several large turtle swimming nearby. I look down and notice another turtle resting on the sandy bottom under a small ledge. I signal John, swim over and hang on as the turtle hurtles away. The initial exhilaration soon gives way to empathy as the powerful stokes of the turtle slow with tiredness. I drop off and watch it's rounded form melt with distance. The brief ride was fun, but it somehow bothered me.

The next week I read an article on the turtles of Hawaii. All of Hawaii's turtles are endangered of becoming extinct and are protected from hunting (which I already know). What I didn't know is that riding turtles or even scaring them out of their resting areas is also illegal. It seems that this "harassment" contributes to a decline in the turtle's already low productivity. I would not want that. It makes me feel good to surf with turtles feeding nearby or to dive and watch a turtle silently "flying" by.

On the other hand, it makes me feel bad to think of my actions from a turtle's point of view: "The turtle is resting in its normal place under the small ledge. All of a sudden, this noisy, awkward, weird apparition comes flapping and grappling over, clutches the turtle shell and hangs on dipping and swaying, blowing and bubbling. The turtle doesn't know what's going to happen. With a surge of energy it tries to escape. Soon tiring it resigns itself to what . . . death? Then the apparition lets go and with great relief the turtle swims rapidly away possibly not to frequent that sandy ledge again".

In the future, I know that I will resist the urge to grab on for a brief ride. I'd rather watch the turtle swim by, unafraid, still an ancient master of the water realm.



PACIFIC QUEST DIVERS

ACTIVITIES CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2 Open Water (A) Class-1	3 Divemaster Class-1	4 Open Water (A) Class-2	5 Divemaster Class-2	6	7 Club Boat Dive Divemaster
8 Open Water (A) Dive	9 Open Water (A) Class-3 Rescue Class-1	10 Divemaster Class-3	11 Open Water (A) Class-4 Rescue Class-	12 Divemaster Class-4	13 Night Dive	14 Open Water (A) Dives Advanced Class Divemaster
Divemaster 15 Open W. (A) Dive Rescue Class Advanced Class	16 Open Water (A) Class-1 Rescue Class	17	18 Open Water (A) Class-2 Rescue Class	19	20 Instructor Class	21 Rescue Class Club Boat Dive Instructor Class
22 Instructor Class Rescue Class Open Water (A) Dive	23 Open Water (A) Class-3	24 Instructor Class	25 Open Water (A) Class-4	26 Instructor Class	Summer's Here SALE! 27 Night Dive Advanced Class	SALE! 28 Open Water (A) Dives Instructor Class Advanced Class
Advanced Class 29 Open Water (A) Dives IDC	SALE! 30 Memorial Day Open 8-12 CLUB PARTY	SALE! 31 Open Water (A) Class-1 Instructor Class		**MAY**		

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	JUNE		SALE! 1 Open Water (A) Class-2	SALE! 2 Instructor Class	3 SALE!	Club Boat Dive 4 SALE! Instructor Class Advanced Class
SALE! 5 Instructor Class Advanced Class Open W. (A) Dive	SALE! 6 Open Water (A) Class-3	7 Instructor Class	8 Open Water (A) Class-4 Instructor Class	9 Inst. Dev. Class	10 Club Boat Dive	11 Open Water (A) Dives
12 Open Water (A/ Dives	13 Open Water (A) Class-1	14 Open Water (B) Class-1 Rescue Class	15 Open Water (A) Class-2	16 Open Water (B) Class-2 Rescue Class	17	18 Club Boat Dive Advanced Class
Rescue Class 19 Advanced Class Open Water (A/B) Dives	20 Open Water (A) Class-3	21 Open Water (B) Class-3 Rescue Class	22 Open Water (A) Class-4	23 Open Water (B) Class-4 Rescue Class	24 Night Dive	Inst. Eval. Class 25 Rescue Class Open Water (A/B) Dive
Rescue Class- 26 Open Water (A/B) Dives Inst. Eval. Class	27 Open Water (A) Class-1 Eqpt. Spec.	28 Open Water (B) Class-1 Medic 1st Aid	29 Open Water (A) Class-2 Eqpt. Spec.	30 Open Water (B) Class-2 Medic 1st Aid		

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			JULY		1	2 Club Boat Dive Advanced Class
3 Open Water (A/B) Dives Advanced Class	4 Open Water (A) Class-3	5 Open Water (B) Class-3	6 Open Water (A) Class-4	7 Open Water (B) Class-4	8 CLUB NIGHT DIVE!	9 Open W. (A/B) Dives
10 Open Water (A&B) Dives	11	12	13	14	15	16 Club Boat Dive
17	18 Open Water (A) Class-1	19 Open Water (B) Class-1 Divemaster	20 Open Water (A) Class-2	21 Open Water (B) Class-2 Divemaster	22 Club NIGHT DIVE	23 Advanced Class
Advanced Class 24 Open Water (A/B) Dive Open Water (A&B) 31 Divemaster	25 Open Water (A) Class-3	26 Open Water (B) Class-3 Divemaster	27 Open Water (A) Class-4	28 Open Water (B) Class-4 Divemaster	29	30 Club Boat Dive Open W. (A/B) Dive Divemaster

46-216 KAHUHIPA STREET, KANEOHE, HAWAII 96744 (ACROSS FROM CITY MILL) - PHONE (808) 235-3877

SUMMER SALE

SUMMER'S HERE SALE

Get ready for great diving with PACIFIC QUEST DIVERS' SUMMER'S HERE SALE!

From May 27 to June 6, PACIFIC QUEST DIVERS' entire stock of quality diving equipment will be on sale at up to 50% off. This will be your perfect opportunity to purchase that new diving system, upgrade your regulator, sign up for diving lessons or stock up on diving accessories - all at great discounts.

Mark your calendar and LET'S GO DIVING!

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PACIFIC QUEST DIVERS

NEWSLETTER

DAVE REIDENBACH BECOME A COURSE DIRECTOR

After a busy 10 day course at the PADI College in California, Dave was awarded the COURSE DIRECTOR degree. This enables Dave to teach the Instructor Development Course (IDC) as well as the Medic First Aid Instructor Course. Congratulations to Dave for this well earned degree.

After Dave completed this course in February, he took a well deserved vacation in March. While visiting his folks, he and Carla decided that they would like to live near their family in Wisconsin. Dave was offered a job in a nearby PADI facility and will be moving by the end of June. Anybody have a good dry suit for sale?

BECOME A PADI SCUBA INSTRUCTOR

From May 20 to June 9, Pacific Quest Divers will be conducting a PADI Instructor Development Course (IDC). Course Director Dave Reidenbach will be instructing with the assistance of Zane Bilgrav. Upon completion of this course, the IDC candidates will be prepared to take the 2 day Instructor Exam (IE) to be conducted by a team from PADI on June 25 and 26. Successful completion of the IDC and IE will yield a PADI OPEN WATER SCUBA INSTRUCTOR rating. This is a passport to a career in the exciting sport diving industry. Tuition for the IDC is $950 and $300 for the IE.

CLUB NEWS

MEMORIAL DAY DIVE, PICNIC AND HOPEFULLY LOBSTERS!

On Monday, May 30 Pacific Quest Divers will be hosting a potluck barbecue at Alii Beach Park near the boat launching ramps of Haleiwa Harbor. All afternoon and into the night, the Argonaut II will be available for dives open to club members and their friends. Come all for good food, company, North Shore diving and maybe even a few lobsters.

NORTH SHORE CLUB DIVES

On May 15, the Argonaut II will be moved to Haleiwa for the summer. North Shore aficionados rejoice! Remember, you must present your current club cards to go on the boat or to receive club benefits. No card, no go.

In case you didn't know, any club member can go diving on the Argonaut II any day of the week and not just on club days. Simply call the afternoon before you'd like to go. If there is space, sign up and you are all set for the next day of good diving.

Copied from Microfilm 3903 English translation of Freycinet, L. 1826. Voyage autour du Monde- executee sur les corvettes de S.M. l'Uranie et la Physicienne etc. Navigation et Hydrographie premiere partie, and Atlas. Paris 1-733. Microfilm only contains section dealing with Hawaii- note states that the original typescript is in the Bishop Museum. Narrative represents a visit by Freycinet made in the year 1819.

Pages 596-597 "Taboo"

paragraph starting top of page 596

"The religion of the King of the Chiefs dictates that all persons who eat with men may not eat with women, under penalty of death. It is also forbidden to all women to eat pig, bananas, coconuts, shark meat, turtles, and a kind of fish of red color; but they are permitted to use the flesh of red dogs for food. They are also forbidden to enter into the hut where men eat."

Transcribed by G.H.Balazs 1/83

HAWAII NATURE FOCUS

NATURE STUDIES FOR CHILDREN

Sponsored by the Kilauea Point Natural History Association
Box 87, Kilauea, Kauai, HI 96754

No. 9

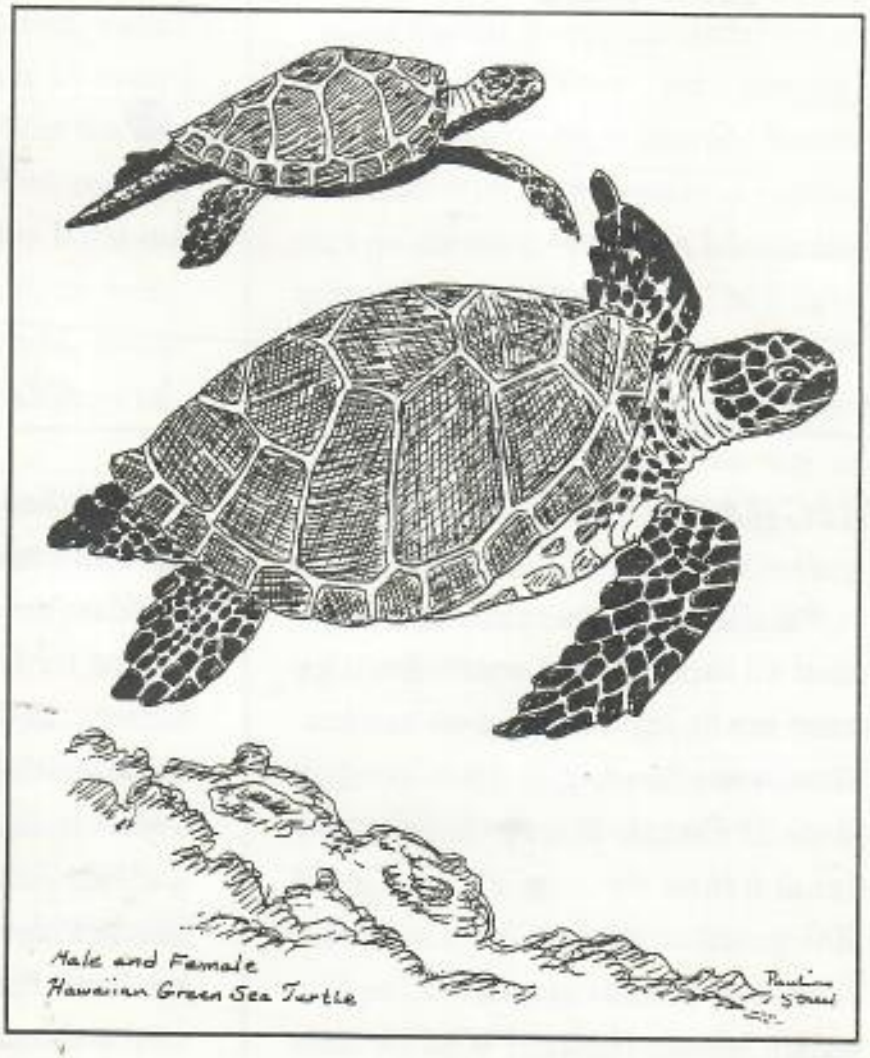
HONU— THE PACIFIC GREEN SEA TURTLE

Why is the turtle we see swimming near our Hawaiian Islands called the green sea turtle? We notice that its back is brown and its legs and head are brown, too.

Many animals are named because of interesting habits or features of their bodies.The green sea turtle gets its name from the green color of the fat on its body.

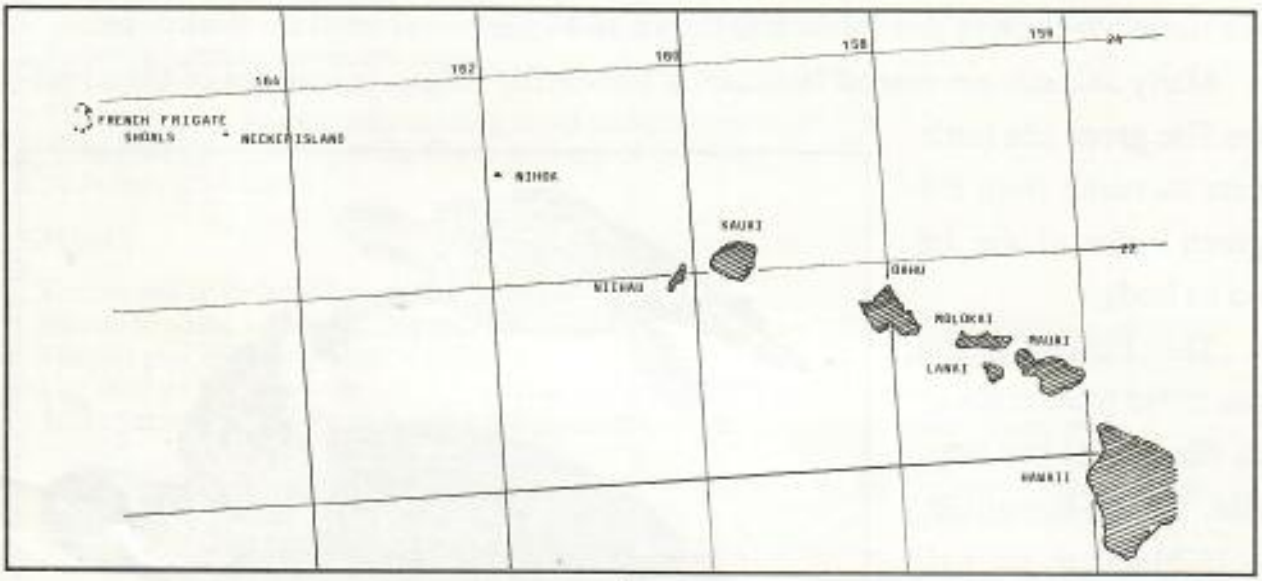
The Pacific green sea turtle (called *honu* in Hawaiian) is a *reptile*, an air-breathing, cold-blooded animal. Adults are two to four feet long and weigh from 100 to 400 pounds.

The green sea turtle's hard shell is actually its skeleton. The top part of the shell is called the *carapace* and the underside of the turtle shell is the



plastron. The green sea turtle cannot pull its head and legs inside its shell for protection, as some land turtles do. This turtle's webbed feet make it a fast swimmer (up to 25 mph) and it is able to go long distances without resting. The *honu* has no teeth, but its uneven, jagged jaw works well for chewing.

Pacific green sea turtles have lungs to breathe air. When sea turtles are feeding they stay under the water for five to ten minutes, and then come to the surface to breathe. When they are asleep or resting they can stay under water up to two-and-a-half hours. Adult turtles often sleep between rocks under water. Young turtles usually sleep while floating on top of the water.

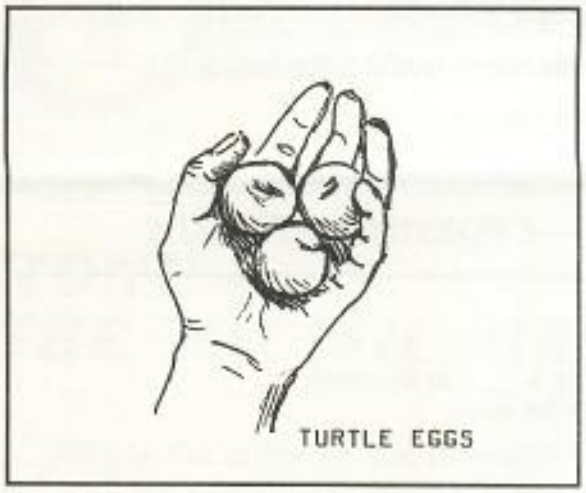


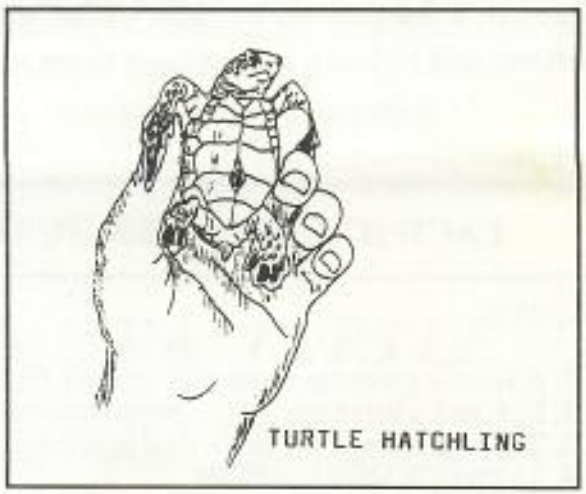
MIGRATION & NESTING

Pacific green sea turtles spend almost all their lives in water. Females come out to lay their eggs on beaches. Most *honu* nesting in Hawaii takes place at French Frigate Shoals (extreme left on the map above), about 500 miles northwest of Honolulu. These tiny islands are part of the Hawaiian Islands National Wildlife Refuge and the nesting areas are protected from man. Occasionally nests are found on the main Hawaiian Islands.

The turtles migrate from the feeding areas in the main Hawaiian Islands to the nesting areas at French Frigate Shoals from May to August. At night the females dig pits on the sandy beach with their back flippers. They lay about 100 eggs, cover the pit with sand and return to the ocean.

TURTLE EGGS & HATCHLINGS


TURTLE EGGS


TURTLE HATCHLING

The turtle eggs, which look like ping-pong balls, hatch after about two months. All the baby turtles, called *hatchlings*, work together to scrape the sand away to get up near the surface. When the sand is cool enough, usually at night, the turtles burst out and hurry to the ocean. Many *honu* hatchlings are eaten by crabs, sharks and other large fish in the shallow offshore waters.

When the Pacific green sea turtle hatchlings reach the ocean they are *carnivorous*—they eat animals such as sponges and worms.

After they are about six months old they are mostly *herbivorous*, eating algae and seaweed. When they reach the main Hawaiian Islands they are about two to four years old and their carapaces (top shells) are about 14 inches long.

PROTECTING PACIFIC GREEN SEA TURTLES

The Pacific green sea turtles are in great danger. They are preyed upon (eaten) by tiger sharks. Resort and residential development at nesting sites on the main Hawaiian Islands has reduced their population. They have become much more rare due to increased use as food, leather, ornaments and in cosmetics. The use of SCUBA diving gear made turtles easier to catch and turtle steaks were very popular in Hawaii's restaurants during the 1960s.

The Endangered Species Act of 1978 helps protect the Pacific green sea turtles and other sea turtles. It is illegal to kill sea turtles or to sell any sea turtle products. It is also against the law to bother sea turtles in the water or on their nesting beaches. Large

fines must be paid by people who harm sea turtles. With cooperation of the people of Hawaii, scientists and conservation workers hope to protect the Pacific green sea turtles, and to learn more about them to try to increase turtle population.

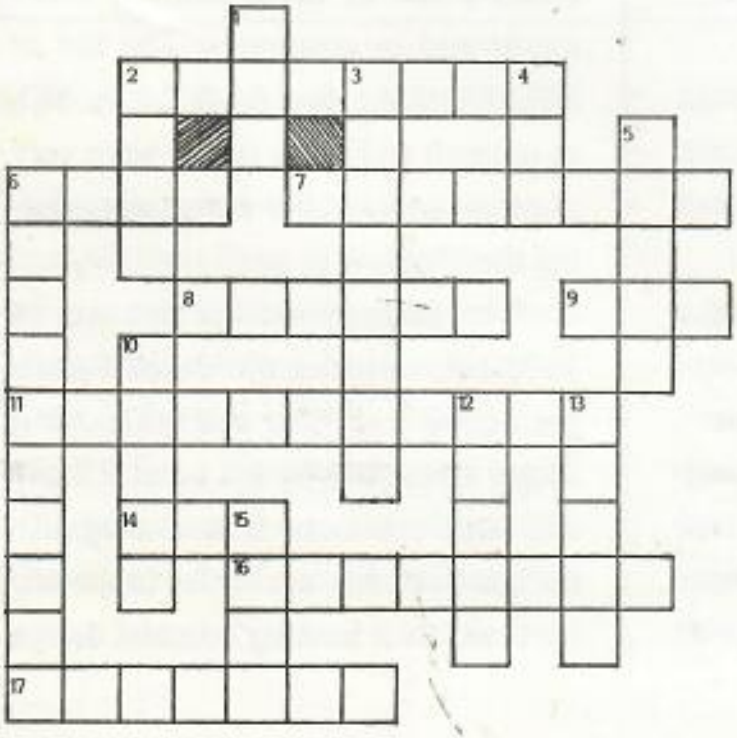
PACIFIC GREEN SEA TURTLE——*CROSSWORD PUZZLE*

DOWN

1. A female green sea turtle uses its back flippers to dig a _ _ _ in the sand
2. Fish and whales use _ _ _ _ for swimming through the water
3. The underside of the turtle shell is called the _ _ _ _ _ _ _ _
4. To drink in small quantities
5. The whole body of salt water covering nearly three-fourths of the earth's surface
6. Recently hatched turtles are called_ _ _ _ _ _ _ _ _ _
10. The color of the green sea turtle
12. The path taken by one body circling about another body (_rb_ _)
13. Young turtles _ _ _ _ _ while floating on top of the water
15. A mango grows on a _ _ _ _

ACROSS

2. Turtles and seals have broad, flat limbs called _ _ _ _ _ _ _ _
6. Hawaiian name for the Pacific green sea turtle
7. The top part of a turtle shell is called a _ _ _ _ _ _ _ _
8. The shell of the green sea _ _ _ _ _ _ is actually its skeleton
9. It is against the _ _ _ to bother Pacific green sea turtles
11. Animals that eat meat are carnivorous. Animals that eat grass, seaweed and other plants are _ _ _ _ _ _ _ _ _ _ _ _
14. One cannot swim in the water without getting _ _ _
16. Turtles, snakes, lizards and crocodiles are all _ _ _ _ _ _ _ _
17. A common name for a group of marine plants eaten by green sea turtles



George - This is for your turtle file.

RESOLUTIONS TO BE PRESENTED AT TWELFTH
ANNUAL MEETING

Feb. 16, 1962

WHEREAS, the survival of certain endemic Hawaiian birds is now recognized to be in grave danger, and the status of other species is presently unknown, and

WHEREAS, a number of introduced land birds have become objectionable in agricultural areas and present control problems, and on the other hand

WHEREAS, the life history requirements of the sea birds should be determined and their nesting areas given full protection because of their intrinsic value and the usefulness of these birds to the Hawaiian tuna fishermen, now

THEREFORE BE IT RESOLVED, that the Conservation Council for Hawaii at its Twelfth Annual Meeting does strongly recommend to the Governor and members of the State Legislature that the Department of Land and Natural Resources be granted funds with which to hire a qualified biologist and initiate a program to investigate these problems associated with the preservation and control of these non-game birds of the islands, and

BE IT FURTHER RESOLVED, that a copy of this resolution be sent to the Governor, President of the Senate, Speaker of the House and the Department of Land and Natural Resources,

WHEREAS, the sea turtles in the State of Hawaii have been over-exploited through the years to a degree which drastically reduced the turtle population in waters of the major Hawaiian group, and

WHEREAS, the intrinsic as well as the aesthetic and economic value of the turtles require their continued preservation, and

WHEREAS, the biological information available on the turtles is insufficient for the intelligent and proper management of these marine reptiles, now

THEREFORE BE IT RESOLVED, that the Conservation Council for Hawaii at the Twelfth Annual Meeting does strongly recommend to the Department of Land and Natural Resources that a biological investigative program be initiated on the sea turtles for eventual promulgation of conservation measures and

BE IT FURTHER RESOLVED, that a copy of this resolution be forwarded to the Governor, President of the Senate, Speaker of the House and the Department of Land and Natural Resources.

r from Wm R. Smythe Fauna Committee Chm, CCH
Annual Report Conservation Council for Hawaii
12th annual meeting

Hawaii's Shoreline

The State of Hawaii

LAND USE OF THE STATE OF HAWAII: 1962 AND PROPOSED

Land use	Statute miles				Percent distribution			
	Total shoreline		Sandy shoreline		Total shoreline		Sandy shoreline	
	1962	Proposed	1962	Proposed	1962	Proposed	1962	Proposed
All uses[1]	934.4	945.7	184.9	185.4	100.0	100.0	100.0	100.0
Urban	69.1	99.2	22.5	26.5	7.4	10.5	12.2	14.3
Resort	4.4	29.7	2.1	6.7	0.5	3.2	1.1	3.6
Industrial	24.5	33.3	0.6	1.4	2.6	3.5	0.3	0.8
Military	77.0	59.0	14.1	9.0	8.2	6.2	7.6	4.9
Military park	4.5	2.5	2.5	1.8	0.5	0.3	1.4	0.9
Public park	58.4	271.2	20.5	96.7	6.3	28.7	11.1	52.2
Quasi-public park	3.3	4.6	2.2	1.1	0.4	0.5	1.2	0.6
National park	32.0	29.5	0.0	0.0	3.4	3.1	0.0	0.0
Agriculture	28.5	28.8	1.6	3.2	3.1	3.0	0.9	1.7
Conservation	37.6	387.9	4.4	39.0	4.0	41.0	2.4	21.0
Open land[2]	595.1	—	114.4	—	63.6	—	61.8	—

[1] Offshore islands excluded, except Sand Island, Ford Island, & proposed reclamation of reef lands in Keehi Lagoon & off Ala Moana Park("Magic Island").

[2] Open land included in Conservation under Proposed Land Use classification.

1962

ercent distribution	
Total horeline	Sandy beach
100.0	100.0
11.4	7.3
27.0	25.3
1.3	1.7
44.6	47.2
15.7	18.5

& Ford Island.

SHORELINE CHARACTERISTICS: 1962

Shoreline Characteristics	All shoreline		Accessibility Statute miles		
	Statute miles	Percent	Acces-sible	Marginal	Inacces-sible
* Total	934.4	100.0	338.5	158.4	437.5
Bedrock	597.9	64.0	34.2	134.0	429.7
Gravel	42.9	4.6	30.8	6.0	6.1
Sand	184.9	19.8	173.4	9.8	1.7
Mud	20.5	2.2	14.4	6.1	0.0
Artificial structures	69.3	7.4	68.8	0.5	0.0
Seasonal change	18.9	2.0	16.9	2.0	0.0

* Offshore islands excluded, except Sand Island & Ford Island.

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Simply stated, the major islands of Hawaii are volcanic peaks rising above the ocean from a submarine "mountain" range.

At the water's edge, the slopes are steep. Nearly half the shoreline is physically inaccessible by land; another sixth only marginally so. Ninety-five per cent of this area is rocky coastline.

A little over a third of the coastline is accessible. About half of this is year-round sandy beach; another fifth is built up with artificial structures to support coastal land uses. Of accessible coastline, only between one-fourth and one-third is non-sandy and not built up with coastal structures.

Shoreline characteristics have been included in land use maps contained in this report and will in part explain why certain land use decisions were made.

Biology

Check again 08.15

Length Rate of Turtle
at Coconut Island

Hyatt

Green turtle:
caught 4/15/50 at Moanalua Bay, Oahu
placed in Coco Isle pond on 4/16/50

Number	Date	Length cm.	Width cm.	Wt. lbs.
495-39311	4/15/50	41.6	35.6	20
	died			
495-39312	4/15/50	42.9	34.1	22 1/4
	11/6/51	42.5	34.1	18 1/2
495-39313	4/15/50	42.0	35.6	20
	11/6/51	42.3	35.7	16 1/4
495-39314	[illegible]	5[illegible]5.6	42.0	42 3/4
	11/6/51	53.4	41.9	34 1/2

Number	Date	Height mm.	Width mm.	Wt. Gr.
448-39315	4/15/50	50.0	62.1	15-3/4
	11/6/51	80.6	62.8	118
notched shell	11/6/51	53.9	43.2	40 1/4
Hawksbill	11/6/51	49.6	38.6	28

Small Green Turtle
French Frigate Shoals

Number	Date	Length mm	Width mm	Wt.
X-119	11/5/52	69	59	66 grams
	3/21/53	103	89	187 "
X-120	11/5/52	72	58	70 "
	3/21/53	115	92	248.5 "
X-121	11/5/52	70	62	70 "
	3/21/53	105	96	208.5
X-122	11/5/52	69	60	71 "
	3/21/53	99	89	178.5 " 173.5
X-123	11/5-/52	70	62	74 -
	3/21/53	116	102	300 "

Printed in Great Britain by
Alden & Mowbray Ltd
at the Alden Press, Oxford

Journal of the
Fauna Preservation
Society
October 1973

Oryx

The First Captive-Bred Turtles

In July this year Mariculture, a commercial turtle farm on Grand Cayman Island in the West Indies, announced that green turtle eggs laid on the farm had hatched—the first known case of turtle-breeding in captivity, previous hatchings having been from eggs collected in the wild. For three years Mariculture had been trying to breed from its adult turtle stocks, but without success until in April this year they introduced two males from a wild breeding beach. The result was an 'outburst' of matings, involving seven of the 60 adult females in the pond; over 4000 eggs were laid and incubated artificially. Hatching began on July 16, and success was over 90 per cent. This could indeed, as Sir Alan Parkes, scientific adviser to Mariculture, says, be a landmark in conserving the green turtle. With an animal as useful (to human beings) as the sea turtle (of which all seven species are endangered) for meat, eggs, hide, shell, soup, etc., farm breeding is probably the only way, and certainly the sensible way, to relieve the pressure on the wild populations. But not until turtle farmers have successfully ousted the commercial use of the wild-caught turtles on the world market will conservationists rejoice.

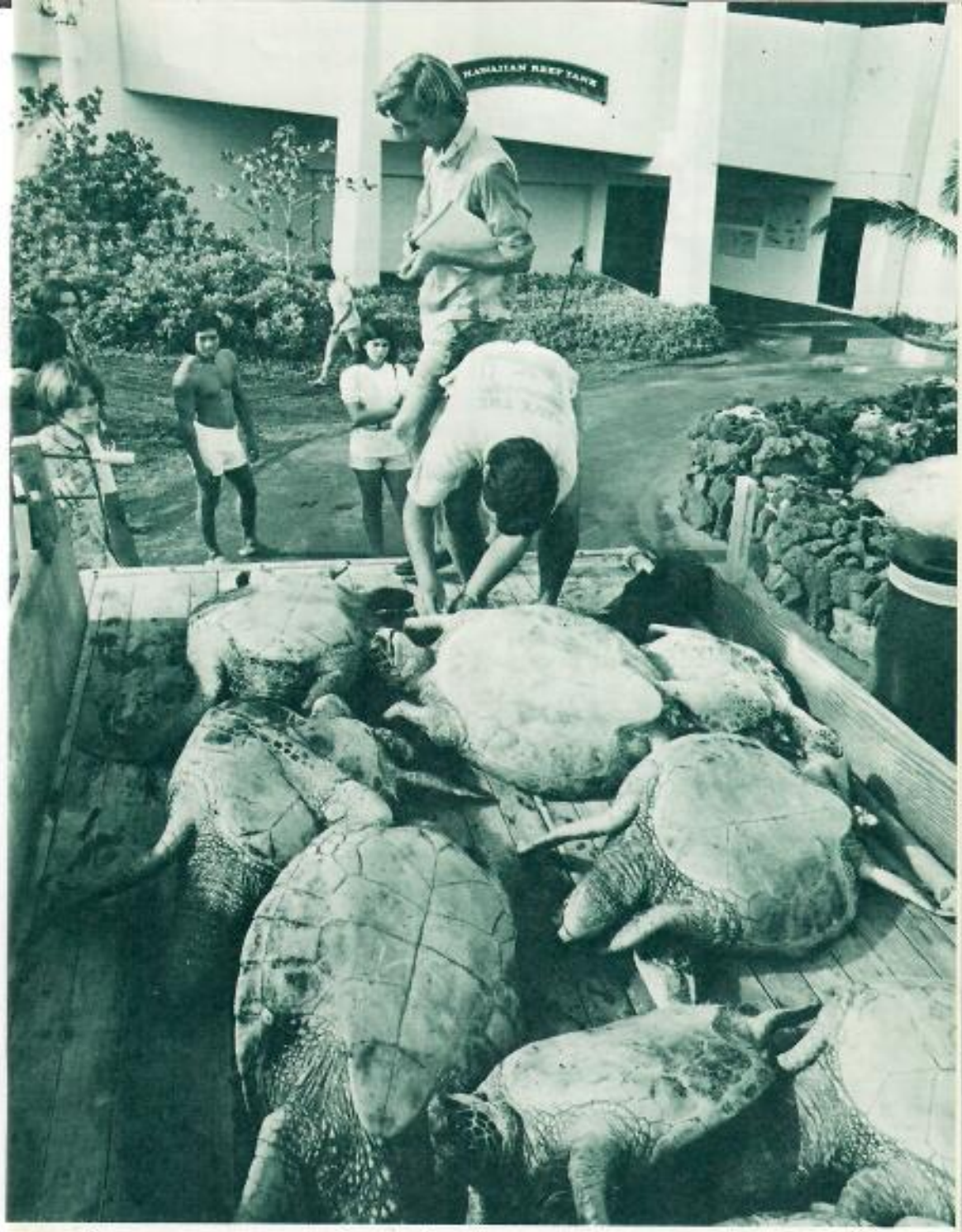
Help for Tobago's Leatherbacks

'Probably for the first time in the history of Tobago at this time of year there are no turtle carcasses on the beaches', Robert Johnson, Chairman of the local branch of the Society for the Prevention of Cruelty to Animals, wrote to us in June this year. Earlier, in April, three leatherback turtles had arrived to lay their eggs on Courland Beach, in front of the aptly named Turtle Bay Hotel, to be killed (as usual) with revolting cruelty and the eggs scattered. A few pounds of meat were taken from each carcass. He decided to try a system of rewards for every turtle that not only laid her eggs but got back to sea. Careful and detailed plans were made and publicised, with the result that in May eleven leatherback turtles laid and all returned safely to the sea: $550 dollars was paid out at $50 a time and well reported on radio and in the press. What is more not one turtle was slaughtered in the month. Tobago gives turtles some protection, but the close season is from June 1–September 30, whereas the main laying months are April and May. Mr Johnson's chief difficulty was getting the money for the awards. In June he was able to write that the Turtle Bay Hotel had contributed $300—well it might for such a tourist attraction—but that, even with gifts from the USA and UK, they were still paying out more than they received.

Time to Stop Turtle Trade in Hawaii

So many green turtles are being taken by fishermen in Hawaii compared with only a few years ago that numbers may be declining seriously. In 1963 fishermen with commercial licences who offered their catch for sale took 380 lbs; in 1971 the figure was 19,884, and last year 25,583. These figures take no account of catches not offered for sale, or those of sport fishermen, or of the many fishermen who simply do not make returns. Quoting the figures in the Hawaiian Audubon Society's journal *The Elepaio*, George H. Balazs, of the Hawaii Institute of Marine Biology, says that green turtle fillet steaks are served in restaurants on most of the islands, and stuffed turtles are sold as curios; he adds, 'many local residents have observed that the number of turtles sighted in recent years has decreased'. North-west of the main islands Hawaii has a large national wildlife refuge (under control of the Federal Government), extending 800 miles from Nihoa Island to Pearl and Hermes Reef, where of course all wildlife is protected. This is where the turtles breed. But some of their main grazing grounds are round the main islands outside the refuge, where they are only protected within the 60-fathom line (often less than a mile offshore) and on land. Up to the 12-mile limit they can be taken by Hawaiian fisherman and beyond that by anybody. Even hawksbill and leatherbacks, which occasionally occur, can be legally

taken in these waters without size or quantity restrictions. As Dr Harold Hirth pointed out, in a report to the UN, the green turtles nesting in the refuge may well be the same individuals as those feeding unprotected round the main islands. Research tends to confirm this—and Hawaii is losing the opportunity that occurs nowhere else in the world of managing and protecting a colony of green turtles both on their nesting and feeding grounds. Other Pacific islands, including Fiji and Samoa, impose both size limits and close seasons, and French Polynesia bans all commercial catching (allowing only residents to catch for their own consumption). The least Hawaii can do is to implement Dr Hirth's first recommendation and ban the sale of stuffed turtles and the serving of turtle meat and soup in hotels.



NINE HEALTHY CAPTIVE *green sea turtles were recently tagged and released into the wild by workers at Sea Life Park, as part of a University of Hawaii study of the migrations, growth rates, and the survival of the dwindling population of these turtles.*

Please see page 12-73

Sea Secrets

An Educational Service
of the International
Oceanographic Foundation

If you are not receiving SEA SECRETS and wish to do so, please write for information regarding membership in the Foundation to the Secretary, The International Oceanographic Foundation, 10 Rickenbacker Causeway, Virginia Key, Miami, Florida 33149.

Volume 18, No. 1
January-February, 1974
(Fourth Series)

creases the concentration of carbon dioxide.

If carbon dioxide is inhaled in excessive amounts, such as in the non-ventilated enclosed hold of a vessel, it will pass quickly to a control center in the brain and cause breathing to be affected adversely which, of course, leads to other problems. Some suggested means of preventing these tragedies are the use of readily available belts with ropes and snaphooks to rescue persons overcome in the hold, and the use of mechanical ventilators during the unloading of fish from the vessel and in fish meal factories.

HAWAII'S CONCERN FOR ITS TURTLES

Most tagging studies of turtles have taken place at nesting beaches, where females conveniently come ashore at specific sites. Few tagging programs have been conducted in turtle feeding areas because much effort must be expended in their capture. George Balazs of the University of Hawaii at Manoa is presently directing a program of tagging green sea turtles in the latter areas, and the work is providing information on migrations, growth rates, and the survival of this species.

Balazs has also been encouraging the release of captive green turtles where excessive numbers are present. In 1973, 21 turtles were tagged and set free from the Waikiki Aquarium and 9 from Sea Life Park. Of this number, three have thus far been reported as captured. One was caught by a conservation-minded diver off the south coast of Lanai. Since it had been originally released off Kauai, this large adult turtle had traveled over 200 miles. After close examination, it was again set free. It was seen, however, that large sections of laminae on its carapace were peeling off with healthy new shell located underneath. Balazs speculates that the time the turtle spent in captivity with subsequent release to the wild where differing temperatures and pressures exist may have stimulated the shell molting.

For centuries, green sea turtles have been a valuable source of protein for many people. The greatest pressure from man, however, on the populations of these turtles has resulted from commercial exploitation, such as in the marketing of turtle jewelry, leather and cosmetics, and in the inclusion of turtle soup and steak on restaurant menus.

Today, in the entire Hawaiian Archipelago, only one congregated green turtle nesting area still exists. The small sand islets at French Frigate Shoals, 480 miles northwest of Honolulu, are the site of 95 percent of all the nesting activity taking place in the region. Although the shoals have been declared a protected area, studies have shown that the turtles breeding at these islets are the same animals that occur around the Hawaiian Islands, where they are unprotected and overexploited.

Fortunately, the Hawaiian State Department of Land and Natural Resources now has under consideration protective legislation that would place stronger controls on the capturing of green sea turtles, and Balazs hopes these controls will become effective before drastic declines of the turtles occur and they actually qualify as being endangered.

MAP MARINE MISCELLANY

George Balazs and his friend.

Coastal Plants Slideshow

The University of Hawaii Sea Grant Marine Advisory Program and the Conservation Council for Hawaii will present a 20-minute slideshow on Hawaii's coastal plants. Titled "Na Mea Ulu Ma Kahakai o Hawai'i," the slide/tape presentation features Hawaii's unique and interesting coastal flora.

The slideshow was prepared by Bert Kimura of Leeward Community College and Ken Nagata of Lyons Arboretum under a special project funded by the UH Sea Grant College Program.

In addition to the slideshow presentation, Kimura and Nagata will also discuss some of their findings from extensive field surveys conducted in Hawaii. One of the purposes of their work was to document the status of coastal plants considered as threatened or endangered.

The slideshow will be presented at the McCully-Moiliili Library on Thursday, December 14, at 7:30 p.m. For more information, call the Marine Advisory Program at 948-8191.

Copies of the slideshow will be made available for use by the public later this year.

A rare photo of the Hawaiian monk seal and Hawaiian green sea turtle napping together at Whale-Skate Islet, French Frigate Shoals has been published in the May-June issue of *Sea Secrets*.

The photo was taken by George H. Balazs of the Hawaii Institute of Marine Biology and was used to illustrate an artical on the rare behavioral traits of green sea turtle aggregations in the Hawaiian Islands National Wildlife Refuge. The unusual photo also appears in the December issue of *Honolulu* magazine with other outstanding photos of wildlife in the leeward chain. In addition, seabird photos by Balazs will be featured in the 1979 Dillingham tide calender.

The same issue of *Sea Secrets*, an International Oceanographic Foundation publication, includes a US Navy photo of the unknown shark "megamouth," which was hauled up dead by a Navy research vessel operating in deep waters northwest of Oahu. The fish, a 15-foot male weighing about 1,600 pounds, is one of the largest species of sharks, according to a research team headed by Dr. Leighton R. Taylor, director of the Waikiki Aquarium.

A discussion of megamouth is also included in Spencer Wilkie Tinker's 568-page *Fishes of Hawaii: A Handbook of the Marine Fishes of Hawaii and the Central Pacific Ocean*, which came off the press in September and is now available in island and mainland bookstores.

Tinker's newest book joins his *Pacific Sea Shells* and *Sharks and Rays: A Handbook of the Sharks and Rays of Hawaii and the Central Pacific Ocean*, which have been popular in Hawaii for many years. Charles J. DeLuca, curator of the Waikiki Aquarium, is co-author of the *Sharks and Rays*.

Also keeping the marine environment in the public consciousness is an article on "Harvesting Hawaii's Oceans" in the September-October issue of *Downtown* magazine. The article by David Logan discusses Hawaii's fishing potential and the successful fish aggregation project begun by the National Marine Fisheries Service and the Pacific Tuna Development Foundation.

A U.S. Navy photo of the shark "megamouth," which is one of the largest species of shark.

Another marine-related cover story entitled "Big Stakes at Kahuku" in the October issue of *Hawaii Business* discusses Hawaii's aquaculture industry and corporate farmer, Art Lowe. The article also mentions C. Brewer's Kilauea Agronomics subsidiary on Kauai and other fish farming projects on Oahu and throughout the state.

The Cooperative Observer

PACIFIC REGION

JUNE 1982 Volume IV Number 1

TERN ISLAND, FRENCH FRIGATE SHOALS — HAWAIIAN ISLANDS NATIONAL WILDLIFE REFUGE

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA SERVICE / PACIFIC REGION HONOLULU, HAWAII

improve the abandoned Tern Island facility. Construction began in early 1952, and by October the Tern Island LORAN station was in operation.

Storm waves washed over the island on 1 December 1969, extensively damaging equipment and buildings, and forcing helicopter evacuation of the crew from the LORAN building rooftop the following day. The crew returned by vessel ten days later, but the runway was not operational until 15 January 1970. As a result of the damage caused by this storm and to prevent further weather problems, the living quarters were rebuilt in 1972 at a cost of nearly $200,000. This building is now constructed in such a way that wave wash can pass under the floor.

On 30 June 1979, the Coast Guard decommissioned the LORAN C station at Tern Island. The crew of 22 men left the island and were replaced by two Fish and Wildlife Service (FWS) refuge staff. Since that time, the station has been occupied by 1 to 3 FWS refuge staff. Additional family members, researchers and other visitors have raised the total station occupancy to as high as 10 for short periods.

Tern Island is presently the only "permanent" on-site Service facility within the remote island refuges of the Hawaiian/Pacific Islands National Wildlife Refuge (NWR) Complex. In fact, the only other on-site facility in the entire complex is at Kilauea Pt., Kauai. Primary administrative offices are in the Federal Building in Honolulu. No other locations within the existing boundaries of the HINWR are practical for a permanent Service station although the Service personnel could be stationed at Midway Atoll. If all or a portion of Midway Atoll were incorporated into the NWR system, on-site Service personnel would be appropriate to perform educational, enforcement, management, and research duties.

FWS "presence" within the HINWR supports the Service mission statement and program goals, particularly those of the Endangered Species and Migratory Bird Programs. Program goals for Endangered Species include listing of qualified species, protection of listed species and recovery of listed species through the development and implementation of recovery plans. In addition, at least 10 NWHI plant species have previously been recommended for formal listing pursuant to the Endangered Species Act. The Migratory Bird Program goals relating to maintenance of population levels with optimum diversity and to the preservation/management of habitats can best be addressed through physical Service "presence" in the NWHI. The Coast Guard facilities at Tern Island, and more recently the FWS station, have made this "presence" possible in a meaningful way.

Prior to Service occupation of Tern Island, Service research/management studies at FFS involved intermittent census and tagging of seals, turtles, and seabirds. Opportunities for year-round monitoring of fish and wildlife species at FFS became a reality when the Service permanently occupied the station in July 1979. Long-term Service studies initiated or accelerated at this time included seabirds (phenology, breeding success, monitoring of known age birds, nest site tenacity, food habits), seals (patterns of habitat use, population estimates through molt studies, pup production), turtles (habitat use), and reef ecosystems.

The operation of a manned facility at Tern Island has attracted a variety of individuals and agencies seeking a platform for one-time or long-term monitoring studies

"I'd be a star if this were Waikiki Beach."

"Am I glad I didn't have to walk that far."
(Masked Booby)

ABOUT THE COVER - TERN ISLAND, FRENCH FRIGATE SHOALS

French Frigate Shoals is a coral atoll situated almost at midpoint of the 1600-mile long Hawaiian archipelago. Tern Island is one of 13 small named islands in French Frigate Shoals. The island is considered by the federal government to be a federally-owned segment of the Hawaiian Islands National Wildlife Refuge (HINWR).

History - French Frigate Shoals (FFS) was first visited by French expedition ships, BROUSSOLE and ASTROLABE, under the command of Jean Francois de la Perouse in November 1786. Over the next century, numerous other sailing ships visited the Shoals. Commercial exploitation began with a search for guano by the bark, GAMBIA, in March 1859. In the same month the first recorded ship wreck (SOUTH SEAMAN) took place. The lure of turtles, seals, beche-de-mer, bird feathers, fish and shark products led other sailing ships to their demise in the years to come. The first biological survey of the Shoals was made in 1891. In 1894, several of the Northwestern Hawaiian Islands (NWHI), including FFS, were leased to the North Pacific Phosphate and Fertilizer Company for guano harvest, but they never worked FFS.

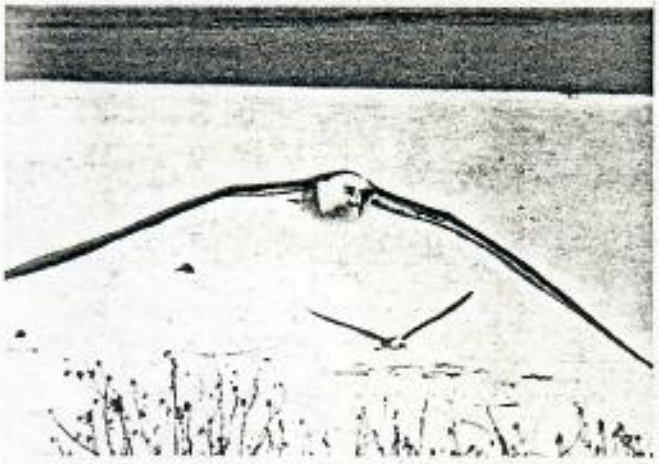
The effects of unregulated exploitation led President Theodore Roosevelt to sign Executive Order (EO) 1019 in February 1909, establishing the Hawaiian Islands Reservation. This EO, which did not include Midway Atoll, was issued to prevent the continued slaughter of birds which had been exploited for their eggs, feathers, and guano. In 1940 Presidential Proclamation 2416 changed the designation of the Hawaiian Islands Reservation to the Hawaiian Islands National Wildlife Refuge (HINWR), and administrative jurisdiction was transferred from the Department of Agriculture to the Department of Interior. Limited exploitation of fish and wildlife resources continued within refuge boundaries until the mid-1950's. It was, in part, concern stimulated by this exploitation and its effect on refuge resources that led the Bureau of Sport Fisheries and Wildlife (later U.S. Fish & Wildlife Service) to enter into agreement with the Territory of Hawaii in 1951 authorizing declaration of all emergent lands of the HINWR as a Territorial Wildlife Refuge. This refuge, which also includes Kure Atoll, became a State Wildlife Refuge upon statehood.

French Frigate Shoals began an important role in military history in 1928 when hydrographic surveys were conducted in consideration of its potential as a strategically located anchorage. The Battle of Midway prompted the decision to build an airstrip at FFS in order to support ferrying aircraft, to act as an emergency landing facility and to provide an outpost for defense of Pearl Harbor.

The new Naval Air Facility was commissioned on 17 March 1943. In November 1944 there were four officers and 123 enlisted men on the island with parking for 22 planes. The station was never attacked, and the incidence of enemy ships in the area was low. The station was placed into caretaker status a month after the war ended in September 1945. Final disestablishment occurred on 9 June 1946.

Two years prior to this date, a Coast Guard LORAN station had been established on nearby East Island. The LORAN station was supplied through the Tern Island Naval Station. When the Naval facility closed in June 1946, the LORAN facility was supplied by buoy tender. Storms and corrosion caused rapid deterioration of buildings. Morale of the crew deteriorated as well, due to undependable supply and isolated duty. Funds were released in October 1951 to

INHABITANTS OF FRENCH FRIGATE SHOALS



Laysan albatross

Hawaiian monk seal

at FFS. The National Weather Service (NWS) has installed a monitoring facility that transmits weather data by satellite. Although remotely operated, FWS staff on the island assist the NWS in monitoring this equipment and provide logistical support for periodic maintenance. The Tern Island station plays an important role in monitoring weather "upstream" of the main Hawaiian Islands. The only other weather reporting station to the northwest is Midway.

The Service has been approached on several recent occasions by operators of various commercial nature tours, expressing interest in conducting such tours in the HINWR. This activity has been discouraged because of the anticipated impact on fragile island resources. However, educational film makers and writers have visited the HINWR, including Tern Island, and have produced films and articles that have been widely distributed. These have been closely supervised.

Recreational activities, including wildlife oriented activities, have been discouraged in the HINWR. The Service has denied requested access for sport fishing, recreational diving, boating, glass ball collecting, and other similar activities.

Pertinent legal mandates and refuge policy clearly dictate a continuing restrictive policy towards non-wildlife oriented activities in the HINWR, particularly at FFS where critically important monk seal and turtle populations are at stake. Even wildlife oriented activities, including some forms of educational use, must be restricted in an effort to reduce all potentially impacting human activity to the minimum necessary to manage the wildlife resources.

Acknowledgment: Photos and history provided by the U.S. Department of the Interior, Fish and Wildlife Service, Honolulu, Hawaii. Special thanks to Robert J. Shallenberger, Supervisory Wildlife Biologist, and Gerald M. Ludwig, Assistant Refuge Manager (Remote Islands).

NWS automatic weather reporting station on Tern Island

"I really get a lot more respect in the water." (Green Turtle)

Black-footed and Laysan albatross colony

Fish and Wildlife Service on patrol

Baiting the bottom line

Only the ups and downs are predictable in commercial fishing.

THOSE WHO have any tendency at all toward motion sickness should stay out of the commercial fishing business. Never mind the fact that the seas are often rough. It's the radically up-and-down motion of the bottom line that's enough to make a shore-bound businessman sick.

For example, take Alika Cooper & Sons, a commercial fishing and fish processing enterprise in Hilo. Last year was the best year Hawaii's fishermen had seen since 1975, says Cooper, with his company alone processing close to 1½ million pounds of fish. But this year is the worst in years. What are his end-of-the-year projections? "Projections?" he spits out. "Ha!"

Unpredictable factors. The fact is, it's impossible to make realistic projections in the fishing business. There are far too many changeable factors involved. First and foremost is whether or not the fish are biting, and that factor is what's making this such a down year. "The fish just aren't coming back," says Cooper, noting that, whereas the fishing season usually starts in May, by September they were still "just dribbling in."

Auction price is another unpredictable factor—one that depends on time of year, demand versus supply and the condition of the fish. At a recent auction, says Cooper, the price for a pound of ahi ranged from $1.13 to $2.77, depending on the quality of the fish. And because of supply and demand, Cooper recently saw ahi drop from an average of $3.50 per pound to $1.50 per pound within two weeks.

The appeal of commercial fishing is the potential profit. Cooper says that a fisherman can gross up to $1,500 at auction for one night's work. Yet out of that comes around $200 for fuel, bait and ice, plus payments to the processor, shipper and auctioneer. And, Cooper notes, "he may not have caught anything at all the night before."

Those big margins also don't account for the cost and repair of equipment. While repair costs, for instance, are difficult to forecast, Cooper says he can count on spending around $5,500 per engine each year for overhaul work. But there's just no way to know whether a transmission is going to fail, or a rudder is going to break, or the radar equipment is going to give out, or traps are going to be swept away by storms, or long lines are going to be cut by a passing freighter—the possibilities are endless.

Alika (center) and his two sons, Kaohu and Mahi, have built up a family business which handles every step of commercial fishing from selling the bait to getting the catch to auction.

There's one other cost that Cooper can count on each year, and it's "the thing that practically kills you," he says. That cost is insurance. Cooper spends at least $40,000 a year in coverage for the company's boats, trucks, property, temporary disability insurance for his six employees and health insurance for the fishermen.

Why bother? So if the business is that unpredictable, why be in it at all? Because admits Cooper, although when it's bad, it's horrid—when it's good, it's very, very good. Last year, for example, Cooper & Sons handled around $1.3 million worth of fish. And for Alika Cooper, there's also the fact that fishing is a family tradition. Cooper got into commercial fishing in 1946, then took a 10-year leave from the industry in 1955 when he married, moved to Volcano and tried farming for awhile.

But in 1965 Cooper moved his family to Hilo, and he got back into long line commercial fishing using a 65-foot sampan. Shortly after, he bought a couple of skiffs and started net fishing. Then, in 1975, he formed Alika Cooper & Sons with his wife and three children. Alika, Jr. has since left the company to run a nursery; Kaohu is in charge of the company's captains and fleet and Mahi handles mechanics and repairs.

Over the last seven years, the family members have built the business up bit by bit. They started with two boats purchased with six percent Small Business Administration loans. Now the company has seven boats (plus one under construction), six of them 27-footers worth around $30,000 each and one 36-footer worth about $100,000. The company also has two cold storage lockers, each with 26,000-pound capacity, 40 shipping containers, an ice block plant and three ice

machines, each of which can churn out up to 7,000 pounds of ice a day.

Cooper & Sons contracts out its boats to a captain and his crew member. The company also services around 20 other fishermen on a daily basis, providing them with bait and ice, and processing, packaging and air-shipping their catch to Honolulu for auction. After the auctioneer and the air shipper are paid, Cooper takes 10 percent from the independent fishermen for processing and shipping services. For its own boats' catches, the company takes 44 percent, with 24 percent going to the crew member and 32 percent going to the captain.

This ahi *may sell for $1.13 to $3 a pound, depending on supply, demand and quality.*

Other than a few small local sales, Cooper usually sends all the fish his company handles to United Fishing Agency in Honolulu for auction. Within a matter of days, Cooper & Sons is sent a check for each fisherman plus a computer printout which details which fish sold for how much, to what bidder and miscellaneous comments on its condition. At times, when the price is particularly good, the company will send fish to Japan, says Cooper. But payment can often be delayed for as much as three weeks when dealing with the Japanese market.

Even in the good years, Cooper says, he may make money on paper but it rarely goes in his pocket. "Practically every cent we make goes into expanding the business," Cooper says with a note of pride.

Some of that money is now starting to trickle into farming. "Fishing is good," says Cooper, "but you can't fish for too long. It takes a young man's endurance." Cooper now has three small lots, two in state agricultural parks, where he is growing fruit trees and flowers. "That," Cooper muses, "is what happens to old fishermen."

Hawaii Business

VOLUME 28 NUMBER 5 NOVEMBER 1982

COVER

Will Henderson of Queen's sees potential chaos ahead for Hawaii's hospital industry.

Photographer: Greg Vaughn

ARTICLES

DEPARTMENTS

Published monthly by Hawaii Business Publishing Corp. Founder Joseph A. Murphy. Copyright 1982 at Hawaii Business Publishing Corp. Editorial, advertising and business offices at 825 Keeaumoku St., Honolulu, HI 96814. Telephone (808) 946-3978. POSTMASTER: Send all address changes to *Hawaii Business*, P.O. Box 913, Honolulu, HI 96808.
Subscriptions: $15 per year Hawaii; $18 U.S. Mainland and Canada; $30 elsewhere.
Single copies: $1.50.
Second Class Postage Paid at Honolulu, HI (USPS 237-560).

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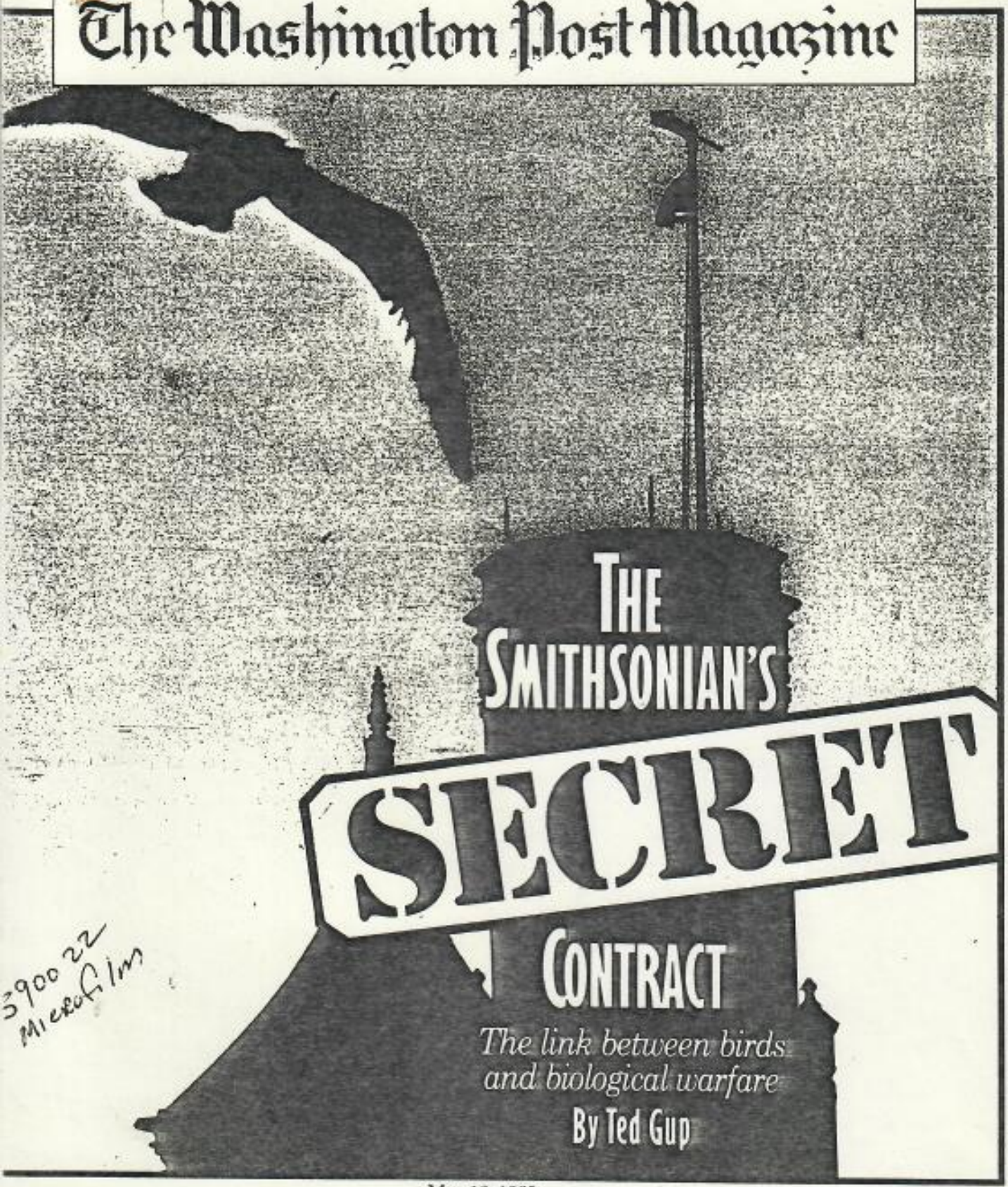

THE SMITHSONIAN'S SECRET CONTRACT

The link between birds and biological warfare

By Ted Gup

May 12, 1985

The Washington Post Magazine

Skins of grayback terns line a drawer in the Smithsonian's files. The birds were collected during the Smithsonian's Pacific project: see page 8.

THE SMITHSONIAN SECRET

By Ted Gup

The Smithsonian Institution said its bird research in the Pacific had nothing to do with the Defense Department's simultaneous study of biological warfare. But it did. The Smithsonian's own archives document a "secret" project that some think violated the institution's own charter.

8

THE BLOOM BOOM

By Catherine Williams and Margaret Carlson

April showers bring May flowers. And December flowers. And January, February and March flowers, and cut flowers for all the rest of the year. Vendors are making a fortune from people who are carting flowers from the street into their homes and offices in record numbers.

10

Answers to last week's puzzles on page 24

Cover photograph of the Smithsonian Castle by Margaret Thomas

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THE SMITHSONIAN SECRET

Why an innocent bird study went straight to biological warfare experts at Fort Detrick ■ By Ted Gup

Twenty years ago, a team of Smithsonian researchers landed on a string of remote Pacific islands to study the comings and goings of sea birds—terns, albatrosses, gulls. But there was another reason they were there, one stamped "Secret." The leaders of this scholarly band of curators and ecologists reported their findings to military scientists whose interest was not birds but biological weapons.

The Pacific project was two separate missions existing side by side: the Smithsonian's and the Pentagon's. The Smithsonian was only too eager to be given funds to study bird migratory patterns and the military was eager to find "safe" sites for atmospheric testing of biological weapons in the Pacific. Such sites could be determined from the Smithsonian research.

An Army spokesman says military scientists wanted to be certain germs would not be spread beyond the test sites by migrating birds. Other military scientists also wanted to know if sea birds could be used as carriers of biological weapons, winging deadly disease across borders. In military terms, birds could be "avian vectors of disease."

The secret contract was an odd departure for the Smithsonian Institution, beloved and benign. Although the Smithsonian has for decades had unclassified research contracts with the Department of Defense, as it has with other federal departments and agencies, the Pacific Ocean Bird Project was not just another contract.

Smithsonian researchers burned copies of some project notes and correspondence with the military, but many of their originals are preserved in acid-free boxes deep within the Smithsonian's own archives, which are open to the public. Forgotten by many, consulted by few, the 17 square feet of records contain day-by-day accounts, maps, photos and correspondence with the military. All are pieces of a puzzle that show the Pacific Ocean Bird Project was one of the largest and most mysterious undertakings in the institution's 139-year history.

The Smithsonian said at the time that no part of the project was classified "secret." It was. The Smithsonian questioned how its scientists could know the military would use its study for biological weapons research. Some of those in charge of the project did know. In the end, the bird study caused a major self-examination within the Smithsonian that brought about a rededication to never again take on a secret study. And today, 15 years after the project ended, a timeless question remains: What responsibility do scientists and institutions have to weigh how research—even basic research—will be used?

THE PACIFIC project spanned eight years, cost the Pentagon $3 million, and involved dozens of Smithsonian staffers and Defense Department workers. From the first, the Smithsonian knew the contract was with the controversial Fort Detrick biological warfare research center in Frederick, Md. And even that fact was classified secret. The Smithsonian was prohibited from divulging anything about its work without clearance from Fort Detrick.

Early letters to Smithsonian contract officers made it clear the Army's interest went beyond ornithology. On Oct. 1, 1963, the Army Biological Laboratories at Fort Detrick wrote to Smithsonian administrators about "Material containing Biological Weapons System information which reveals the nondescriptive code designations for BW [Biologic Weapons] agents . . ."

Although the pairing of the Smithsonian and Fort Detrick seems unlikely, in the early 1960s there were numerous ties between the military and research institutions. The Smithsonian's contract was signed in October 1962, the same month that President Kennedy announced that Soviet missiles were in Cuba. Military exotica flourished: mind control through drugs, porpoises as animate torpedoes, new concoctions of chemical and biological weapons, turning life against life. It was a macabre time of Strangelovean fantasies when even one of God's gentlest creatures, a gull, could be considered for a doomsday assignment.

And there was another, simpler reason the Smithsonian took the contract. Money. The Smithsonian wanted more research funds.

The risks were great. If word got out that the revered Smithsonian was working on a classified project sponsored by the Army's biological warfare branch, the institution's entree to other countries might be lost, and its image blemished. There was a legal question as well. Smithsonian officials have long considered secret research to be contrary to the spirit, if not the letter, of the 19th century trust establishing the institution. The trust mandates that the Smithsonian would be "for the increase and diffusion of knowledge among men." Because of that, some at the Smithsonian have refused to believe that the institution ever could have undertaken a classified project.

"Never," said David Challinor in a 1983 interview. The Smithsonian's respected assistant secretary for science, who has been with the institution since 1971, said: "Why, by our very nature we cannot do classified work. It would violate the trust. This is what the Smithsonian Institution is all about. We have to publish what we do. If we don't, we are living a lie."

But last year, Challinor learned that parts of the Pacific project had been classified. "It is only recently that I got the inside scoop on that myself," he said. " . . . it didn't smell right to me in the first place."

If it was not a lie that the Smithsonian lived during that period, then it was a selective rendering of the truth. The Smithsonian touted the project as a measure of its devotion to the environment. "The project which surpasses all others in number of personnel and size of the geographical area covered," said the Smithsonian's 1965 annual report. With a certain irony, the report warned of the hazards man posed to his environment and himself:

". . . man, in his struggle to advance himself, . . . is subjecting the total environment—water, atmosphere, and living tissues—to physical and chemical influences which need to be measured now and in the future. For unless these fundamental

TED GUP is a Washington Post staff writer.

changes in his environment can be assessed, man himself, through ignorance, may fall victim to his own progress." That was written by Philip S. Humphrey, then the Smithsonian's chairman of the Department of Vertebrate Zoology and head of the Pacific project.

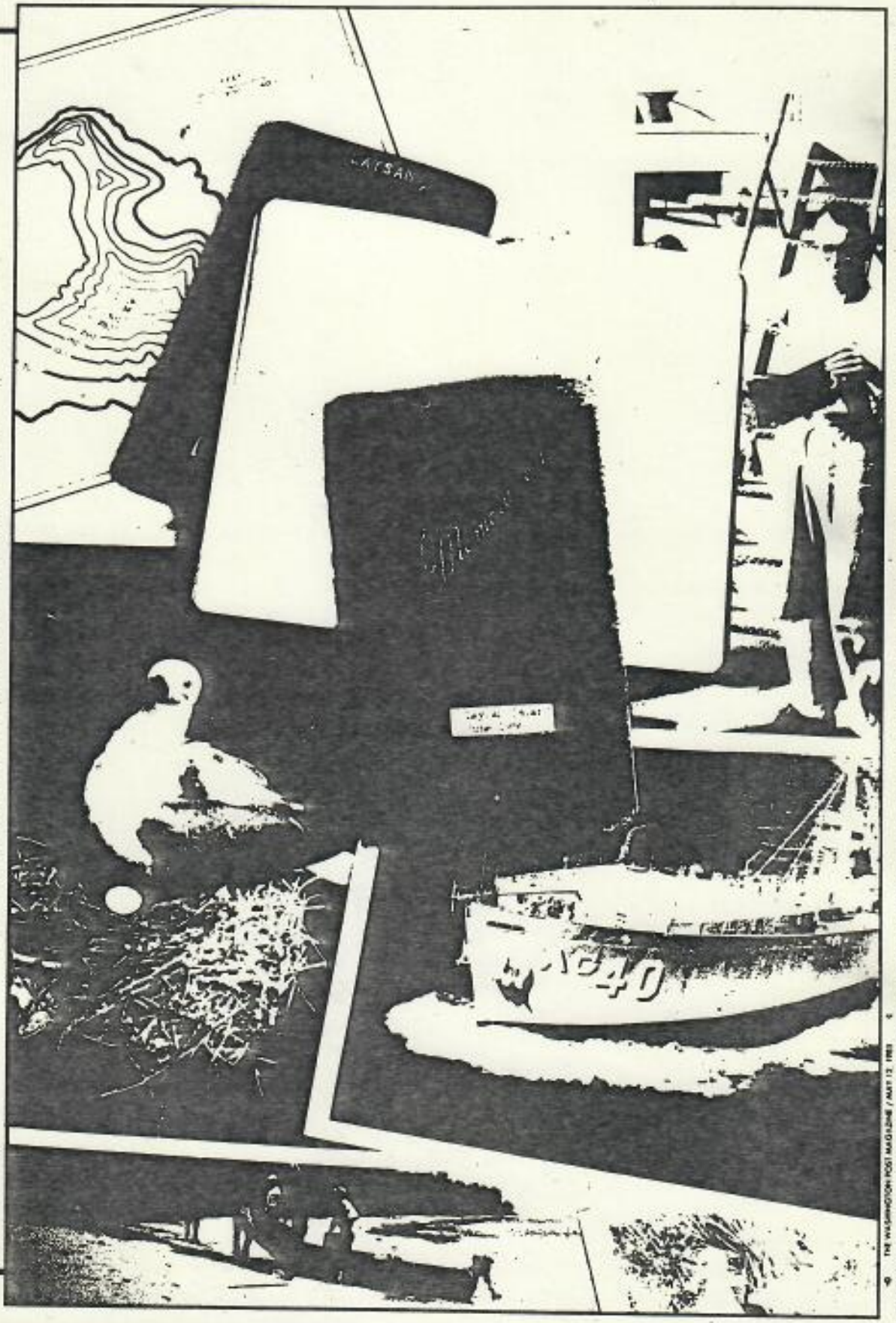
Smithsonian researchers did study the migratory patterns of birds and the rich ecological mix of species on the islands. They published reports detailing their findings for the scientific community. And there is no evidence that Smithsonian personnel took part in testing biological weapons.

Said the project's research curator, Arthur Binion Amerson: "The Pacific program was one of the most successful modern day field studies ever done. We were not involved in any military activities. What they [the Depart-

Continued on page 12

PORTRAITS of the Pacific Ocean Bird Project from the Smithsonian's archives clockwise from top left, maps of Rabbit and Sand islands where some studies were conducted; Charles Ely, a Smithsonian researcher, examines a bird at sea; the USS Granville S. Hall was one of several Navy ships used by Smithsonian and military researchers. Notebooks record bird bandings and sightings.

PHOTOGRAPH BY MARGARET THOMAS



THE WASHINGTON POST MAGAZINE / MAY 12, 1985

The Pacific Ocean Bird Project

Birds, from page 9

ment of Defense] did with it was their business."

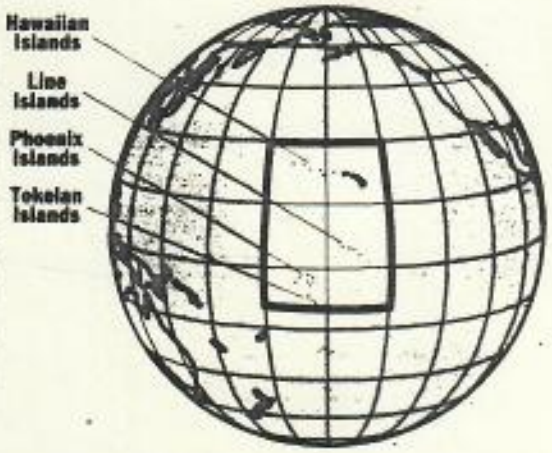
THE PACIFIC study had projects within projects. One was Operation Starbrite, described in a 1964 Smithsonian report classified "Confidential" by the Army. The Starbrite program consisted of monthly 15-day cruises aboard U.S. Navy vessels operating out of Pearl Harbor. Cruising a 50,000-square-mile grid of ocean and atolls, the Smithsonian personnel were to record "all visible animal life." From sunrise to sunset, they were to note the activity of birds, the species and numbers, and their every movement.

Officers from Utah's Fort Deseret Test Center, where biological weapons research was conducted, accompanied Smithsonian scientists on many "Starbrite cruises" to islands with names like French Frigate Shoals, Christmas Island and the Phoenix Islands.

"Attempts were made to collect as many specimens as possible," noted a progress report. "This was accomplished with 12-gauge shotguns [a common method of collecting birds for research] from the helicopter deck or from a whaleboat." Parasites and stomach contents were preserved for further study.

Another 1964 report details a biological survey of Sand Island and Johnston Atoll, described as an island "naturally favored by birds as a breeding site and stopping off place." Johnston, 700 miles southwest of Hawaii, was used between 1958 and 1962 as a nuclear testing site. Since 1970, thousands of tons of nerve gas have been stored there.

Much of what the Smithsonian researchers did was standard procedure. But against the background of the military's interest, their reports read like passages out of *The Andromeda Strain*.



HIGHLIGHTED area shows major concentration of bird migratory study and includes areas where the Army tested biological weapons. Between 1962 and 1970 the research covered 4 million square miles of the Pacific.

MAP BY BRAD WYE

Bird blood samples were taken within 20 minutes of capture, placed in glass vials, frozen, then shipped to Fort Detrick.

Before the project was over, 2 million birds were banded—Masked Boobies, Great Frigatebirds, Sooty Terns. Some had orange streamers tied to their legs so that their flight patterns could be seen at sea. Many were tracked by radar. Their dates of arrival and departure were recorded, as were their areas of origin.

By 1964, less than two years into the study, security measures were increased at the urging of the military. Cryptic messages were exchanged among the expeditions in the Pacific, the Smithsonian and Fort Deseret Test Center.

In April of that year, Smithsonian researchers were told they needed a series of inoculations. Some received their shots at Fort Detrick. In a memo written that month, under the heading "Inoculations (Classified Information)," the Smithsonian's Charles Ely wrote: "Decision to get everyone in the project immunized as soon as possible without actually calling in people from the field. Must be very careful about the approach and consider it a routine matter. Specifics may not be discussed by phone." A later memo spoke of personnel getting "antigent [sic] immunization" at Fort Detrick. (Humphrey speculates that the Army did not want Smithsonian personnel to contract diseases from the test areas.)

Documents now a part of the Smithsonian archives show Ely was particularly concerned with security. In April of 1964 he wrote: "As a result of a recent security meeting in Washington some aspects of our program have been classified by the military. It therefore becomes important that our people be even more careful about discussing the project with outside people. No one wants to be branded a security risk as a result of idle conversation.

"A discussion of this matter with SI [Smithsonian Institution] personnel under you will vary with the individual and his knowledge of the program . . . It should be enough for our men to know that they are securing data for the Division of Birds, S.I. and that the military is interested in learning the ECOLOGY (or environment) of areas in which they may someday be committed. Military and ecology are both nice vague terms . . .

"Forget the term Starbrite . . . Don't use any naval ship names with term S [Smithsonian] . . . don't associate DTC [Deseret Test Center] with S [Smithsonian] . . . Don't mention the Eastern organization (or live bird shipments) in any connection . . ."

On April 23, 1964, Ely wrote a colleague: "I've started a procedure of burning all project notes, carbon papers, etc. keeping only the original and carbons to be transmitted whether potentially classified or not . . . Also I'd appreciate receiving out here only the minimum classified information needed to keep me abreast of developments . . . This cloak and dagger business is not for me."

In a recent interview, Ely, an ornithologist lecturing in zoology at Fort Hays State University in Kansas, said he could not discuss the specifics of the project: "If they [the military] told me exactly what they were going to do and it were a secret, I wouldn't tell you. That's what it boils down to."

Research curator Arthur Binion Amerson said he never asked what the military's interests were. "We knew what Detrick was supposed to do, but we didn't know what they were doing . . . Yes, we heard rumors, but we had no physical evidence of what was going on."

Project head Humphrey is director of the Museum of Natural History at the University of Kansas. In a recent interview, he said: "What I knew was that the military was planning certain biological weapons testing in the central Pacific and basically they wanted to know whether it was safe. So it seemed to me then, as now, there was a clear distinction between the basic ecological work done by the Smithsonian and how that information was subsequently used by the military."

Humphrey said he remembers the names of two "candidate agents" to be tested by the military—VEE and Q Fever. VEE is Venezuelah Equine Encephalitis, a highly infectious virus that causes an acute influenza-like syndrome. One medical manual describes the symptoms as "severe headache, chills, fever, and explosive vomiting and diarrhea." VEE viruses, it says, "have produced more human illness in the Western Hemisphere than any other arbovirus." Q Fever is an acute infectious disease that can linger for months though it is rarely fatal. Humphrey said the biological agents were tested in aerosol form. Humphrey said the Army needed the information to prevent the spread of the biological agents by birds, but was not aware of any military interest in using birds as carriers of agents.

He said he was uncomfortable with the notion of letting them loose. "The more we learned about the tropical ecology," he said, "the more complicated it seemed to be and the less feasible it seemed to me biological weapons testing became. I made this point to various people including to the President's Scientific Advisory Committee. I have no idea as to the outcome of my expression of concern."

Nevertheless, Humphrey says, "I think that was at that time an appropriate function for the Smithsonian and, even today, I think it would be an appropriate function for the Smithsonian in the national interest. I personally don't happen to agree with the notion of biological warfare. I think it's hideous, but it's a fact of life."

The military's project officer was John B. Bushman, then stationed at Fort Deseret Test Center in Fort

Douglas, Utah. He now works in Washington with the Environmental Projects Branch of the Army Corps of Engineers. He declined to be interviewed.

IN 1969, the secret escaped for a time as television and newspaper reporters got suspicious, but their stories were met with public disbelief and the Smithsonian's own indignant protestations. A study of birds and nothing more, the Smithsonian told the Audubon Society, senators and puzzled museum patrons.

Once before, in December 1964, there had been a brush with the press. Ely wrote in a memo that he received a phone call from a local paper inquiring about their work and asking about a tie-in with the Atomic Energy Commission. "The reporter also copied a lot of misunderstood tripe from various books and previous articles, some of which I changed . . . All this further convinced him that we are with AEC—which I guess at least throws him on a cold trail."

Four years later, in December 1968, the press posed a more serious threat. A project memo notes: "The National Broadcasting Company continued to make inquiries of present and former Program employees concerning work accomplished on the Program."

A letter from a researcher to a Smithsonian administrator notes: "The ship's name and our location are particularly touchy. Now NBC can tie up the Smithsonian and the Hall [the USS Granville S. Hall] and no telling what else."

The NBC report aired Feb. 5, 1969. The next day inside The New York Times, The Washington Post and other papers, articles suggested a link between the Smithsonian project and chemical or biological weapons. The Defense Department denied any "military

THE SMITHSONIAN'S DEFENSE CONTRACTS

IN AN ALEXANDRIA OFFICE, miles from the Mall and the familiar Castle, is a side to the Smithsonian Institution few know exists. Behind a door marked "Manpower Research and Advisory Services Smithsonian Institution" works Dr. H. Wallace Sinaiko. He is a Smithsonian researcher working under a $190,000 a year contract with the Office of Naval Research. His subject: psychological studies on how to enhance recruitment, re-enlistment and quality of life in the volunteer Navy.

Sinaiko is one of several Smithsonian researchers working with the Department of Defense; over the past decade Defense Department contracts with the Smithsonian have totaled $10 million. The Smithsonian has had contracts with many government agencies. With the exception of the Pacific project, says the Smithsonian's assistant secretary of science, none of the contracts were classified.

Among the dozens of contracts with the military, the Smithsonian has conducted a study of dolphins with a Navy grant, an Air Force study of the Demilitarized Zone in Korea focusing on "diseases of man transmitted by animal vectors," and a 1966-1968 Army study on mosquitoes as vectors of disease in Southeast Asia.

Throughout the early 1960s, the Smithsonian Astrophysical Observatory (SAO), a network of observatories funded in part by NASA, did work for the U.S. Air Force as part of the observatory's routine Satellite Tracking Program. A memo in the Smithsonian archives reads: ". . . At NORAD's request, several Soviet satellites have been tracked and on occasion, reduced films have been sent to USAF. . . . Several SAO personnel travelled to NORAD (Colorado Springs) to consult on operational and communication techniques. . . ."

A December 1972 report notes: "Cosmos 520 (1972 72-A) was tracked for four days by special request of the U.S. Air Force."

In one instance, the SAO request was declined by a foreign researcher. On Nov. 11, 1964, an Indian scientist wrote from an observatory in that country: "While we shall be too happy to track such NORAD satellites in which SAO or other agencies, including NORAD, may have a scientific interest, it would put us in a rather embarrassing situation if we were asked to track NORAD or any other satellites on behalf of military agencies . . . You will appreciate that as a young scientific institution in a non-aligned country it would be best for us to keep away from such controversies."

Much Defense-related work was initiated in the days when Leonard Carmichael was the Smithsonian's secretary—1953 to 1964. Carmichael felt deeply about issues of national interest. Smithsonian archives contain an inventory list of Carmichael's locked file cabinets. The list refers to several secret reports, including one of April 6, 1953, the "Final report of the Advisory Group on Psychological and Unconventional Warfare to the Research and Development Board." The reports were destroyed by the Defense Department in 1960.

Between 1959 and 1963, Carmichael served as a director of the Human Ecology Fund (HEF), a research board funded by the Central Intelligence Agency, and a conduit for a variety of CIA projects — part of the MKULTRA program. According to two former CIA employes who worked for the fund, Carmichael signed a secrecy agreement not to disclose its CIA funding.

A former executive director of the HEF said Carmichael "was brought on because he had a fantastic image. Anybody of that caliber would not be involved in any hanky panky. That was exactly the image we wanted to project." A former CIA employe said Carmichael evaluated HEF research proposals but did not participate in any CIA research.

Carmichael's activity on the HEF was in a personal capacity, and not as a Smithsonian official. However, one letter evaluating a CIA project for HEF was written on Smithsonian stationary, and Carmichael's appointment book cites numerous meetings with HEF personnel at his Smithsonian office.

The CIA under Project MKULTRA was working on its own bird study related to biological weapons. In 1977 the Smithsonian was asked by a reporter about possible links between the CIA's project and the Smithsonian's. On Aug. 23, 1977, Smithsonian officials met with a CIA attorney to inquire about the Smithsonian's possible role in CIA-sponsored work, according to an internal memo. They were told that "there was no official Smithsonian role" although "someone associated with the Institution served as a consultant to the CIA-front organization which passed as a research funding agency."

That information was released in a 1977 Smithsonian statement, but the unnamed "someone" associated with the Smithsonian was Leonard Carmichael, it's former secretary.

Then the CIA gave the Smithsonian more information. On Nov. 7, 1977, CIA General Counsel Anthony A. Lapham wrote Smithsonian Secretary S. Dillon Ripley that "newly-discovered documents evidenced some type of involvement, direct or indirect, between your institution and Agency-sponsored research in the 1950s and 1960s into various aspects of human behavioral control." Lapham wrote the Smithsonian asking "whether you believe the identity of the Smithsonian should continue to be protected against disclosure by this Agency."

The Smithsonian chose not to release the new information. In a Nov. 18, 1977, letter to the CIA, Ripley wrote: "Because the Smithsonian in no way participated in this program, I believe it would be unfair and improper to disclose the institution's name in connection with it . . . It would, I believe, be a tragic disservice to the people of the United States and the world should the Smithsonian's ability to carry out its congressional mandate of 'increase and diffusion of knowledge among men' be impaired. Therefore I request that the Central Intelligence Agency not disclose the Smithsonian's name in any context as being involved in Agency-sponsored research into human behavioral control."

Nothing has been released under a Freedom of Information Act request to the CIA filed by The Washington Post in 1982 asking about links between the agency and the Smithsonian. The request is still being processed, says the CIA.

—Ted Gup

motive behind its sponsorship." The Smithsonian "insisted that it had no knowledge that its migratory bird study was in any way related to chemical-biological warfare research."

The Smithsonian attacked the reports.

Science magazine wrote an extensive article and quoted a senior Smithsonian official who "told Science 'unequivocally' that the Smithsonian 'has never engaged in any kind of biological warfare research.' He said there is 'no evidence' that the Smithsonian has served as 'an unwitting dupe or cloak for some kind of biological warfare research.'"

In a March 10, 1969, letter to Rep. William F. Ryan, Smithsonian Secretary S. Dillon Ripley wrote: "the Smithsonian Institution does not attempt to ascertain reasons why an agency decides to offer support for our scientific efforts . . . Rarely, if ever, are scientists or institutions in a position to predict how or where the data arrived at from their studies may be utilized. The line between the utilization of research information for health-oriented objectives and other applications, (biological warfare for example) is too fine to be discernible."

Smithsonian records do not make it clear what senior officials at the institution knew about the project.

DURING THE YEARS of the Pacific project, there were many at the Smithsonian with interests in both science and national security. Sidney R. Galler worked at the Office of Naval Research from 1948 until 1965, when he joined the institution. While with the Navy, Galler oversaw projects related to what he called in a recent interview "environmental warfare" and was "instrumental" in helping Humphrey get a contract to do research similar to that which was later expanded into the Pacific project.

"I wasn't interested in the germs," said Galler, "I was interested in the animals and their behavior that could be

On the sixth floor of the Smithsonian's Museum of Natural History, the ornithology department, are thousands of bird skins—terns, boobies and shearwaters—researchers brought back from the Pacific project. They are stacked drawer on top of drawer, cabinet on top of cabinet, creating a scene reminiscent of the closing shot in "Raiders of the Lost Ark."

utilized by an enemy to carry the germs." Some Pacific oceanic birds, he said, can "migrate tremendous distances and reach target areas with about 97 percent accuracies." He said the Department of Defense was interested in "the development of defensive capabilities."

Galler said he was not aware that the Smithsonian contract was classified or that actual agents had been tested. Today Galler continues to work as a "consultant on environmental warfare defensive strategies."

At the time the Smithsonian contract was signed the late Leonard Carmichael, a psychologist, headed the Smithsonian. During the early 1960s—while the Pacific bird study was under way—Carmichael served on the board of a CIA-front organization called the Human Ecology Fund. That body channeled money to various programs of interest to the CIA under "Project MKULTRA," which, according to 1977 congressional testimony, conducted the CIA's chemical and biological research. There is no evidence Carmichael was involved in any such studies.

In October 1961, the CIA funded a project titled, "Role of Avian Vectors in Transmission of Disease," according to agency documents released in the 1970s. Whether there was a connection between the Smithsonian's bird project and the CIA's is unclear. A Freedom of Information Act request filed with the CIA in 1982 is still "awaiting processing" according to a CIA spokesman.

CARMICHAEL was succeeded in 1964 by S. Dillon Ripley, an ornithologist. During World War II, Ripley was on assignment in the Far East with the Office of Strategic Services, the forerunner of the CIA. In a 1983 interview, Ripley said he was certain the Pacific project was not classified. Shown various documents from the Smithsonian's archives that were marked "secret," Ripley said:

"I can't say that I have ever seen this kind of document before. No, I've never seen these things. I can't help you on that because it doesn't ring a bell with me at all . . . to me as a bird man, this was a wonderful breakthrough because it was a source of funds. That's all I know about it."

MILITARY FUNDING for the Pacific Ocean Bird Project came to an end on June 30, 1970, seven months after President Richard Nixon renounced the use of biological weapons.

On the sixth floor of the Smithsonian's Museum of Natural History, the ornithology department, are thousands of bird skins—terns, boobies and shearwaters—researchers brought back from the Pacific project. They are stacked drawer on top of drawer, cabinet on top of cabinet, creating a scene reminiscent of the closing shot in "Raiders of the Lost Ark."

Some scientists and researchers at the Smithsonian were incensed over the Pacific project. In a Nov. 17, 1969, memo the National Museum of Natural History Senate of Scientists attacked the project and reaffirmed the Smithsonian's founding principles:

"This issue is of such controversial nature that the Senate officers will keep themselves informed of developments to insure that neither this project nor any other is allowed to affect the scientific climate, access to data and specimens, or the good name of the Smithsonian Institution in national and international science. The points are as follows:

"1. The Pacific Ocean Bird Project,

Continued on page 20

Birds, from page 17

with Philip Humphrey as Principal Investigator . . . will terminate without reservations of any sort on June 30, 1970. Simultaneous termination of Philip Humphrey as Research Associate in the Department of Vertebrate Zoology would also be viewed with favor by the NMNH [National Museum of Natural History] Senate members . . .

"The goal of the NMNH Senate of Scientists regarding any scientific project, past or present, in which SI [Smithsonian Institution] staff members are involved is to insure the complete, free exchange of scientific data, specimens and publications to all qualified scientists throughout the world, regardless of sex, religion, ethnic group or nationality. No NMNH staff member shall engage in research or seek funds from any sources that have any restrictive clauses in it that violate the above principles."

The project was concluded. But a final word belonged to those responsible for storing the safe containing documents on the project. In a Feb. 12, 1971, letter to the Defense Supply Agency, Smithsonian General Counsel Peter G. Powers wrote: "When the Pacific Project terminated on June 30, 1970, it was necessary to find a place to put the two drawer Diebold container. It was moved to 1242-24th Street, N.W. and will be kept there until such time as another classified project is obtained by the Smithsonian."

"By GOD, it would be over my dead body if that thing were ever cranked up again," said David Challinor, who since 1971 has directed the Smithsonian's scientific research efforts. As a result of the Pacific project and the turmoil it caused, the Smithsonian Institution has, since 1970, inserted a clause into its contracts specifically prohibiting classified work and requiring all findings to be published in the open scientific literature. ■

too far. She enjoys the choicest of Florida vegetables and eats raw chicken meat with relish. She eats ravenously after laying, but for several days before she spends all her time trying to dig a hole through the bottom of the cage with her strong ovipositors.

On Feb. 16 I caught a 3-4 inch cricket which the lizard ate head first. Apparently the hopper feeling that spring had come and that we could do without her gave up the ghost and another batch of eggs—black this time—on the same date.

CHAPMAN GRANT

Wichita, Kansas.

NOTE ON SEA TURTLES

I can find no allusion to marine turtles coming ashore except to lay eggs. Even the "Natural History of Hawaii" makes no mention of an exception. Both sexes of *Chelonia agassizii* spend many hours basking on the beaches of the uninhabited islands of the Hawaiian group where there is no outlying reef. They even climb onto sheltered rocks to bask where no beaches occur. This leads one to wonder whether all green turtles come ashore to bask where they were not persecuted.

CHAPMAN GRANT

Wichita, Kansas.

ON THE URODELAN FAUNA OF SAKHALIN

The importance of the faunistic relations of Sakhalin Island both to the Asiatic continent or to the main group of Japanese islands attracted the attention of observers long ago.

So far as Reptilia and Anura are concerned, almost indisputable confirmation has long been established, while the Urodelan fauna has been the topic of discussion until quite recently. In Sakhalin, the first

J. Med. Ent. Vol. 8, no. 4: 456 30 October 1971

NEW RECORDS OF CHIGGERS (ACARINA, TROMBICULIDAE) FROM THE NORTHWESTERN HAWAIIAN ISLANDS[1]

The northwestern Hawaiian Islands consist of a series of small islands and atolls extending from Nihoa to Kure Atoll. With the exception of Kure Atoll and the Midway Islands, which are under federal military jurisdiction, these islands comprise the Hawaiian Islands National Wildlife Refuge. The collections reported on here are from Pearl and Hermes Atoll (27° 46′ N, 175° 54′ W) and Laysan Island (25° 46′ N, 171° 44′ W). Pearl and Hermes Atoll comprises 7 small islands with a maximum elevation of 3 m (10 ft). Vegetation consists of grasses with 2 shrubs, *Scaevola frutescens* and *Messerschmida argentea*. Laysan is a single island with similar vegetation and a maximum elevation of 12 m (40 ft). Both islands serve as nesting sites for sea birds. The only mammal present on either island is the Monk Seal, *Monachus schauinslandi*. Tomich (1969, Mammals in Hawaii, 1–238) listed rabbits and guinea pigs as formerly occurring on Laysan Island. Brennan (1965, J. Parasitol. **51**: 888–92) described *Guntherana domrowi* from the common noddy, *Anous stolidus*, on Pearl and Hermes Atoll.

Collections made on Pearl and Hermes Atoll by Dr J. L. Gressitt yielded chiggers from 4 Berlese samples. Of these, 3 were soil and litter samples from North Island and one was from the occupied nest of the Black-footed Albatross, *Diomedea nigripes*, from Southeast Island. Additional material was taken on Laysan Island from the Golden Plover, *Pulvialis dominica*. The species recovered are as follows:

Neoschoengastia gallinarum (Hatori, 1920)

This species was recovered from all 4 Berlese samples from Pearl and Hermes Atoll. All of the specimens were unengorged. A total of 66 mites was recovered, one of these being from the nest material. Additional material was found in Bishop Museum collections taken from the Golden Plover, *Pluvialis dominica*, on Laysan Island, determined by M. Nadchatram (Institute for Medical Research, Kuala Lumpur, Malaysia). The scutal measurements of the specimens from Pearl and Hermes Atoll and Laysan Island are somewhat smaller than those given by Womersley (1952, Rec. S. Aust. Mus. **10**: 1–673). Womersley gives the AW with a range of 53–56 μ and PW with a range of 67–70 μ. The present material has AW = 48 μ and PW with a range of 56–59 μ. In all other respects the specimens appear to be identical. Two of the specimens from Pearl and Hermes Atoll are aberrant in that they have 2 AM setae.

Leptotrombidium (Leptotrombidium) intermedium (Nagayo et. al., 1920)

This species was represented by a total of 28 mites from all of the samples from Pearl and Hermes Atoll. The mites from the nest of the Black-footed Albatross, *Diomedea nigripes*, were engorged and all others unengorged. The specimens were compared with material from Nepal and the descriptions by Womersley (loc. cit.). The only significant differences observed were in the length of the sensillae (Womersley = 59–65 μ, Nepal = 67 μ, Pearl and Hermes Atoll = 51–54 μ) and the SD (Womersley = 46.5 μ, Nepal = 33–35 μ, Pearl and Hermes Atoll = 38–41 μ). While this species has been widely reported from rodents and other small mammals, as far as I have been able to determine, this is the first record of the species being associated with birds.

Neotrombicula tamiayi Phillip & Fuller, 1950

Two specimens of this chigger were recovered. One was from the nest material of *Diomedea nigripes*, the other from a Berlese sample. Both were from Pearl and Hermes Atoll. The specimens are identical in all respects to *N. tamiayi* as described by Phillip & Fuller (1950, Parasitology **40**: 50–57) from Japan. This species has been described from a number of hosts, including murids, birds and reptiles.

I am grateful to Eugene Kridler, U.S. Department of the Interior, Fish and Wildlife Service, for making these collections possible.—**M. L. Goff,** Dept. of Entomology, Bernice P. Bishop Museum, P. O. Box 6037, Honolulu, Hawaii 96818, U.S.A. Present address: Dept. of Biology, California State College, Long Beach, California 90804, U.S.A.

[1]This study was supported by Grants GB-20087 and BO-23075 from the National Science Foundation.

More on Nets

by Rick Gaffney

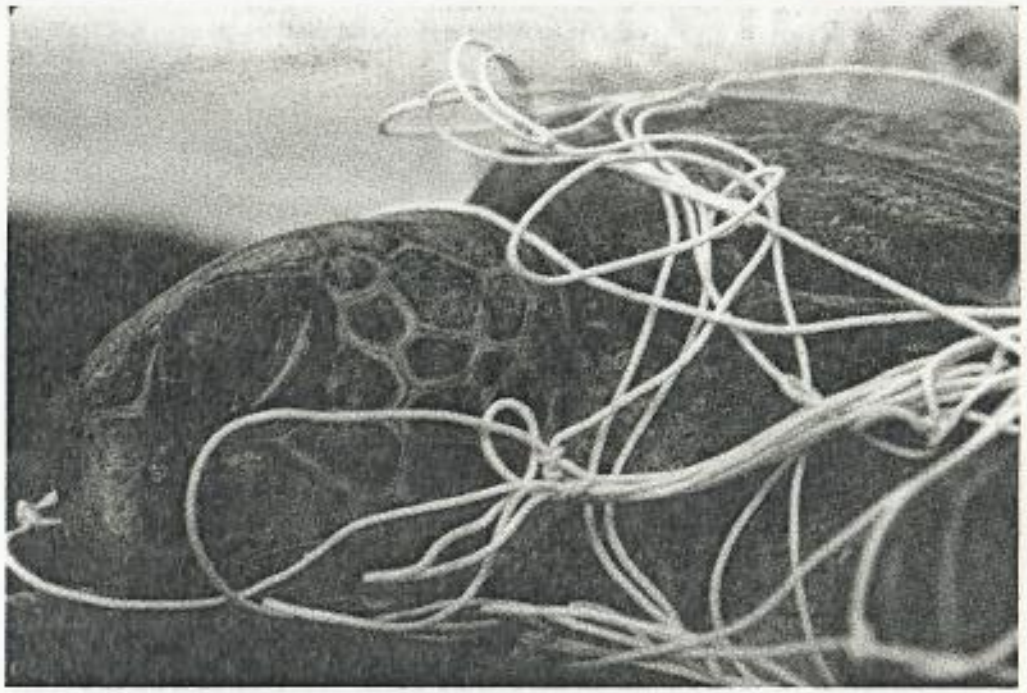
■ The November Conservation Line, entitled "The Gill Net Menace," drew a large amount of response—most of it favoring the HAWAII FISHING NEWS stance that gill nets ought to be banned to protect Hawai'i's fishing resources.

There are a few corrections I must make. Specifically, I indicated that Hawai'i had a law regarding the overall maximum length of gill nets. I was wrong; there is no maximum length at present, and that is scary—there certainly should be. More, in discussing enforcement I implied that the Division of Aquatic Resources handled enforcement. In fact, the Department of Land and Natural Resources actually has an enforcement division, and the understaffed division has to keep up with not only fishing law violations, but also hunting violations and other "natural resources" law problems. They aren't even close to handling the broad problems that exist across the fishery, and they are spread too thin.

I also learned that there are recent changes in Hawai'i's fish and game regulations concerning gill nets. Specifically, these changes limit the length of time that a gill net may be left "unattended" to 12 hours, and that limitation apparently applies as well to bullpen type nets, which used to be set and left for days—fishing continuously the whole time. But what does "left unattended" really mean?

At the same time that HAWAII FISHING NEWS came out strongly supporting the nationwide efforts to ban gill nets, no less respected a publication than *Saltwater Sportsman* featured a lead story on the same subject—the crying need to ban gill nets. Rip Cunningham's editorial in the November issue is worth a read to gain some insight on the problem nationally—and the suggested solutions.

Undoubtedly this is not the last word on gill nets, especially with the legislative session rolling into view this month. Changes in Hawai'i's laws regarding the fast proliferating use of gill nets will certainly be considered before the session is too far along. Actual passage of legislation is another matter.



This hapless green turtle fell victim to drifting trawl net.

Photo by George Balazs

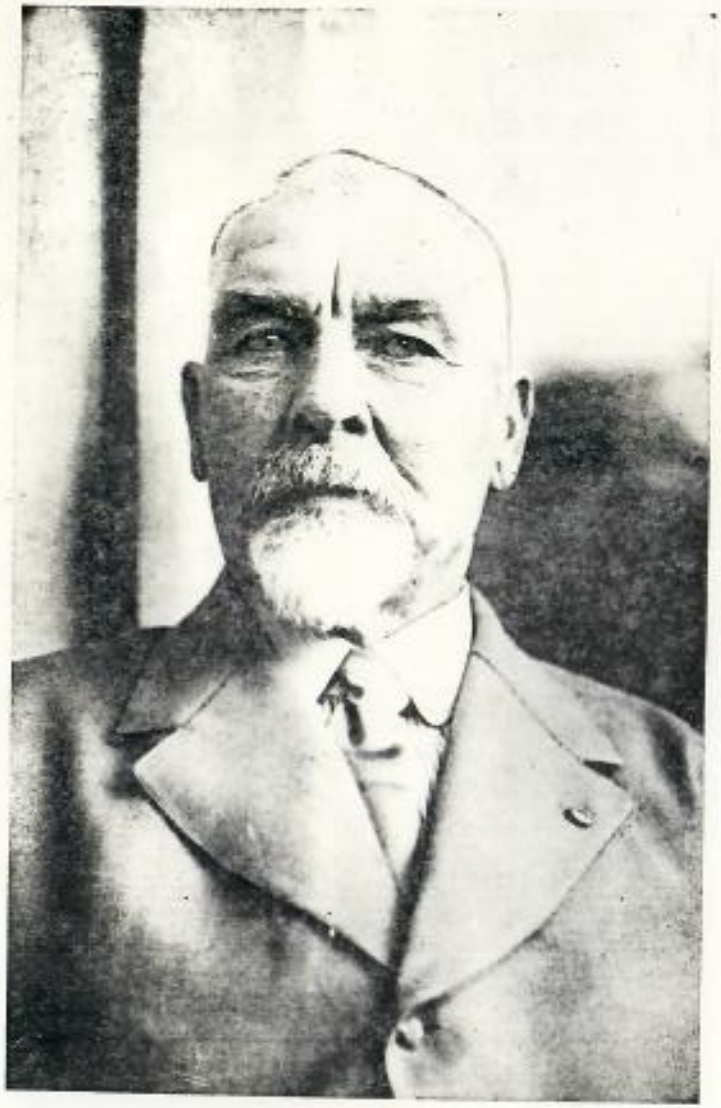
One caller pointed out that bullpen nets are particularly effective in capturing turtles, which can then be tagged and released for further scientific study when they are recaptured. That's great—to a point. It is quite possible that being entangled in a gill net may harm some turtles enough so that they become shark food or worse, that they simply die of exhaustion or drown.

There is information about the use and abuse of gill nets in a growing number of publications these days. For instance, in his "From the Sea" column in the Honolulu Advertiser, Mike Markrich recently editorialized about the need to better protect Hawai'i's marine resources from overharvest and abuse. It is time for the fishing community to learn all it can about this important issue, band together for the common good and see to it that the 1986 Hawai'i Legislature begins the process of protecting Hawai'i's waters from the gill net menace.

By the way, most offshore fishermen are aware of the massive increase in propeller and rudder entanglements with nets in Hawai'i's waters in the last few years. Most offshore fishermen call this unwanted netting "cargo net." It is not! For the most part it is trawl and gill net that is doing all the damage; local fishermen just don't recognize the heavy polypropylene mesh for what it is. And besides—cargo is shipped in containers these days; cargo net, while still used occasionally, is virtually a thing of the past.

If you think about how much this net shows up in island waters these days, you get a pretty good idea of just how much the use of netting has proliferated in the Pacific Ocean in recent years; much of the use involves gill nets.

. . . Rick



Captain John Cameron

JOHN CAMERON'S ODYSSEY

TRANSCRIBED BY

ANDREW FARRELL

Drawings by

CHARLES KUHN

NEW YORK

THE MACMILLAN COMPANY

1928

discovery? We discovered ourselves. Why should Keremania [Germany] and Beretania [Britain], which have so much land, devour our small islands and compel us to pay for living in our own territory?" Although they had been oppressed by their own chiefs, the natives were prone to forget that fact once independence was irretrievably lost. They desired, no doubt, security with freedom, and both they could not have.

Once again I met the gentlemen of the *Mutine*, this time at Jaluit, where the gunboat called for coal. After supervising delivery of the fuel I said a last good-by and had a last peg of produce of Scotland. As I left the vessel the jolly, jolly officers cheered me, while I waved to them a disreputable straw hat. Ah, I should like to meet them again, to see Old Jeff with his satchel of ammunition, the cork, I hope, well pushed in, so he should lose no single precious drop. I should like to gaze on the thatch of Dr. Ferguson flaming in the old wardroom, while the sun blazed outside on some equatorial lagoon; I should like to see the doctor's eyes twinkle and once again hear his peaty Irish brogue. Who says I shall not? Perhaps there truly is a place called Fiddler's Green.

CHAPTER FIFTEEN

I CRUISE TO STRANGE ISLANDS IN UNFREQUENTED SEAS, AND IN JAPAN I CLOSE MY ODYSSEY

On the archipelagoes the sun of independence was setting; my life at sea likewise was drawing toward its last watch. Perhaps it was fitting that one should synchronize with the other. The islands were being changed, for the better, of course; but they would be different, and we men, it appears, resent mutation in what we know best: we would have the world remain at pause, while we seek variety in new nooks of earth. So with the passing of the old order I departed from the scene.

Events tended to decide for me. At Jaluit I found a new manager for the house of Crawford, Mr. Reid, who had been sent from San Francisco to relieve Anderson, probably because Devine, he of the pea soup, had reported unfavorably on the volume of liquor being consumed at our station. Well, Devine, that happy-go-lucky dog, had done us an ill turn. Anderson was a considerate gentleman, whose one great fault was his weakness for whisky; I cannot praise Reid so highly. Hardly was he in the saddle before he began to ride hard: old hands were

dropped without mercy. As one of the changes I was made manager of our head station for the Gilberts at Butaritari; but I was delayed in taking charge, and soon I heard from a friend that Crawford & Co. were about to fail. By all means, my friend continued, I should hasten back to Jaluit and demand a settlement, since I had let most of my earnings accumulate with the company; and I should firmly refuse to accept a draft on San Francisco.

To Jaluit went I. Reid was astonished to see me. "Nothing is wrong," I assured him. "I am merely tired. Please accept my resignation." He urged me to reconsider, offered me a raise in pay, and, when I held firm, admitted he lacked cash to pay me in full. "You can borrow from the German firm," I pointed out. "I wouldn't stoop to it!" he said hotly. "They'd think Crawford & Co. were on their last legs." "I'll give you three days to settle with me," was my ultimatum.

Without delay I laid my case before my friend Brandeis. From him I received assurance that if I were not paid promptly, then he, as German commissioner, would close the Crawford station and sell sufficient goods to discharge the firm's debt to me. Practically compelled by this to make some satisfactory tender, Reid offered to turn over to me the schooner *Ebon* with a supply of trade goods and to pay the remainder of my account in cash. I accepted and was treated most liberally. This settlement was timely; within a year the Crawford company failed and disappeared from the South Seas.

Thus I became owner of the vessel I had commanded so long. It would be worth my while, I thought, to trade in the Gilberts, but not in the Marshalls, where the Ger-

mans threw many obstacles in the way of persons of other nationalities. After putting the *Ebon* in first-class condition I sailed for the Gilberts. At Butaritari I arranged with Wightman Brothers, a San Francisco firm, to sell them my copra at the highest current rates, while I remained free to buy my trade goods wherever I elected. This agreement and my large number of friends among the traders of the Gilberts augured well for my venture. And everything did go prosperously. But pleasant as I should have found my situation, I tired of it and longed for a change: paradise itself would have palled on me then. Again chance intervened to alter the course of my life. Mrs. Peter Grant, wife of a trader in the Gilberts, a white woman, mother of five children, one of them at the breast, became seriously ill and had to be hurried to the German doctor at Jaluit. I took her, thereby, I think, saving her from death. While I was at Jaluit, Charley Tierney, trader of Apaiang and my good friend, who only a few weeks before had enlisted me in Mrs. Grant's behalf, himself was brought in to have his right hand amputated. Poor Charley had been fishing with dynamite. I acted as the surgeon's assistant at two successive hackings; but Charley had come too late, and at the doctor's request I told him that he could not recover. He took that dreadful news like the man he was.

Being thus at Jaluit, I sold my copra to the Germans at a good price, then returned to the Gilberts, only to be severely reprimanded by Wightman Brothers for my transactions in the Marshalls. Perhaps I should have held my copra for them; their brusqueness, however, caused me to break off business relations. "I'll give up trading,"

I declared, "if trading means that I'm a slave to any one. I'll make a pleasure yacht of the *Ebon*, go cruising for a year, and quit salt water. If I can't make good on land I can always fall back upon old ocean."

It was my intention to visit some of the uninhabited islands of the Pacific, which had long fascinated me, and to pay at least part of the expenses of the cruise by fishing for sharks. In view of the fact that I would be absent from civilization for many months, I laid in stores for a whole year, and I knew that I could always supplement them with food from the sea. When the *Ebon* was ready, adequately prepared for every contingency likely to arise, I began my voyage. A pleasant errand sent me first to Ocean Island, or Paanopa, near the Gilberts. With me was a young girl, my ward, daughter of my old friend Frank Christopher, who had asked me, as he lay dying, to look after her, and I had promised that I would. She desired me to call at Paanopa so that she might see her brother. The lad, a fair-haired, blue-eyed, sturdy fellow of seven, a few years younger than his sister, had quite forgotten her.

From Paanopa we proceeded to Kusaie. King Charley was disconsolate at hearing of my plans. "Stay with me, Cameron," he begged. "I'll give you plenty of land." "No, Charley," said I. "My mind is made up. I'm married now; my wife is with me; and we intend to leave the islands, probably for Japan or China. But my men want to return to the Marshalls, and I'll have to ask you to get me a crew. Then, old fellow, you and I will take our last drink together."

Eleven souls were in our company when we quitted Kusaie: my wife, a daughter of a chief of Mejit Island, Marshalls; Christopher's daughter; a woman servant; a Japanese mate; six Kusaie seamen; and myself. Our first destination was Caspar Rico, an atoll I wished to explore, which lies six hundred and sixty miles northeast of Kusaie. On our way we were struck by a wicked gale, but I should not have felt compelled to heave the vessel to had not a certain young woman, my daughter, chosen that time to make her appearance. She was born on May 11, 1893. Now I was indeed glad that I had had the experience of delivering a Portuguese woman on the *Iwalani* in far-away Hawaii. While the *Ebon* almost tied herself in knots, the baby's first faint cry arose against the roaring of the storm.

After a hard struggle against a fierce ebb tide in a narrow and crooked channel, we got a boat into the lagoon of Caspar Rico, and I landed to explore the island. It interested me most by reason of its great basaltic stones, similar to the celebrated monoliths of Ponape, which evinced that the atoll had been inhabited, or at least visited, in some remote age. Quite manifestly such huge stones had been taken there from some high island, for no such rock was to be found elsewhere on Caspar Rico. One block that I measured was fifteen feet and six inches long, five feet and four inches wide, and three feet thick. Think of the labor, the multitude of men, the large canoes or boats, that had been required for its transportation. Obscure impulses, indeed, drove those far-off men to such a task. And to what end? That other men, coming long afterward, should marvel.

At Caspar Rico we had a pleasant stay, but not altogether a picnic time, for we began our shark-fishing. The second leg of our cruise took us one hundred and fifty-eight miles southwesterly to Bikar, a bare atoll, tiny and uninviting; I soon left it, and steered for my old principality of Midway. On the way thither, however, I called at Ocean Island, which Jorgensen, Moses, and I had failed to find with our curlew pilots. It proved sandy and barren, with a very exposed anchorage; yet I must go ashore to see the building erected by the Hawaiian Government to cache food for castaways. No structure was to be seen anywhere; but many sheets of corrugated iron, still in good preservation, which were scattered about the place, doubtless represented its remnants. Some years afterward I heard that a party of Japanese, engaged in killing sea birds for their feathers, had stolen the provisions; whether they also destroyed the house I do not know. It was significant, however, that no woodwork, which should have been blown about the island if the building had been wrecked by a storm, was in evidence. Since the sheets of iron were of no use on Ocean Island now, I took them aboard the *Ebon* with the intention of using them in trying out sharks' livers in the sun (Note 55).

From Bikar to Ocean we had sailed eleven hundred miles in a northeasterly direction. Our next run, of only fifty-five miles eastward, brought us to Welles Harbor, Midway, where the *Wandering Minstrel* had been lost. My emotions at seeing the flat atoll rise from the sea would be difficult to describe; but surely something resembling pleasure stirred in me when I gazed at the island on which I had spent so many miserable months. So

does time soften and tint our memories. With eager anticipation I looked forward to tramping over those well-remembered beaches; to entering Redwood Cottage, now silent, once filled with the sound of many voices; to recalling this face and that, and recollecting the many incidents, comic and tragic, that marked our exile.

On the morning after our arrival I anchored the schooner in the lagoon, sailing through the very channel

that I had surveyed for the *Wandering Minstrel*. There lay the *Ebon* in a good berth, secure from all sorts of weather; there the *Minstrel* also would have been safe from the storm that drove her to her doom. Ah, if Walker could have seen the *Ebon* riding sweetly at anchor!

My wife, infant, Christopher's daughter, servant woman, and I took up our quarters in the cottage. It was then almost forty years old, but only the roof required some slight repairs. For the men we put up a shack from the remnants of the shanties built by the *Wandering Minstrel's* crew. The very boards seemed like old and hated friends. Then we landed from the *Ebon* everything needed to make us comfortable during a prolonged stay.

I intended to catch sharks one day and do as I pleased the next, secure in the knowledge that my dinner did not now depend on finding eggs or snaring sea birds. Many pastimes occurred to me: I might trap curlew, kill hair seals for shark bait, even pick up eggs, and loaf. What can be more pleasant than to idle where one has toiled and suffered?

Amid these pleasures I was not loath to turn an honest dollar. The anchors and chains of the *Minstrel* would be worth salvage; but no trace of them could I find, peer as I would through the crystal water (Note 56). We did find the rotting hulk of the boat that was built for the Walkers. How the details of its construction passed through my memory as I stared at the remains of that little craft: the tugging crew; the master workman Jorgensen; Walker dreaming of distant ports; a hot sun blazing over all! And the wreck of the *General Seigel* was there, driven on shore by successive storms. We stripped off the copper sheathing of her bottom; then broke her up for the copper bolts of her keelson. Did ghosts watch us at our work: one-handed Peter Larkin, Brown with a bullet hole in his head, the lost Jacobson?

For six weeks we remained at Midway. At the end of that time much shark's liver oil, many dried fins and tails, had been stowed in the *Ebon's* hold; but even Midway, fecund dam of sharks, began to yield fewer of her hateful spawn, and my men grew restless. Let us, then, prepare for a voyage: replenish our water casks; collect eggs; smoke mullet; cure a little beach la mar; hustle our live stock aboard,—pigs, chickens, and curlew; and stand to sea. Ah, the lure of strange lands: to feel one's self a

minor Columbus; to see the far azure peaks of a high island stabbing the sky at some glorious noon, to anchor in its lee at nightfall and sniff the land odors borne on an offshore breeze; to pick up an atoll and its palms staining the sea at sunrise, or stare at far threads of surf breaking on distant reefs, or gaze on the thin, poisonous green of a lagoon reflected in an afternoon sky, long before the low ring of coral shingle and its coconuts pierce the horizon: here, if ever, is delight unalloyed. So off we sailed for Lisiansky, two hundred and seventy miles to the southeast.

On our passage a great gale blew for three days, and seas ran as huge as any I ever saw off the Horn, Good Hope, or in the chops of the English Channel. Yet the *Ebon* rode as dry as a cork—and as lively, confirming my belief that a well-found schooner would weather a storm in greater safety than would any other craft afloat. So we came to Lisiansky, some forty feet high and a mile long, an isle of coral sand covered with coarse grass and scrub. Into its lagoon we sailed through a narrow break in the reef and between two immense boulders, against which the sea beat furiously, while hair seals took their rest on the rocks.

That evening we prepared to camp on shore, pitching a tent in a good place and spreading fine Samoan mats on mounds of dry grass. But the best laid schemes of mice and men—no, I am wrong: the plans of the men went agley; not those of the mice. We had settled ourselves for an appetizing supper of fresh food when myriads of mice attacked our meal ravenously and utterly without fear. Drive them away we could not; we slaughtered them by hundreds, yet they would not be

denied. A full hour elapsed before we could eat in some semblance of peace; then each of us had to hold his food in one hand and a stick in the other. During the night the pests continually galloped over us; they did not, however, bite us, though that seems remarkable, since there was little on the island for them to eat, unless they devoured one another.

By day we were not molested. In preparation for the certain onslaught of the next evening we brought the ship's cat ashore. Surely he would protect us. Not so. As the gloaming fell the mice swarmed upon us in numbers exceeding those of the preceding night. Some mouse runner with a fiery cross must have dashed about the island to summon the clans. Our cat began to kill in a feline paradise: here were all the dreams of the cat family come true: mice in impossible numbers, mice of incredible boldness. In a whirlwind of activity Tom slaughtered, too engrossed to bother with torturing his tiny victims. Yet the armies thronged too rapidly for him. Over his face crept disgust, dismay, fear as of the supernatural. Soon he sat himself on his haunches and stared at us; surrounded by windrows of dead mice, he let the wee animals run unharmed between his paws. The beasties had conquered: we removed our camp to the beach and dug a moat, which soon filled with sea water, as a protection against them. Only one succeeded in crossing the ditch. It was pointed out to Tom, but he would not touch it (Note 57).

Sharks were both numerous and large at Lisiansky. Our fishing grounds, however, lay outside the reef, so distant that we soon sought other fields at Laysan, one

hundred and twenty-five miles to the east. It is fifty feet high, some two miles long by one wide, well covered with shrubs; and on the south side of the isle we found a small harbor, in which we anchored. Having observed some buildings as we skirted the coast, I landed to learn whether the island was inhabited. A hard tramp of three miles over loose sand brought me to the settlement, where I met a caretaker, a German, the sole person on Laysan, all the other members of a force engaged in shipping phosphate rock having gone to Honolulu for the winter, during which no cargo could be handled. This Robinson Crusoe, as I shall have to dub him, for I did not note down his name, was no end pleased to see creatures besides sea birds and his two pigs, and at his invitation we took up our quarters ashore.

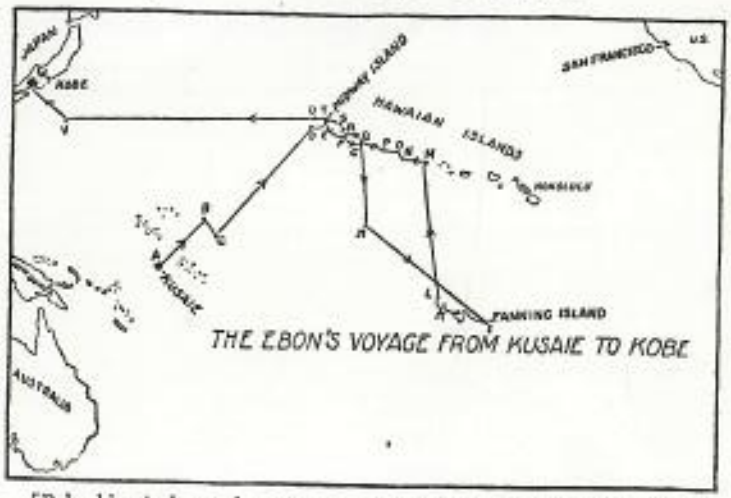
Lisiansky of the Mice, Laysan of the Birds! For seven months the gonies had been tirelessly cruising about the deep sea; now they were returning to Laysan in huge numbers to nest. Land to them was nothing more than a place whereon they might lay their eggs and hatch their young, which would soon follow their parents into the wide heaven that stretched above a wilderness of tossing waters. Fowl of air and sea, they were too intent on returning to their own proper elements to do more than scoop out a nest in the sand. Homeless feathered folk were they; yet not so: rather were they domiciled in a most spacious habitation, without walls, floored by the ocean, roofed by the stars. Sea birds need no sympathy from men.

Laysan also had two kinds of land birds that I never saw elsewhere. One, a trifle larger than canaries and

similar in color, could sing quite as well as those warblers, but differed in having parrot-like beaks. They were such nuisances, comparable indeed to the mice of Lisiansky, that we had to close the doors and windows of the dining room at meals. One day, when we had finished our dinner, I asked Crusoe to open a door. In swarmed the birds, two hundred or more, to devour our scraps. About this unexpected manna they made a great to-do; between mouthfuls discussed it in the gayest of bird languages; now and then they dashed outside on some errand. Tamer wild things I never saw: they were absolutely fearless; they did not struggle when caught; instead they waited in unmoved and confiding patience until they were freed. A beautiful and touching sight it was, a glimpse of what Eden had been before Adam learned, with other devastating knowledge, that living things could be killed. At length driven outside, the merry little fellows then deafened us with their songs.

The other species of strange birds could not whistle, dance, or sing; their wings were so tiny that they could not fly, though they ran rapidly on their abnormally long legs. In color they resembled quail, but were much smaller; their pink eyes were exceedingly bright and roguish. In marked contrast to the canaries, they were as easy as rats to catch. Moths formed their staple diet (Note 58).

As Jorgensen had done during his long loneliness on Midway, Crusoe of Laysan longed for work. I showed him how to build a kiln and make lime from a certain sort of coral; and before we sailed he had whitewashed all the buildings. He was a simple, God-fearing person, who lived quietly and died, I trust, as he lived. After our



THE EBON'S VOYAGE FROM KUSAIE TO KOBE

[Pokaakku is better known as Caspar Rico; Kure is better known as Ocean.] Arrows indicate direction. The following table shows the length of each leg:

	From — To	Nautical Miles
A.	Kusaie—Caspar Rico	660
B.	Caspar Rico—Bikar	158
C.	Bikar—Ocean	1100
D.	Ocean—Midway	55
E.	Midway—Lisiansky	270
F.	Lisiansky—Laysan	125
G.	Laysan—Johnston	560
H.	Johnston—Fanning	1000
I.	Fanning—Washington	90
J.	Washington—Palmyra	125
K.	Palmyra—Kingman's	45
L.	Kingman's—Neckar	1000
M.	Neckar—French Frigate Shoals	75
N.	French Frigate Shoals—Gardner	120
O.	Gardner—Maro	145
P.	Maro—Laysan	65
Q.	Laysan—Lisiansky	110
R.	Lisiansky-Laysan	110
S.	Laysan—Lisiansky	110
T.	Lisiansky—Pearl and Hermes	170
U.	Pearl and Hermes—Midway	100
V.	Midway—Bonins	2150
W.	Bonins—Kobe	590
	Total	8933

departure the crew of a vessel found him dead in a chair with his Bible on a table in front of him. They buried the body and left a statement of the circumstances (Note 59).

Having caught many sharks, small but wicked devils, we decided to flee from approaching winter and seek milder weather near the equator. In preparation for a stay near the Line I bought supplies, which Crusoe could easily spare from his well-stocked storehouses.

Our first call was at Johnston, or Cornwallis, Island, five hundred and sixty miles south of Laysan and southwest of the eight islands of Hawaii proper. We found a good berth in its lagoon, and in a pretty little cove, on a beach of white sand, was an ideal spot for our tent. Near by were ruins of shanties built years before by a guano company; there also was a well, with pumps and pipes intact, which we cleaned and put in order. Nor were these the only traces of men. On a little mound, the highest part of the island, was a board affixed to a post: it notified all and sundry that these sands had been annexed by H. B. M. S. *Champion* in behalf of Queen Victoria. No getting ahead of the Widow! Yet we paid her neither rent nor taxes during our stay of a month.

Signs of men, signs of shipwreck! We stumbled across two boats, both hauled above high water, one in fair condition, the other badly smashed; and in the craft were harpoons and lances and some bird shot in bags. The condition of the better boat, which was well worth the repairs I decided to give it, indicated that the men who left it there had been rescued. Else why should they have abandoned a tolerably seaworthy craft on a desert island?

Another vestige of a vessel: near the ocean edge of the reef, in three feet of water, we found an anchor, weighing about a ton. After much puzzling I deduced that it had ridden on a portion of a wrecked vessel across the coral, which had cut the remnant of the ship to pieces and left only the stout iron to testify that men had passed this way.

Night after night we were lulled to sleep by the never-ending boom of waves crashing on the reef, casting showers of spray aloft, and dying in blankets of foam on the waters of the lagoon. Now and then, however, the sea was so calm that scarcely a ripple marred its glistening surface: the restless ocean heave rolled languidly against the coral wall, as though exhausted by its unending and futile struggle to dislodge what myriads of tiny creatures had been building long before the six thousand years of recorded human history began. Tempted by the opportunity that such serenity threw in our way, we decided one afternoon to explore the reef in a boat, taking with us homemade water telescopes, or boxes with panes of glass at the bottom. The sides of the boxes shut off the light from about us, much as a photographer's black cloth does, so that we were enabled to see to great depths in the crystal water.

How pure is the sea, the deep sea; how it receives the scourings of torrential rains, the floods of great rivers, and takes all to its tremendous depths, yet remains undefiled! He who knows the ocean only as seen from a continental beach cannot comprehend the wonderful purity and beauty of those wide waters that lie about remote islands. Here we saw fish, all daubed by some mad jester of a divine painter, darting in and out of the

crevices of the branching coral, or seemingly asleep and holding by their teeth to rocks, while their bodies swayed gently to the movement of the sea; crayfish with their feelers waving back and forth from their refuges in fissures of the reef as they searched for food or gingerly explored the water for the presence of an enemy; shellfish swarming on the sand; occasionally the mound-like shapes of beach la mar:—that multitudinous ocean life of which few get a glimpse. And beyond and beneath what we do

see lie marvels that would stagger us could we even dimly apprehend what they are.

Our catches of sharks at Johnston were only fair, because our bait was principally sea birds, which the brutes did not relish as they had the flesh of hair seals; but our hauls almost filled our containers with liver oil. Now and then we took things more easily: "Spell O!" was passed, and we hunted turtles. One of the men employed the Kusaie method of taking them by anchoring a few captive females near the beach to attract the bulls. It succeeded admirably and helped us greatly with attractive bait for shark-fishing. While we men were thus occupied, my wife and her woman servant busied themselves

making feather beds and pillows from the down of sea fowl; they completed enough to last a lifetime or longer; and in the end we gave all to persons who, unlike ourselves, needed soft couches.

We were standing to sea, bound to Fanning Island, when from the mate, who was at the masthead, came a cry of "Sail O!" A bark under full sail was heading for us. Through the telescope we could see that she was a whaler: that was made evident by boats hanging from her davits ready for immediate use. I lost no time in pulling to her with some turtles and two pigs, welcome additions to the fare of a vessel long at sea and especially for Christmas dinner, as the day was December 24. The newcomer proved to be the whaler *California,* Captain West. "You are Santa Claus himself!" he exclaimed. "What's the charge?" "Ask that again and I'll leave your ship," I retorted. "No, no," said he. "Come to the cabin and meet Mrs. West." That good lady had transformed the quarters into the most comfortable, cheery place imaginable, gay with potted flowers and a caged linnet. On learning that I was accompanied by my wife and child she immediately invited the three of us to dinner next day.

From West I heard that he was keeping an eye open for the wreck of the whaler *Jacob Howland,* which had been lost on Johnston Island. Had I seen anything of her? I told him of the two whaleboats and the anchor. "Were the crew of the *Howland* saved?" I asked. "Yes," said he; "they were picked up by another whaler a few days after the wreck." I was well pleased to hear that (Note 60).

Whalers are not necessarily fishermen: some of the

officers who had gone to try their luck reported to West that there were no fish about the island. "The place is swarming with fish," I said. "Have your boats ready to-morrow morning. I'll guarantee a catch." At daybreak we set out; sent skirmishers into the water to drive the fish toward shore; and with that done exploded dynamite cartridges. Within an hour the boats of the *California* were loaded to the gunwales. Then came recall to the whaler for dinner.

A delightful Christmas we spent there in the middle of the Pacific; an ocean like a pond; an enjoyable dinner with plenty of good liquor; afterward organ music and songs. When we were ready to depart early in the morning my boat was gone. "I sent your men away with some jars of Mrs. West's homemade jam," West explained. Jam I did find on the *Ebon,* but something more: a great supply of foodstuffs, rope, canvas, and other articles. West had repaid me many times over for my little kindness to him.

From Johnston we proceeded to Fanning, one thousand miles to the southeast, where I expected to see Captain William Greig, a fellow Scot, my friend of old days in Honolulu, and owner of Fanning and its near-by sister atoll of Washington, on which he produced much copra. But he was dead, his son Jimmy informed me. Jimmy piloted us into the lagoon, a body of water nine miles long, while the current ran like a mill race and heavy seas swept the sides of the narrow channel; and we anchored for a short and pleasant stay.

At Fanning the fronds of coconut palms, gleaming in the sun and moon, rustling in the southeast trades, once more delighted us. Sweet indeed were those lusty and

rakish trees to men and women who had long gazed on such atolls as we had visited since leaving Kusaie: isles that boasted nothing more than low scrub, if they were not, in fact, completely barren, still waiting for ocean current to wash upon their beaches life in the form of coconut or pandanus seed. And it was no little thing again to come in contact with the world of men, uttermost fringe though Fanning might be. What did I know of the recent stir of Edinburgh and San Francisco; what of the history newly made in Rome and Peking? Crusoe of Laysan, living lonely with sea birds and his pigs, had been almost as ignorant as I; and Captain West of the *California* had been cruising too long to tell me much. Of what the nations might be doing, turtles had revealed nothing when we "turned them off their legs" on moonlit nights; hair seals, dozing in the sun, had died too quickly, when clubbed on their noses, to divulge any secrets; and the eyes of fish and sea fowl alike had been inscrutable. We had sailed, as it were, in a profoundly unhuman silence; over us day and night had played their endless cosmic leapfrog; great clouds had glowed pink and lavender in dawn and sunset; we had been caressed by trade winds and bludgeoned by gales; soft stars had shone or clouds had gathered at the beck of storms; in tropic suns a blue sea had flashed mutely, under gray skies a sullen sea had menaced us; and through all we had pursued our solitary course from island unto island.

And now at Fanning we found a community, a microcosm of men, natives of Manihiki and the Gilberts, engaged in making copra under the supervision of Greig's

sons, who had heard at least a far echo of the bustle of America and Europe. Two vessels, besides, arrived from the outside macrocosm during my sojourn: an American schooner and my old acquaintance the *Janet Nicoll,* from which I got not only reading matter and gossip but also two cases of medicine, produce of Scotland, the sole remedy any of our company needed during our cruise. Good Fanning atoll!

Sharks at Fanning were numerous but not large, as vicious as the devil, as supple as whalebone, and the darkest I had seen. Once Jimmy Greig took me to see droves of them entering the lagoon by a shallow passage at high spring tide, slowly feeling their way in two or three feet of water. When we foolishly crossed the inlet Jimmy was bitten in the heel, not seriously, however, though the wound bled profusely. Attracted by the blood, a shoal of ravenous monsters rushed for us, and we rushed for shore. Only a miracle could have saved us if we had stumbled and fallen.

We had come south to escape a Northern winter; now spring called us to higher latitudes and better fishing grounds. From Fanning we sailed ninety miles northwesterly to Washington, a little jewel of an atoll; and thence we proceeded to Palmyra, one hundred and twenty-five miles to the northwest of Washington.

Palmyra we found to be a ring of coconut-crowned islets inclosing a lagoon of fair size. Sea birds abounded, especially boatswains, they of pure white bodies and scarlet marlinspike tails, and boobies, the sleepiest and most stupid of sea fowl. Turtles were few but of gigantic size. They served, for the first time, I suppose, in all history,

as steeds. With the lighter men of the crew acting as jockeys we held turtle races, which were lacking in bursts of speed, though not of laughter. Who would not have roared at the clumsy creatures hoisting and humping themselves along?

Two great catches we made at Palmyra. One was a diamond, or ray, fish that took a small baited line I had left hanging over the *Ebon's* rail. At first, not knowing what I had, I tried in vain to start the dead weight. Now and then I might gain a few inches; then a load, seemingly of a ton, would settle upon the line; yet all the time there was no struggle, nothing more than a dull, incredible sagging. For two and one-half hours I played the giant most carefully, for it could easily have snapped my line had it made a rush. Finally I had a glimpse of a ray's dark form. In went a harpoon; the fish, struck in a vital spot, hung limp; and with the whole crew mustered we pulled it aboard. Its mouth was fourteen inches long by four wide; the tail was six and one-half feet long; from tip to tip of the wings the fish measured sixteen feet. Its weight I had no means of determining; but the muscle required to hoist it indicated that a ton was a conservative estimate. Our other capture was a huge shark, the largest we caught on the entire cruise, twenty-two feet and eight inches in length by eight and one-half feet in girth amidships. When dried the fins and tail weighed twenty-five pounds; the liver yielded fourteen gallons of excellent oil, enough to fill the last of our containers. In its stomach was the body of a shark we had killed the day before, itself no less than eight feet long.

Shall I tell, too, of the coconut crabs of Palmyra? They

existed by the hundreds, those mammoths, those titan-clawed crustaceans. As their name indicates, they live on coconuts: they climb the palms, nip off a nut, scramble down to retrieve it, strip away its dense husk, insert a claw into the soft eye of the shell, snap it open, and devour the meat. We found the animals' flesh delicious, yet it might be dearly bought, for one crab cut a man's thumb to the bone, and we freed our unhappy shipmate only by smashing the crab's claw between two stones (Note 61).

At Palmyra we had good luck shark-fishing, but we worked under handicaps. Among them was the shallow water near the island, which prevented us from landing and burying the carcasses of sharks as we had done elsewhere. When we dumped the bodies overboard we were, of course, militating against our own fishing, for the remaining sharks would be less disposed to take our bait so long as they could feast on their erstwhile playmates. Horrible cannibals, those fellows! More than once a hooked shark was bitten in two before we could land him.

When broken weather set in at Palmyra we sailed for Kingman's Reef, forty-five miles to the north, a scattered and jagged menace to shipping, a sinister place of coral rocks, twelve miles by six. Breakers were bursting everywhere when we sighted it. About the middle of the reef, seen through spume and spindrift, was a stranded bark. How she got there remains a puzzle to me: in that part of the Pacific there were oceans of room for the navigator. Afterward I heard that we had seen the *Lady Lampson* or the *Lady Head,* I forget which (Note 62).

The next leg of our voyage took us to Neckar Island, one thousand miles to the north. We found it an isolated

rock, two hundred and fifty feet high, fringed with heavy surf that made a landing difficult but not impossible: an unattractive place that did not hold us long. From Neckar we sailed for French Frigate Shoals, seventy-five miles westward, which I have already described in my account of the *Wandering Minstrel's voyage.* On one of the islets we pitched our tent and prepared for a long sojourn, provided sport should prove good, as it decidedly did. Numerous turtles gave us sufficient shark bait, and heaps of turtles' eggs, as many as one hundred or one hundred and fifty in one nest, furnished us food. With no little cunning did the reptiles construct and conceal their sand incubators, but we found them easily enough by probing with iron rods at promising places: yolk from a broken egg on the metal told us when we had struck home.

Life on that islet of French Frigate Shoals delighted us all, especially the baby, who crawled and tottered and capsized, to the accompaniment of excited crowing, into the yielding sand. How I wish I could cruise again to that good place, once more to see that clear sky and enjoy that perfect weather! It would add ten years to my life to escape from the red tape that enmeshes us civilized men, to flee from police, tax-collectors, landlords, swindlers, innumerable parasites that suck our blood. None of them infested our world of islands. At French Frigate Shoals, praise God, sharks were fish, not humans.

And what shark-fishing we had! What a prodigious haul we made one day! We were on one of the outlying islets, resting after a long row of six miles, when a shark's fin clove the water close to shore. One of my men

scrambled to his feet, baited a hook, and cast it into the water. It was snapped up instantly. Then began that colossal catch.

An eight-foot fellow was pulled in. With him came hundreds of others to the water's very edge, some, in truth, venturing so close that their threshing tails stirred up sand. Peaceful a moment before, the sea was now in an astounding commotion: it seemed alive. Ravenous as they were, the devils pounced upon a hook as it struck the water, yet not before a momentary struggle had centered about the morsel of food. Indeed the sharks jostled as though they were humans. On the heels of such a tumult followed a greater while a catch was dragged ashore: about it darted the others, lashing the water to foam. So frenzied were they that some ventured to the beach itself. As they turned again for the water we caught them by their tails and hauled them, stern-first, upon the sand, while they squirmed and twisted their eel-like bodies almost double in ferocious attempts to bring their jaws to bear upon us and their steely eyes glared.

This novel method of catching sharks commended itself highly. Half the men, discarding their lines, stood by to grasp the maddened beasts and pull them high enough on the beach to prevent them wriggling back into the water. On the sand we had to leave them until they should be exhausted; we lacked both time and facilities, such as we had in the boats, for killing them. Still the school came, still we fought under a broiling sun, for two and one-half hours. Then we, and not the fish, called a truce: they had not fled, but we could do no more, for our hands were painfully cut and bruised by the sharks'

hides and by our lines. Victors, yet beaten, we reclined panting on the sand, while multitudes of devils darted to and fro before our tantalized eyes.

On that beach lay one hundred and forty-six sharks from eight to fourteen feet in length. There they had to remain until the next day. By good fortune a favorable wind carried us back to the schooner; without that breeze I do not know how we could have made the six-mile

passage: rowing, at least, was out of the question. What a relief it was to soak our hands in hot water and apply vaseline and bandages! Next morning, when we returned to the islet, we found many of the tough brutes of sharks still vigorous enough to snap viciously at anything within reach, while others were half buried in sand from the violence of their dying struggles. Those still living were quickly dispatched; next came the task of removing the fins and tails and burying the carcasses, which required three days.

Once more we sailed: to inaccessible Gardner Rock, one hundred and twenty miles to the northwest; to wicked

Maro Reef, one hundred and forty-five miles farther on; then to Laysan, sixty-five miles westward of Maro. By this time Crusoe of Laysan was dead, but at the island I found my old friends Captain George D. Freeth, in charge of the phosphate settlement, and his foreman, Max Schlemmer, who had returned with their Japanese laborers from Honolulu for the summer's work. That night I had news of Hawaii and of my cronies, many of whom were dead. On the next day I began repairs to a puzzling leak in the *Ebon*. By using a large loaded lighter I careened the schooner, to find that fifty square feet of Muntz metal sheathing had been ripped away, that the butt end of a plank was badly split, and that oakum near the butt was hanging in shreds. A swordfish had rammed the schooner and had driven his lance through three inches of Douglas fir and two and one-half inches of ceiling plank, besides the sheathing. Eleven and one-half inches of embedded bone testified to the tremendous force of the fish's thrust.

Our stay of a month at Laysan was broken by a round trip to Lisiansky, one hundred and ten miles distant, which Freeth wished to explore for guano deposits. On our second and final departure we again steered westward for Lisiansky. After a few days of shark-fishing there we turned to other work, killing seals and turtles and curing the meat. These stores were for a voyage to the Bonin Islands and Japan that I had now resolved to make. Why should I go to Japan? Reason enough: to see a new country, one painted in glowing colors by my Japanese mate, who had spent sixteen homesick years far from that earthly paradise. Once there I would sell the *Ebon* and stay on shore for a time. But Japan became and remains

my home. What is the fate of our years? Chance sends us thither, a whim lures us hither; and soon, too soon, we travel no more.

From Lisiansky we sailed one hundred and seventy miles northwesterly to Pearl and Hermes Reef and on one of its

islets pitched our tent, but we did not remain long. Another westerly run of one hundred miles brought us to Midway. There we overhauled the *Ebon* thoroughly for the long voyage of two thousand one hundred and fifty miles to the Bonins, which lie five hundred miles off the coast of Japan. Now we were ready for the sea; we bade farewell to Midway, the last good-by that ever I shall say to that island, and steered for the Bonins. On the twenty-second day we dropped anchor in Port Lloyd, a spacious harbor of Peel Island.

Much of the history of the odd little archipelago is compressed in the name Bonin, which is a corruption of

the Japanese "bu" (without) and "nin" (inhabitants). Japanese subjects are said to have discovered the group as early as 1592; but the islands, twenty in all, remained for more than two centuries without a settled population, and there was no regular communication with the world from 1635 to 1830 or thereabouts. At that time two Britons, two Americans, one Dane, and about twenty-five Hawaiians, among whom were a few women, visited the group with the aim of opening trade with Honolulu. On Peel Island they hoisted the British flag. Thereafter the population received slow accretions of whites and Pacific islanders.

In 1827 Britain had established a claim to the Bonins, but the United States had done likewise in 1823, and in 1853 Perry, the celebrated American commodore, bought land on Peel Island with the aim of establishing a naval station. When his right to do so was questioned by Britain, Perry retorted by taking possession of South Island, which had been visited in 1823 by an American mariner. What might have become a tangled problem was finally solved by the Japanese. They assumed charge of the entire archipelago in 1875,—evidently with the tacit consent of the British, who had relinquished their claim in 1861. A Gibraltar of the Far East could have been constructed there. Perhaps it is as well that neither Britain nor the States did anything of the sort. Even the least bellicose people (and the Japanese are hardly that) would have found it difficult to tolerate the presence of another power in the Bonins, or, as the Japanese know them, Ogasawarajima.

Britain's renunciation of the group greatly displeased

the inhabitants, who regarded themselves as British. Their disapprobation became discomfiture when they were swamped by Japanese fishermen. Like a swarm of locusts, devouring everything in their path, came the Orientals. Time was, said the people, when Peel Island was thickly wooded; now it looked barren, and all the goats and deer that formerly roamed the forests had been exterminated. "We did not wish to become Japanese subjects, Captain Cameron," said more than one person to me. "We are taxed heavily; our young men are conscripted for the Japanese Army and Navy; we are little better than slaves."

My own relations with the Japanese officials were somewhat anomalous. Port Lloyd was not open to commerce. Why had I called? "We are in distress," I explained soothingly. "We need food and water." Each day I was interrogated; each day I flavored my replies with Scotch whisky, and the gentlemen of Japan departed purring and profuse with promises. The civilian population and I got along famously, the more because I effected two miraculous cures. My prescription of a tablespoonful of bicarbonate of soda, swallowed dry, brought back from the gates of death a man who was dying of hiccups; my other prescription, of a hot mustard bath and a rub for a child who was said to be dying of cholera, was no less successful. Thereafter my fame was positively prodigious: I was more than a physician: I was a worker of magic.

From the Bonins we sailed for Kobe, Japan, arriving safely and in excellent health after a cruise of two years (Note 63). It was a strange world to which we had come, a world of bamboo-and-paper houses, of little

people who curiously resembled their own dolls; and a cold world, a cold one, for even the Scotch Cameron had been long under tropic suns and felt the Japanese winter severely.

At Kobe my life at sea should have ended. I sold my shark fins and oil, turtle shell, and metal from wrecks at a fair price, and soon disposed of the *Ebon*. But there was little employment for foreigners in Japan then, and I accepted command of a nineteen-ton cutter yacht, the *Condor,* for delivery to some Russian naval officers at Vladivostok. On this tiny craft I began my last voyage as a mariner.

Four days out of Kobe the *Condor* was sailing through the Inland Sea in company with a Japanese schooner. All was calm, a drizzling rain was falling upon a smooth sea; but the barometer began to drop rapidly. The Japanese captain advised that we run for shelter to a safe place with which he was familiar. Suddenly, however, we were becalmed; even the rain ceased, and only the barometer continued to fall. Warned by a "typhoon sky" that I must prepare for the worst, I took in all our canvas except the stay foresail, which we reefed fisherman fashion.

Before the oncoming storm ran a disturbed sea. Then the typhoon struck us. I myself took the tiller, and we scudded dead before the wind. Ere the tempest obscured the world I had a last fleeting glimpse of the Japanese schooner: her sails had been blown away and were flying in great tattered fragments through the air; her rigging had vanished; her two masts were tossing in opposite directions as she rolled, helpless and hopeless, in an over-

whelming sea. Nothing whatever could I attempt in her behalf.

For an hour or two I had sea room. Whither to run after that I had no inkling. On we plunged through mountainous seas; then in the murk loomed islands. Were the passages between them safe? All showed breakers except one, and even it had some surf. That one I had to chance. As I steered for it one of my crew, a big German, crawled aft, with tears streaming down his face, to ask whether I thought that was a passage for which we were heading. "If it is," I shouted to him above the roar of the storm, "we're all right. If not, we'll be in hell within ten minutes." That assurance, I hope, satisfied him.

Beckoning to one of the men, an Englishman whom I could trust, I instructed him to take an oil can forward and pour out the contents as soon as we struck broken water. This prevented surf rolling on board, and we took the passage in good order; then ran into a small sheltered bay, as smooth as a pond, where we anchored.

Anxious hours still remained. Typhoons are revolving storms; the oncoming shift of wind would place us on a lee shore; in preparation for that I made ready two spare anchors. At midnight the wind veered, and we dropped the two additional anchors, housed the topmast, and got ready to hoist our stay foresail in case the ground tackle failed to hold. As a last desperate expedient I intended to swing the *Condor's* head and drive her like hell upon a sandy beach astern: she would be smashed to fragments, yet we ourselves might escape. Happily, however, our chains and anchors stood the strain.

At three o'clock in the morning the storm died, and we went below to splice the main brace. After spending the whole day putting things to rights we sailed next morning; but a fog compelled us to anchor on the other side of the island. There I saw the wrecks of eleven schooners and junks, all broken beyond repair; and there I saw also the bodies of drowned sailors pulled to shore in the nets of fishermen. That single typhoon took a toll of more than fifteen hundred craft of different sorts, ranging from barks to lighters.

Late one afternoon we arrived at Vladivostok. On the next morning, at the request of the *Condor's* owners, I sailed her to a berth in the midst of the Russian fleet. Scarcely was our anchor down before a pinnace from a man-of-war came alongside with a hamper of food and a basket of liquors ranging from champagne to vodka, enough for the thirsty crew of a full-rigged ship. That was merely the beginning of hospitality. One of the officers, Lieutenant Baron Gravenitz, took me under his wing, escorted me to all the vessels of the fleet, and introduced me to every officer from the admiral down. Those gentlemen deluged me with liquor: they were the hardest drinkers I ever saw; not even the priest-chaplains lagged behind the laity. May John Barleycorn himself preserve me from another like flood!

Baron Gravenitz did not stop here. He displayed a genuinely solicitous interest in our fortunes; found places for all my crew, the blubbering German excepted; and was sincerely sorry that the laws of Russia, which did not permit

foreigners to command Russian merchant steamships, prevented him from getting such a berth for me. "I intend to quit the sea," I assured him, to which he replied that he need no longer feel anxiety for my future. A delightful person he was, a perfect gentleman, a true man, as sincere a friend as ever I made. But this is not altogether a world of amity. Even then war clouds hung dark over the Far East: the Russian fleet expected orders at any moment to engage the Japanese. Gravenitz was pessimistically confident: "The Japanese Navy may get an initial advantage," said he, "but in the end we will win." Poor fellow, the Battle of the Sea of Japan undid his prediction (Note 64).

Bidding a reluctant farewell to my very good friend the baron, I returned to Kobe by steamship. It was in 1897 that I went ashore. My thirty years at sea were done.

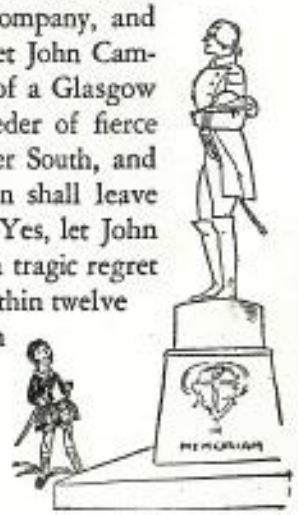
CHAPTER SIXTEEN

BY WAY OF EPILOGUE

Shall we, the reader and the transcriber of this narrative, here take leave of John Cameron? Could time and place be more fitting? Is he not safe after thirty years of storm? Good is solid ground after the roll of the sea, and sweet the order and assurance of life on man's natural habitat, dry land. But let us add a brief chronicle of Captain Cameron's later years. He resided in Japan, principally in Kobe and its environs, until his death in May, 1925, and after two years in different occupations he

entered the service of the Standard Oil Company of New York on July 1, 1899, and continued with that corporation for almost twenty-six years, being retired in April, 1925, a month or so before he died.

In this time he made three lengthy trips abroad: in 1911, when he crossed and recrossed Siberia on a visit to Scotland; in 1920, when he went on a British freighter from Kobe to New York by way of Suez, and returned on another British vessel from Philadelphia to Kobe by way of Panama; in 1923, when he visited Honolulu. Pleasant excursions, these. But not altogether so. Consider his interminable land voyage on the Trans-Siberian Railway. It would be much better, he thought, if one could traverse Asia and Europe by water. For the first time, as he said with substantially literal truth, he lost sight of the sea. At Ostend "the ocean cheered him wonderfully." He could not go astray "now that he had come in contact with his old friend blue water." What awaited him at his journey's end in Scotland? A strange country, inhabited by a strange people. His schoolmates were gone, scattered to all the winds; many were dead; only one remained of a large and joyous company, and he was a white-haired, feeble man. Then let John Cameron flee from the bleak and dirty weather of a Glasgow July. The North is a great parent, a breeder of fierce youth; but her children ever love the milder South, and not without reason is it written that a man shall leave his mother and shall cleave unto his wife. Yes, let John Cameron hasten back to Japan, filled with a tragic regret that he had visited the land of his birth. Within twelve years a trip to Honolulu was to affect him



not dissimilarly. Man is a sad animal because he remembers what has ceased to be.

In this shifting world is there nothing stable? Yes, the restless sea itself. All the agonized generations of toiling men cannot remold the ocean. Bracing indeed did John Cameron find it even to breathe a remote whiff of sea atmosphere, to go aboard one of the dwindling fleet of sailing vessels that arrived at Kobe with case oil, and to "relish pea soup, hard tack, and a slice of good salt beef." Of course he observed an improvement in "the quality and quantity of food supplied to shipping," and doubtless he enjoyed the fare because it was savory and not because the taste of "salt horse" flooded his soul with a thousand memories. Yes, yes, quite so.

By 1919 a growing unrest had become acute: Captain Cameron "had to get away from Japan and go somewhere." But this would be no voyage by rail. In 1920 he set out for New York through Suez. Let us picture him for a moment: he fills his lungs with salt air; he revels in the "pitching and rolling of the vessel as she churns along; finding himself once more on a stretch of salt water is like starting a new life." For he attained the new nowhere but in the old. Yet mark how the world has changed! Is this Singapore, the village that was? Can this other place be New York, where strolling pipers once played in the streets for John Cameron and "rosy-cheeked, strapping lasses"? "Jew York," snorts a disgusted Scot. On through Panama, that marvel of construction and operation; on to British Columbia for bunker coal. No call at San Francisco, and that is a disappointment, but

perhaps a lesser one than a visit would have been, for San Francisco now trades on its past. Yet there are glimpses of the headlands of California, those milestones of old voyages on coasting vessels laden with Douglas fir. With them John Cameron must be content.

In December, 1923, he spent three weeks in Honolulu. The Yokohama-Honolulu great circle course is within hailing distance, so to speak, of Midway and French Frigate Shoals, but he would have been able to sight neither from the deck or even from the masthead of the Toyo Kisen Kaisha steamship *Shinyo Maru*. From no lookout, indeed, could he ever have seen his "old principality" of Midway and the "good place" of the Shoals: he would have found that they also had faded strangely and terribly into limbo. Yes, the world had changed, but so had he; and though he comprehended the first fact, he seemed perpetually bewildered by the second. So to Hawaii. There he did not see the Kona and Kau coasts of the island of Hawaii; or Maalaea, Maui, under the shadow of Haleakala; or Nawiliwili Bay, Kauai, on whose shores he once feasted and drank deep with a king. All his time was passed in Honolulu, that Caucasic-Mongoloid hybrid spawned by cane sugar and coolie labor, a city un-American and un-Hawaiian.

In April, 1925, as has been said, Captain Cameron was retired by the Standard Oil Company on pension. What should he do? A man must bestir himself, though seventy-five years old. Perhaps John Cameron could find new employment, "something not too strenuous," for there was, after all, a condition known as age. What if he

failed to get a position ashore? Then he would "try the sea again, if some skipper were such a damned fool as to carry him for ballast." But a longer voyage than any he had made opened before him; he embarked upon seas that remain ever uncharted, notwithstanding the glib cheer of all creeds. He is buried in Japan. For him no epitaph could be more fitting than a line from Tennyson's "Ulysses":

"I cannot rest from travel."

NOTES

BY

ANDREW FARRELL

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1. A cheese-cutter cap had a visor resembling a cheese cutter or a knife with a semicircular blade such as is used in chopping bowls.

2. Persons who think only in terms of 50,000-ton liners of the present may find it difficult to credit this. They should consider that the small vessels of the '70's did not stand high in the water, that the average freeboard of British ocean-going steamships of that time probably did not exceed fifteen feet. Such an incident easily could have occurred when a ship rolled heavily toward a boat that was then on the crest of a swell. Men have been washed overboard from vessels and carried aboard again by succeeding waves.

3. Four or six ships named *Florence Nightingale* were afloat about 1870. One of them, built at St. John, New Brunswick, in 1855, foundered in 1872 while on a voyage from Cardiff to Rio, and in view of her loading port she doubtless had a cargo of coal. It would appear that this vessel must have been the one on which Captain Cameron sailed; but I hesitate to make positive identification, because two voyages of the *Ida*, slow as she was, could not have required five years; that is, from 1867 to 1872. Perhaps there is an error in the latter date, or Cameron may have spent much more time ashore between voyages than his manuscript discloses.

4. Atlantic packet ships were the forerunners of the liners of to-day. They had an unsavory reputation, although one may question whether it was altogether deserved. No doubt unruly, drunken crews of "packet rats" often were treated with extreme severity, but good men probably had little trouble. Most of these vessels were American, inasmuch as the Yankees had little competition after they entered the packet trade. The American packet *Dreadnought*, so the old song boasted, "beat the Cunarder a week and a day."

5. The American ship *R. D. Rice* sailed from Philadelphia with a cargo of case oil for Kobe on November 20, 1900. Fire destroyed the vessel and more than half her cargo at Kobe on April 28, 1901.

6. The ship *Grace Darling*, of 1,042 tons, built at South Boston in 1854, departed from Nanaimo, British Columbia, for San Francisco on January 3, 1878, under command of Captain Harrington. She was last seen hove to in a heavy gale on January 18. It is assumed that she foundered in the storm. All hands, eighteen in number, perished.

7. This disaster occurred on November 4, 1875, with the loss of two hundred and seventy-three lives. Only two of the *Pacific's* company, instead of three, as Captain Cameron has it, were saved. The reader will observe that Cameron has the order of the wrecks of the *Grace Darling* and *Pacific* reversed.

8. Captain Cameron manifestly was an officer on the *Otago*, but he does not make clear what berth he filled.

9. Captain Cameron's naturalization was granted by the court of the Twelfth Judicial Circuit, California, William P. Daingerfield, district judge, on February 21, 1878.

10. The cornerstone of Iolani Palace, now the Executive Building of the Territory of Hawaii, was laid on December 31, 1879, with Masonic ceremonies. The building was completed about three years afterward.

11. Notwithstanding the assertions of Jimmy the Devil, it is improbable that all indentured laborers were used humanely in Australia. I have heard stories, and I believe they are true, that a favorite punishment in Queensland was to flog a native and rub salt into his wounds. But I must add that official British supervision and protection of indentured labor to-day is wholly admirable.

12. In "An Index to the Islands of the Pacific Ocean," by Dr. W. T. Brigham, late director of the Bishop Museum, Honolulu, the number of missionaries murdered on Erromanga is given as five. Readers who are disposed to take Captain Cameron's fear of being served as "long pig" somewhat lightly may be interested in a comment that Dr. Brigham made in the "Index" as recently as 1900: "Cannibalism—This custom, which arouses a curious horror in most civilized people, although man is a carnivorous animal and human flesh is not unwholesome, was once prevalent in the Marquesas, Fiji and New Zealand, and is now [1900] in full force in the Solomon Islands, New Hebrides, Bismarck

Archipelago and parts of New Guinea. Elsewhere in the Pacific it has never existed or has yielded to the pressure of civilization." No further substantiation of what Cameron says of cannibalism as it was about 1880 is needed.

13. This challenge is not likely to be accepted. Kahuna-ism in its diametrically opposed phases of mental healing and praying to death exists covertly in Hawaii to this day, although I do not say it is widespread. In the reign of Kalakaua there was a studied revival of heathenism. To this hour tales are told of the appearance of the goddess Pele on the island of Hawaii, portending an eruption of Kilauea or Mauna Loa, and she has even been glimpsed on the island of Maui, which has witnessed no volcanic activity since the coming of white men. Propitiatory sacrifices still are made to her when rivers of molten basalt roar down the slopes of Mauna Loa. Farther south in the Pacific "devil work" exists by the side of sincere Christianity.

14. Many years ago the people of the Gilberts were notorious wreckers. They had a gentle custom of building fires at unwonted places in order to mislead vessels, which would steer by lights on shore while approaching an island after nightfall.

15. This smallpox infection was brought from China. The first cases were discovered in Honolulu on February 4, 1881.

16. Natives of different Pacific archipelagoes served as plantation laborers in Hawaii for many years. As early as 1852 or thereabout the kingdom of Hawaii opened negotiations with the British consul-general in Honolulu for the removal to Hawaii of the entire population of Pitcairn Island, but this scheme failed. Apparently the first arrivals were ten persons who landed on Kauai on December 31, 1859. From what islands they came I do not know. In April, 1865, fourteen Marquesans were brought to Honolulu by the missionary packet *Morning Star*, and immigration from different groups continued until 1885, although no arrivals are recorded for seven of those twenty-one years. All told, 2,444 Polynesians, Micronesians, and Melanesians were recruited. Enrolling these people on any considerable scale did not begin, however, until 1878, when the reciprocity treaty of 1876 between the United States and Hawaii had assured the future of sugar in the islands. In 1878, too, the first company of Portuguese arrived, and Chinese swarmed into Hawaii from 1876 to 1886, after which their immigration was checked. No South Sea natives were indentured after 1885, because early in that year the first Japanese hordes made their appearance. Most of the Pacific natives were returned to their homes after expiration of their contracts. Those Polynesians and Micronesians who did stay in Hawaii

are now largely lost in the kindred Hawaiian population, and the principal impress they have left is the so-called "grass," or hula, skirt, which was adopted by the Hawaiians from the Gilbertese. But the Melanesians, black-skinned and kinky-haired, remained distinct much longer. To this day, indeed, one may see, usually in more remote districts, full-blooded or part-blooded persons of Melanesian ancestry. Perhaps their grandparents were passengers on the *Pomare*.

17. Captain John Degreaves has been dead many years, but he is still remembered kindly by some elderly residents of Hawaii. At one time he was instructor in navigation to King Kalakaua, and he also taught navigation to the Hawaiian officers of the warship *Kaimiloa*, of which something is said in this volume. The Degreaves family, I am informed, was prominent in the islands of the English Channel. The old gentleman's later life was deeply tragic.

18. Another version of Captain Jackson's difficulties as an officer of the *Galatea* is much more romantic than this and concerns a personage placed even higher than a royal duke. H. B. M. S. *Galatea* was at Honolulu in 1869 under command of the Duke of Edinburgh. Duke P. Kahanamoku, the Hawaiian swimmer, owes his name to this visit. His father, born about that time, was named for Edinburgh, and Kahanamoku in turn was named for his father.

19. Mauna Loa (Long Mountain), on the island of Hawaii, is the greatest mountain mass in the world. It is, in fact, too vast to be called a mountain in the usual sense of the word. It is a stupendous dome formed by a prodigious number of layers of basaltic lava; its two diameters at sea level are seventy-four and fifty-three miles in length; its summit is 13,675 feet above tidewater, and it is based on an ocean floor 17,000 feet or so below the surface. Mauna Kea (White Mountain, that is, snow-crowned), also on Hawaii, is comparable to Mauna Loa in size and is one hundred and fifty feet higher. Haleakala on Maui also is huge.

20. Lava broke from the flank of Mauna Loa on November 5, 1880, and continued to flow until August 9 or 10, 1881. By that time the foot of the rock stream was at the edge of Hilo, almost sixty miles from the source. Precisely as Captain Cameron says, the eruption stopped immediately after Princess, or High Chiefess, Ruth made her offerings to Pele. That fact is indubitable, but it is difficult, if not impossible, to discover any contemporaneous accounts of the event. All I have been able to find in the Honolulu newspapers of those days is the barest mention of Princess Ruth being on Hawaii when Princess Liliuokalani, at that time regent and subsequently queen, went to the

foot of the eruption. A careful search of the archives of Hawaii, made for me, revealed nothing more; the 1882 volume of *Thrum's Annual*, the standard reference publication of Hawaii, contains only a brief relation of the lava flow and says nothing whatever of Ruth's sacrifices and the astonishing coincidental cessation of Mauna Loa's activity.

For this silence, it seems to me, there is a plausible explanation: the principal white men of Hawaii, that is to say, the members of the missionary group, were none too desirous of proclaiming such a reversion to paganism. They did not, on the other hand, scruple to attribute the salvation of Hilo from imminent destruction to the interposition of God in answer to Christian prayers. Nevertheless I can appreciate and sympathize with their motives, although I cannot applaud an act that might have suppressed such an extraordinary story. To a clergyman, however, we are indebted for the most comprehensive narrative of the event that I have seen. This is contained in "The Human Side of Hawaii," by the Rev. Albert W. Palmer, D.D., former pastor of Central Union Church, Honolulu. His account naturally differs in details from Cameron's.

21. Princess Ruth Keelikolani was a great-granddaughter of Kamehameha the Great through her mother. She died on May 15, 1883. The last descendant of the conqueror was Princess Bernice Pauahi (Mrs. Charles R. Bishop), who died on October 16, 1884, leaving a large fortune for education. The beloved Princess Bernice was a far better representative of the Kamehamehas than was Princess Ruth, although they were first cousins. It was very unfortunate for Hawaiian independence that the male line of Kamehameha should have died out in his sons, to be followed soon by the female line, because the dynasty was generally beneficent and hardly would have been guilty of such excesses and abuses as those of Kalakaua and Liliuokalani, which led directly to revolution in 1893 and annexation in 1898 by the United States. But in any event annexation had to come sometime.

22. The *Kaimiloa* sailed from Honolulu for Samoa on May 18, 1887, and returned to Honolulu on September 23 of the same year.

23. From the days of Kamehameha the Great and the early missionaries, laws of one sort and another had forbidden liquor to native Hawaiians or at least had greatly restricted their opportunity to indulge. Under Kalakaua temperance laws were repealed. A long-continued orgy resulted.

24. This fire occurred on April 18, 1886. Most of Chinatown, or about one-third of all Honolulu, was burned with a loss of approximately $1,500,000.

25. The Inter-Island steamship *Planter* was lost on Niihau on January 28, 1886.

26. Not until 1898, when Hawaii was annexed by the United States, did the uninhabited Northwestern islands as a whole come under the American flag; but Midway has been generally considered American since 1859, the year of its discovery by Captain N. C. Brooks, an American citizen, though then master of the Hawaiian bark *Gambia*. He took possession of the atoll, presumably in the name of the United States, and under the Guano Islands Act of 1856; he did not, however, fully comply with the provisions of that law, and American sovereignty cannot be regarded as having been established then. Seemingly the United States Government held this view, for in 1867 the U. S. S. *Lackawanna* was sent to Midway to take possession, and from that year American title may be said to date. Although the island remained unoccupied for many years, and therefore probably was "derelict and abandoned" under international law, no nation seriously contested title, if at all; and in default of a counterclaim American rights were beyond question. American title is now absolute: Sand Island is the site of a relay station of the Commercial Pacific Cable Company, an American corporation, and the atoll is under the jurisdiction of the Navy Department. Certainly Midway was a very early American overseas possession. It probably was never looked upon as a part of the Hawaiian kingdom, and in a strict sense is not a part of the Territory of Hawaii to-day.

In 1870 the United States decided to dredge a channel through a reef into the lagoon in order to afford a coaling station for vessels of the Oriental service of the Pacific Mail Steamship Company and doubtless for naval craft as well; and the U. S. S. *Saginaw*, was sent to the island with a contractor. It is a natural assumption that the orders issued to the *Lackawanna* in 1867 contemplated this work. Dredging proceeded during the summer of 1870; was discontinued for the winter, and was never again resumed. In the afternoon of October 29, 1870, the *Saginaw* sailed from Midway for Honolulu and San Francisco, but called at Ocean Island, fifty-odd miles west of Midway, to succor any castaways who might be there at the extreme westerly limit of the long Hawaiian chain. About three o'clock in the morning of October 30 she was wrecked on Ocean Island. Recent discoveries suggest that the disaster was due to that atoll being much nearer Midway than charts of 1870 or even of 1920 showed, and more to a strong westerly set of the current, both of which put the *Saginaw* upon the island unexpectedly. "The Last Cruise of the *Saginaw*," by George H. Read, pay inspector, U. S. N., retired, tells of the wreck, life on Ocean Island, and ultimate rescue.

Either the crew of the *Saginaw* or the contractor's force must have built the cottage on Midway, which Cameron says was made ready for

an astronomical party that went to the island to observe a transit of Venus. The United States Navy Department informs me that the records of the Naval Observatory contain nothing concerning such an expedition about 1856, or some thirty years before the *Seigel* was wrecked; while the archives of the Navy Department itself do show that the contractor's agent and his men had quarters on Midway, that the Pacific Mail had a coal pile there, and that men were transferred from the *Saginaw* to the naval station, Midway Island.

27. I am confident that this is the first time Jorgensen's story has been published, while his shipmates' version of the *Seigel* affair has been current for forty years. Honolulu learned of the wreck, the deaths of three men, and the marooning of Jorgensen when the Hawaiian bark *Lilian* arrived from the Marshalls on December 6, 1887, with two of Jorgensen's shipmates: a German boy and a Norwegian named Edvart Olsen. The latter is in Honolulu, a blue-eyed Scandinavian, white-haired but sturdy and alert despite his years. He related his adventures at length to me.

The schooner *General Seigel*, said he, sailed from Honolulu on September 1, 1886, to fish for sharks in the waters of Northwestern Hawaii as far as Midway, but not beyond, and she also was directed to recover metal from any wrecks she might find. Each of her crew of eight was to receive twenty-five cents a month and a share of the net profits. Perhaps this very coöperative nature of the enterprise was ominous, because every man well might consider himself the equal of all and discipline would be difficult to maintain. One man, of course, did act as captain: he was Frank Asberline, a Russian Finn, whose name has been given in several ways by different writers (Cameron calls him Jacobson); and Jorgensen himself was mate. The six others were Olsen; a second Norwegian; the German boy already mentioned; Peter Larkin, a French-Canadian; William Brown, a fellow countryman of Jorgensen's; and a Russian,—a rarely polyglot company even for the Hawaii of those days.

After a short stay at French Frigate Shoals the *Seigel* proceeded to Midway and there anchored. Olsen's present recollection is that she fetched the island on September 21; September 16, however, is the more probable date. When she had been at Midway about two weeks, and before the wreck occurred, not after, Larkin went fishing with dynamite. As many a poor devil in many a Pacific archipelago has done, he lost his right hand. It was blown off clean. Inasmuch as "pain killer" was the only medicine aboard the *Seigel* and the crew were quite indifferent surgeons, it is not surprising that Larkin died after ten days of agony.

On November 16 the *Seigel* was cast ashore, and the seven remaining adventurers took up their quarters on land. They had a small boat of

the *Seigel's*, the one Jorgensen called a punt; and two other craft offered themselves. One of them was a boat that had drifted to Midway from the wreck of the British ship *Dunotter Castle*, which was lost on Ocean Island in June, 1886; the other was a Japanese sampan, about twenty-two feet long, that had been left at Midway by the fishing schooner *Kaulilua*. It was sufficiently large for the seven, while the *Dunotter Castle's* boat was not; so work began on the sampan to make it seaworthy for a voyage to some inhabited land. The seven men bolted on a keel of wood, four inches by eighteen; elevated the sides with one-by-twelve boards; put on a deck, and raised two masts. All this made the craft top-heavy, and it capsized when it was put into the water; but by fitting bilge keels or outriggers and by adding ballast the castaways at length succeeded in remedying its instability.

With this work making departure from Midway more or less imminent, Asberline expressed a wish to visit Eastern Island, which he had not seen; and he, Jorgensen, and Brown crossed the lagoon in the *Dunotter Castle's* boat. Asberline had a shotgun, Jorgensen took a rifle. At mid-afternoon Jorgensen returned to Sand Island alone. Next morning he again went to Eastern Island equipped with a butcher knife and a tub that had been used in cleaning fish.

In the meantime the four who remained on Sand Island continued to work on the "scow," as Olsen called the sampan. Jorgensen was using the *Dunotter Castle's* boat in his travels between the islets. On the evening of the day the sampan was put into the water he reappeared on Sand Island, evidently drawn back by the sight of the launching. This was no less than ten days after he had made his second trip to Eastern Island; and all this time Asberline and Brown had been missing.

Yet they were right enough, said Jorgensen. Asberline, in fact, had sent word that the crew might sail when they wished, but were not to take his chronometer, sextant, and epitome. This strange statement fortified a suspicion that had long been growing in the minds of the four men, and that night they decided to abandon Jorgensen. Next morning, however, two of them accompanied him to Eastern Island to search for their missing shipmates. Then Jorgensen at last divulged that Asberline had killed Brown, and that Jorgensen himself had been remaining with Asberline to prevent him committing suicide. Having communicated this interesting information, Jorgensen busied himself with something of greater consequence, nothing less than gathering eggs of sea birds; whereupon the others left him and returned to Sand Island. They did not, however, leave him in such desperate straits as he thought; he need not, at least, have perished of thirst, for the water of Eastern Island, although unpleasant to both sight and taste, is potable. The *Wandering Minstrel's* crew, indeed, found that it seemingly possessed antiscorbutic qualities, which might reasonably be attributed to the island's vegetation.

But Jorgensen, as the reader knows, made a raft and escaped. He gained Sand Island unnoticed. The others discovered his arrival only when they went to the beach with the aim of disposing of the *Dunotter Castle's* boat. At that time they found Jorgensen's makeshift raft, but the Dane himself had slipped into the cottage by a roundabout way. The four intended, said Olsen, to leave him no means of quitting Midway, which they regarded as a satisfactory prison until a vessel could be sent to take him off and return him to civilization; they therefore removed the oars from the boat, set the sail, and permitted the craft to run to sea.

While this was being done Jorgensen got his rifle from a place where he had concealed it the night before. Seeing the Dane thus armed, two men and the German boy fled to the sampan, but Olsen stood his ground and wrested the weapon from Jorgensen. "Now," said Jorgensen to Olsen, "you can shoot me." Olsen pointed the rifle outside the cottage and pulled the trigger, once, twice, before the cartridge would explode. Disarmed and in the power of the four, Jorgensen began to beg for mercy; he offered, as he told Cameron, to allow them to tie him if only they would not desert him; they would not, however, listen to his entreaties. He would, said they, be better off on Midway than they would be at sea; yet they left him whatever they could spare, though that was little enough: some dried fish, matches, an ax. That evening they pulled the sampan into the lagoon and spent the night aboard. One precaution remained to be taken, however: Jorgensen must be prevented from rowing out to the sampan in the *Seigel's* boat. This, therefore, the four sank, just as Jorgensen said. In the morning, before they sailed, they could see him running up and down the beach, evidently in search of the punt.

Olsen dismissed their voyage to the Marshalls in a few words. For two or three days they headed south, thereafter south by west. Favored by a light breeze throughout, they made the Marshalls in twenty days, having sailed on June 28, 1887, and arriving July 18. Not one man could navigate; they merely steered for the quarter in which they supposed the center of the Marshall archipelago to lie. For food they had twenty dried mullet, but they did not get hungry; they chewed a little fish with water, and were content. The more I consider this amazing voyage, the more I am persuaded that the age of miracles has not passed. Yet the four men had this in their favor: they sailed in the summer, when the northeast trade blows steady and sweet; and they probably did no more than run before it, straight as an arrow, for the tiny Marshall atolls.

As I have stated, Olsen and the German lad arrived at Honolulu on December 6, 1887. Since the *Wandering Minstrel* did not sail on her ill-fated voyage until December 10, it seems that her company must have heard of the *Seigel* wreck and the marooning of Jorgensen, and scarcely

could have forgotten or ignored his presence on Midway, inasmuch as they themselves were bound to that part of the world. In fact, Olsen said that Captain Walker had offered to take Jorgensen off and return him to Honolulu; but apparently no arrangements looking toward this were made. Captain Cameron, on the other hand, stated repeatedly that he had not known of the *Seigel* affair until he landed on Midway; and he certainly was not the man to fail to remember such a brisk little series of events. In view of the difficulties he was having with the *Minstrel's* crew at Honolulu, it is possible enough that he did not hear of Jorgensen. The point, however, impresses me as relatively unimportant.

The reader doubtless has remarked a close parallel between certain phases of Jorgensen's and Olsen's narratives. In some minor details each corroborates the other, with here and there discrepancies that one must expect in even the most unprejudiced testimony. This agreement, let me say, confirms my already high regard for Cameron as an accurate reporter.

In their accounts of the circumstances surrounding the deaths of Asberline and Brown, on the other hand, Jorgensen and Olsen naturally diverge radically. It is scarcely necessary to point out that here Olsen's story possesses a consistency and convincingness that Jorgensen's lacks. What, then, are we to conclude? Did Jorgensen kill the two missing men? On the evidence before us (and we probably shall never have any more) we must, I believe, hold that he did. That is not to say that he was necessarily a murderer in the legal sense. We cannot even surmise what occurred between him and Asberline and Brown on Eastern Island; perhaps Jorgensen, at the worst, committed nothing more than manslaughter.

I do not believe that he could justly have been found guilty of that much. That he was insane I cannot doubt. It does seem, however, that his madness was intermittent, and was closely connected, whether as cause or effect, with a low physical condition. In succeeding passages of this volume Captain Cameron casts some illumination on the Dane's mental state. "Was Jorgensen pupule?" I asked Olsen. "Pupule" is a Hawaiian word meaning insane. "No," replied Olsen, "but he was lolo." "Lolo" signifies "soft," silly, imbecile. It denotes weakness of mind rather than insanity; it connotes the primary want instead of the loss of mental power. To illustrate, Olsen said that Jorgensen rushed ashore at French Frigate Shoals with a great knife at his belt and with a gun which he used for shooting birds that he could have knocked over with a stick. But I think that the evidence is against Olsen's conclusion that Jorgensen was merely feeble-minded; Cameron's later testimony concerning Jorgensen's practical ability is too clear. The reader may judge for himself when he has finished what Cameron has to add. One significant bit of evidence remains to be adduced. It suggests the

workings of a poetic imagination, and I cannot place my hand on the original authority; nevertheless I give it for what it may be worth: Jorgensen was accustomed to pace the beaches of Midway, raving wildly, when the moon was full. Does this not mark him as a lunatic, moon-struck?

Yet even a madman needs some motive for homicide, some cause, though slight, sufficient to actuate his unbalanced mind. Why should Jorgensen have killed Asberline and Brown? Seemingly to satisfy a trifling grudge. Jorgensen and Asberline had quarreled over their destination: the former insisted on making for Honolulu, which lay somewhat to windward, while Asberline sensibly held out for the leeward-lying Marshalls. Olsen, in fact, believes that Jorgensen intended to make away with all his shipmates. In a memorandum book of the Dane's Olsen found this singular entry: "Six men sailed for the Marshall Islands," with a date. Was this a manufacturing of evidence to account for the whole company? If it was, Jorgensen's insane cunning overreached itself; he should have waited until all were disposed of before he committed himself in writing.

28. Apparently Jorgensen went ashore with Walker in the first boat.

29. In "The Cruise of the *Cachalot*" Frank T. Bullen describes a Maori method of smoking mutton birds and packing them in their abundant melted fat.

30. What Captain Cameron says of the cries of sea birds is quite subdued in comparison with a description by the late A. L. C. Atkinson, of Honolulu, who was a member of a party that went to the Northwestern islands of Hawaii on the U. S. S. *Tanager* in June, 1923. Here are extracts from a diary he kept on Neckar Island:

"Have I said anything about the noises made by the birds? From each of these flying birds which, as I said, freckle the firmament, comes its different cry—noise of every kind—and continuous,—the noise never ceases. The damnedest din (that's the expression) one ever delighted in, and continuous,—day and night,—a boiler-plate factory would sound like an organ recital in this damnedest din. But at nighttime the din was doubled. At dusk, after supper, I turned in my cot, perched on the rocks, and lay there listening to all the weird noises ever concocted. This eternal din doubled as the day darkened and with the darkness the noises became weird, mysterious, spooky like cries of pain in spiritland,—and continuous.

"If human spirits are transformed and take the form of birds, I heard that first night . . . the cries of every unhappy soul that ever lived in this mysterious island,—and they were continuous, but louder,—

the cries seemed more distinct at nighttime. I lie here, sleep is quite out of the question, listening to all the unhappy souls in their chorus of lament. How a superstitious inhabitant could have stood it, I don't know. Perhaps the birds drove them away. I dozed off on two occasions for an hour at a time. The noise then drove away sleep, and in the morning I knew that the damnedest din had been continuous. . . .

"Somehow these birds' sounds hold me enthralled. There's a strangeness in them, seems to speak of a different world and things unknown to man, and as I lie here and listen I strain to find their relation to the Master Mind. Away out there, isolated from all mankind, I wondered whether they knew of eternity. The air is continually full of the cacophonous cries of myriads of sea birds. Not alone during the day, but all through the night, these weird sounds fill the air. In the dissonance of this clamor one seems to hear the wail of damned souls crying their yearning to be liberated from the freest of all things that fly —sea birds."

31. This is Captain Cameron's last mention of Hanker. In view of the precarious health of the second mate, and in view of the fact that the Honolulu newspapers said nothing of him in their accounts of the rescue of the *Minstrel's* company, I conjectured that he had died on Midway. Such was not the case, however: he returned to Honolulu with the Walkers and apparently made a good recovery of his mental stability, for in June, 1889, he gave to the Honolulu *Advertiser* a lucid account of the wreck, which I shall discuss more at length in another note.

32. Captain Cameron is in error: although he unquestionably sailed on October 13, 1888, that day fell on Saturday. It is impossible to correct the chronology of the voyage now, and any attempt to do so would merely add to the existing confusion. Probably the mistake arose partly from the fact that Cameron crossed the international date line at 180 degrees on his trip, and so may have dropped a day from the calendar. On the other hand, there is evidence in his letters that he was doing some unconscious wrestling with the date. In any case the juxtaposition of Friday, the 13th of the month, and the start of an unprosperous voyage has an unholy attraction for a seaman. He would, if he could, make every Friday fall on the 13th. It is interesting to note that Captain Walker said the *Wandering Minstrel* sailed from Hongkong on Friday, October 13, 1887, whereas that day of the month fell on Thursday.

33. A copy of Cameron's chart, drawn to the scale of the original, shows that the boat was in approximately 17 degrees and 30 minutes north, instead of 16 north, on the fourteenth day.

34. At first glance I thought that Captain Cameron had mistakenly written "left" shoulder for "right," inasmuch as he was facing the bow of a boat that was presumably running south and west. But I now see that by keeping Polaris over his left shoulder he was standing well to the east until he fetched the latitude of Mille and so was ready to steer directly for that island.

35. This is difficult to understand. Cameron's chart shows that he was only ten days on the parallel of Mille after he turned westward, or six days less than the time he had expected that leg of the voyage to require. I surmise that he intended here to write "six" instead of "sixteen."

36. A turtle's belly plate, if properly boiled, furnishes a tender and delicious meat, with little inedible residue, and the younger the reptile the less that little is. It is not clear, however, whether this meat is what Captain Cameron means by "jelly," or whether by overboiling the plate he obtained a gelatine. As he says, most of a turtle can be eaten. Natives of the South Seas make it yield even tripe.

37. The error in the date of the beginning of the voyage is carried over to its end. The reader will observe in the body of the narrative that the day after the boat arrived at Mille was Sunday. But November 25, 1888, the day of arrival given by Cameron, was Sunday, and not, as he indicates, Saturday.

38. Persons who live softly ashore may smile at this matter-of-fact discussion of the possibility of cannibalism at sea. But will would-be scoffers permit me to tell a little story? Not so many years ago a friend of mine, a ship's officer whom I shall call Cullen, met an old shipmate in quite unusual circumstances. This man, whom I shall call Sturgis, had a story to tell, and tell it he did. A few weeks prior to the encounter with Cullen, Sturgis' vessel had been overwhelmed at sea in one of the most sudden catastrophes imaginable. Yielding to necessity and clearly to a great deal of panic as well, Sturgis and a few other men did not take time to launch a boat, but instead threw a life raft overboard and leapt into the sea. Then began a singular voyage of several hundred miles, in the course of which some of the men on the raft died. That much had already been published in the newspapers before Cullen spun the yarn to me. He had not, however, finished. "Sturgis admitted that he and the others ate the corpses," Cullen continued. Then a far-away look crept into his eyes, and his bronzed face twisted in a wry smile. "But between the lines," he concluded, "between the lines, as plain as day, I could read what had happened. Those men who

died were killed for food." Yes, murder and cannibalism for self-preservation. Does the reader still smile?

39. How Captain Cameron arrived at this figure of twenty-seven hundred miles I have no idea. His chart does not show such a distance run; neither does it indicate that the boat's course was kept well eastward in sailing down to the latitude of Mille. I should say that a liberal estimate of the length of the voyage as set down on the chart would be between sixteen hundred and seventeen hundred miles. But that would mean that the boat had averaged no more than forty miles a day, and this seems entirely too small, despite calms, head winds, and storms. By and large the chart probably does not show each day's longitude with even an approach to accuracy. The last or westerly leg of the voyage, indeed, discloses a run of only two hundred and forty miles or so in ten days, although by that time the voyagers probably had an easterly trade wind, even if currents were against them. Still, Cameron had no means whatever of ascertaining longitude, inasmuch as he lacked both a chronometer and nautical tables, and his facilities for computing dead reckoning were scanty indeed. About all he could do from day to day was to prick off his latitude on the chart and stab blindly at his longitude. In view of this it is not surprising that his chart presents a fairly direct voyage from Midway to the Marshalls, while we know that is far from the fact.

40. Captain Cameron emphasizes these reports to Morgan and Sonnenschein at such length because the Walkers accused him of having stated on reaching the Marshalls that he, Jorgensen, and Moses were the only survivors of the *Wandering Minstrel*, in consequence of which the exile of the castaways was greatly prolonged, their sufferings were increased, and some died needlessly. Now it is quite true that almost four months did elapse between Cameron's arrival in the Marshalls and the rescue of the *Minstrel's* company. This would appear to have been adequate for the dispatch of a vessel to Midway, but two additional facts remain to be weighed: Cameron stayed for some days or weeks on Mille (how long I do not know) before he went to Jaluit, so that perhaps the Walkers and crew of the *Minstrel* were picked up within three months or thereabout after Cameron met the American consular agent and the German commissioner; and furthermore, and of greater importance, we must bear in mind that very few vessels would be available for the deliverance of the Walkers and that these were largely or wholly merchant craft, the masters and agents of which would naturally dislike to employ them for anything except trade.

This charge of the Walkers has been reiterated so frequently that it has become an accepted part of the *Wandering Minstrel* story and is widely credited. At what date the Walkers first circulated the tale I

cannot learn; the earliest trace I have found of it is in the Honolulu *Pacific Commercial Advertiser* of December 4, 1896; but I have detected a possible origin, as I shall explain hereafter. No authority was given by the *Advertiser* for its statement, nor is it clear that the Walkers themselves publicly assumed responsibility for the accusation until January, 1922, when the captain's sons did come into the open. There is, of course, no question that the charge was spread by the Walkers.

In these circumstances I have sought to determine the truth of the accusation. An obvious avenue was to ascertain whether the archives of the United States Department of State and the German Foreign Office contained reports from Morgan, American consular agent, and Sonnenschein, German commissioner, on the wreck of the *Wandering Minstrel*. If such documents could be found, they would be conclusive. I regret to say, however, that a search of the records of both the American and German departments, made at my request, disclosed nothing germane. Yet the significance of this fact is, to my mind, not great. As an official of the American State Department said in a letter to me: "Morgan was the Consular Agent in the Island of Jaluit under the Consul-General at Apia [Samoa]. The records contain a few communications from Morgan transmitted by the Consul at Apia, but in none of them is any mention made of the wreck of the *Wandering Minstrel*. This may be accounted for by the fact that it was a British barque and, therefore, American agents would not necessarily be expected to report. Furthermore there is no mention in any of these despatches of Cameron." Sonnenschein would have had still less occasion to acquaint his home government with the loss of a British vessel on an American island half a world away. It does not, on the other hand, follow that the lack of official communications proves that neither Morgan nor Sonnenschein acted in some informal manner for the relief of the castaways.

But why, some one may ask, do I not inquire of Morgan and Sonnenschein? I have sought to do so, and have failed: Sonnenschein has been dead for many years, and I have been unable to find trace of Morgan. I have no doubt that he also is dead. In any event an elderly man in San Francisco believes that he is the only person now living who was connected with the Crawford firm. Captain Owen Thomas, master of the *Ebukai*, who almost certainly would have been able to give conclusive testimony, died in Manila in September, 1924. Another promising way led nowhere. On June 13, 1889, the Honolulu *Advertiser* said that Cameron "refused a passage offered him by the Captain of the schooner *Orient*, which touched at the Marshalls, bound to San Francisco." Inasmuch as this statement probably was based on an item published in a San Francisco newspaper on the arrival of the *Orient* at that port, a search of the San Francisco newspaper files well might disclose the very proof I am seeking. But the records of the San Francisco

customhouse do not show the arrival of a vessel named *Orient* between November 25, 1888, the day Cameron fetched the Marshalls, and June 13, 1889, the day the *Advertiser's* article was published. That newspaper must have made a mistake in the name of the vessel or the port to which she was bound. I must confess failure in my effort; the question remains open, and the reader doubtless will form his own conclusions.

At this point I do ask leave to act as an advocate. There are reasons which, to me, force the Walkers' accusations beyond the limits of likelihood.

First: It appears that a man in his senses would not have uttered such a lie as that with which Cameron is charged. Let the reader bear in mind that Frank Lord and his crew quitted Midway a short time before Cameron. Improbable though it was that their voyage should have a happy termination, it was not impossible. If they had gained an inhabited land, would they not have reported the Walkers' straits? How was Cameron to know that Lord was not already in Honolulu, there to damn any lie Cameron might have told in the Marshalls? Let the reader also remember that three boats were landed from the wreck of the *Minstrel*. Two had gone to sea, but one was left at the disposal of any one else who would brave a voyage. This certainly would have occurred to Cameron if he had been disposed to conceal the truth. Of most weight, some fishing vessel or man-of-war was well-nigh sure to find the colony on Midway sooner or later. Even if all died, which was quite unlikely, Captain Walker's records would have remained to convict Cameron of little less than murder. Is it conceivable that he would have lied, as the Walkers say he did, with all this evidence behind him? Besides, I wish to stress that if Cameron and Jorgensen had agreed to say that they and Moses were the only survivors, and if they had concocted a plausible story to account for the others, a story so carefully planned in all details that they would not trip themselves, they still could not have relied on the discretion or silence of a Chinese boy. The Walkers should explain how the two white men sealed the Oriental's lips after he was safe ashore in the Marshalls.

Second: What motive had Cameron for such a deed? I grant that he had no love for Walker, but it is not on record that he sought Walker's life, and had he done so, I cannot doubt that he would have killed the skipper man fashion, for that would have been Cameron's way. Furthermore, even if Cameron had been willing to have Walker remain on Midway indefinitely, perhaps there to die, Cameron was not the man to condemn the whole company to a like fate. If we credit the Walkers' assertions, we must look on Cameron as an inhuman monster. He was not that, as any fair-minded acquaintance of his knows full well. Many a graybeard in Honolulu still shakes wrathfully when the Walkers' accusations against Cameron are being discussed. "Jack

Cameron never did anything of the damned sort," the ancient fellows roar. I adopt their verdict without reservation.

After a stay of between thirteen and fourteen months on Midway, Walker and the remaining members of the shipwrecked crew arrived at Honolulu aboard the schooner *Norma* on April 6, 1889. Seemingly they had been found by chance. On "March 17, 1889," said a written statement furnished by Walker to the Honolulu newspapers, "the schooner *Norma* arrived at Midway Island shark-fishing, and under agreement conveyed the balance of the crew, self and family to this port." The words "under agreement" indicate that even in rescue the lot of the castaways was not happy: they were compelled, that is to say, to pay for transportation to Honolulu. This is evidenced by a report given to the newspapers by Captain C. Johnson, master of the *Norma:* "On the 26th [of March] sailed for Honolulu, being chartered by Capt. F. D. Walker to bring the wrecked people to the port of Honolulu." In another note I shall have considerably more to say of this "charter," at which, I feel sure, the reader will open his eyes. Although the *Norma* arrived at Midway on March 17, she remained nine days to get food and water and also to give the sick members of the *Minstrel's* crew an opportunity to recuperate before beginning their voyage.

It was on December 10, 1887, said Walker's statement, that the *Wandering Minstrel* sailed from Honolulu; she fetched French Frigate Shoals on December 18, departed on December 27, and made Midway and anchored in Welles Harbor on January 9, 1888. February was ushered in by heavy weather; on the 3d a furious storm arose, in which the vessel parted "both chains" and dragged a third anchor, and was wrecked. At one-thirty o'clock in the afternoon she was abandoned. On October 13 Cameron, Jorgensen, and a Chinese boy "left for Honolulu in a boat well fitted with sails, water and provisions." Since Midway afforded so little in the way of food, and since Walker stated that the only provisions saved from the wreck were a few tins of meats, fruits, and so on, I should like to know what he considered a sufficient store. But his narrative on the whole was brief and exceedingly unsatisfactory.

In no respect was his story more at fault than in the accounting for several missing persons of his company. "Two seamen died of some obscure disease," he said, "and one was drowned while fishing. During the passage to this port one more died of scurvy. My family suffers, one severely, from the same malady." No mention was made at this time of Frank Lord and his four "fellow imbeciles." Yet the Honolulu newspapers evidently accepted the report blindly and made no further inquiry. In 1900, however, an article in the *Advertiser,* presumably based on information obtained from Walker, gave the following enumeration of the twenty-nine persons said to have been aboard the *Minstrel* when she sailed from Honolulu: sixteen returned; six were drowned in the capsizing of a boat; one was murdered; three died of beriberi, two

of starvation, one of scurvy aboard the *Norma*. What man was murdered? Why did Captain Walker say nothing of such a crime immediately on his return to Honolulu? I wish I knew. As for the others: I fancy that beriberi, starvation, and scurvy as used here are practically synonymous. The six drowned, I take it, were Lord and his companions, although Cameron says they numbered five. Seemingly this particular newspaper article ignored Cameron and Moses. At this point it would be well to remind the reader that Cameron gave the total of the *Minstrel's* company as no less than forty-one: thirty-two members of the crew, less two negroes handed over to the Honolulu police; three Chinese stewards; eight whites. This number, let me say, appears entirely too large; but we should bear in mind that everything connected with the *Minstrel* seems to have been done on a lavish scale.

It was not my intention in the preceding paragraph to charge Captain Walker with any misdeed in connection with these deaths. His report was inexplicably scanty, but perhaps he was guilty of no more than extraordinary carelessness or a lack of frankness. And he was cleared of any neglect of duty at the time of the wreck. A British naval or consular court of inquiry into the loss of the *Minstrel* was held in Honolulu on April 10 and 11, 1889; it justified Captain Walker's "position in relation to the loss of the vessel," said a newspaper article. "Everything possible, it was found, had been done to save the ship."

Little by little details were added to the Walker version, until by 1896, as I said, Cameron and Jorgensen were charged with having represented themselves and Moses as the only survivors; Walker now asserted that Cameron stole all the tools that had been saved from the wreck; and Walker recalled that on hearing of the *General Seigel* disaster he had decided to go to Midway and to take possession of the island for Great Britain, quite oblivious of the fact that it had been considered American territory for twenty or thirty years. To put it mildly, time freshened his memory very much. He can supply no more information now, for he died in Victoria, British Columbia, on November 18, 1916, of pneumonia. He was born in Dublin, Ireland, on December 3, 1838.

In my discussion of newspaper articles published after the *Norma's* arrival at Honolulu I omitted what to me is the most extraordinary part. This was contributed by a reporter. He informed Captain Walker that Cameron was said to be keeping a saloon in Tacoma, Washington, whereto Walker made reply that he "well believed it." How could such a rumor have originated? Honolulu had not heard of the wreck of the *Minstrel* prior to the *Norma's* arrival. Fears had been felt for her safety, but nothing definite had been known. In what manner, then, could this story have got abroad? Before attempting to answer such questions, however, let us consider something still more astonishing.

On May 30, 1889, the San Francisco *Call* published an article on the

Wandering Minstrel affair, which was republished in the Honolulu *Advertiser* of June 12. After asserting that the fate of the *Wandering Minstrel* was "still in doubt," despite Walker's report and the British court of inquiry, the *Call* said that Walker's "story, however, does not by any means tally with the statement made by the first mate, Captain Cameron, who shipped on the *Minstrel* at Honolulu and left with her for the French Frigate. He was next heard of in Tacoma, from where he answered an advertisement inserted in the papers by General Manager Murray of the South British Insurance Company, asking for information regarding the whereabouts of this vessel, but did not afford much satisfaction, confining himself to stating that the vessel had been lost down South America way. Something more substantial was obtained by two citizens in Honolulu, friends of Cameron. They received letters, stating that he had set up a hotel at Port Townsend on a bonus of one thousand dollars he had received from Captain Walker. A most determined effort has been made to find this man but he has hitherto succeeded in keeping out of the way.

"The insurance company employed detectives to hunt him up, but they obtained no trace of any such individual. Secretary C. P. Stringer was in Washington Territory and British Columbia recently and he made a most careful search for Cameron, and though he placed the matter in the hands of skilled police officials, he could not find anything. It was suspected that Cameron was engaged in the opium smuggling business, but even in the ranks of the dope handlers he was not to be located. It is thought that he must have obtained news of the search and kept out of the way.

"The most remarkable feature about the whole affair is the presence of the mate in Washington Territory. How could he get away from the island when all the rest were imprisoned there? Why did he not inform the authorities of the destitute condition and unfortunate position of his friends? Why did he not write to say that he had been paid a bonus by Captain Walker?

"Neither Manager Murray nor Secretary Stringer believed the *Wandering Minstrel* was wrecked. . . . The explanation now offered by some of those interested in the vessel is that on arrival at destination, the captain, his family and crew disembarked with provisions, supplies, etc., while Captain Cameron, as per agreement, navigated the *Wandering Minstrel* to some South American port. There he sold her, and, putting the proceeds in his pocket, he sailed for Portland and Washington. Evidently he had no intention of dividing with Captain Walker, who it is understood characterized him in Honolulu as a villain of the deepest dye. Cameron is probably the only man who can throw light on the affair, but he is keeping out of the way."

Then the *Call* described the unsatisfactory state of things that prevailed aboard the *Minstrel* at Honolulu. In this respect the newspaper

generally confirms what Cameron has said. Following the *Minstrel's* departure for French Frigate Shoals and Midway, the newspaper continued, "no more was heard of the vessel until autumn [of 1888], when news reached Honolulu, and was published in the papers there, that she had been sold in South America. Altogether the whole affair is a mystery, and taking this view of it no insurance money has yet been turned over to the owners."

Now again: How did these reports of Cameron being in Tacoma get abroad? It would be absurd to spin a toilsome and ingenious hypothesis; but a suggestion or two may not be out of order. Some vague and warped account of Cameron may have been taken from the Marshalls to San Francisco by a trading vessel, and by a confusion of names, perhaps of Tacoma with Tarawa, Gilbert Islands, he was represented as being in Washington. If we adopt this explanation, however, we must assume that the tale was so incomplete as to omit news of the wreck of the *Wandering Minstrel* as well as the precarious situation of the marooned crew. Or an impostor named Cameron may have been in Tacoma. In any case it seems to me that the question asked by the *Call*, "Why did Cameron not inform the authorities of the destitute condition and unfortunate position of his friends?" well might have become, in the course of years, perverted into a statement of fact.

This article of the *Call's*, republished in the Honolulu *Advertiser* of June 12, 1889, brought an immediate reply from Hanker. He called at the *Advertiser* office and made a statement substantially the same as his sworn testimony at the official British inquiry. After recounting the story of the voyage to Midway and the wreck, Hanker's narrative, with editorial comment by the *Advertiser*, continued in this wise: "The chief mate, Cameron, who is well spoken of, remained with the others on the island for about eight months, and finally left on the 13th of October, 1888, in one of the ship's boats with the full permission of the Captain. . . . Cameron, it is now known, arrived at the Marshall islands safely, after being 42 days at sea. . . . He refused a passage offered him by the Captain of the schooner *Orient* which touched at the Marshalls, bound to San Francisco. Nothing further has been heard of Cameron, since the time of the incident here related; but as that event happened only a very few months ago, the story in the San Francisco *Call* has no foundation, and it was unfortunate that the *Advertiser* gave the yarn additional publicity. This was done, however, before the present version of the details came to our knowledge. There was no money among the castaways, and the thousand dollar Cameron of Port Townsend must be some other Cameron or a myth. Jack Cameron, late chief mate of the *Wandering Minstrel*, was well known in Honolulu and highly respected among his acquaintances. There was nothing mean or dishonest about Jack, and the yarn about him skulking out of the way of policemen does not fit his character in any respect."

I took Captain Walker to task for telling too scanty a tale; now I must reproach Cameron for a similar shortcoming. His narrative is immensely the fuller, more self-consistent, and convincing; it does, however, display some regrettable omissions. The most conspicuous is his failure to advance explicit reasons for refusing to sail with Walker in the schooner built on Midway. He had, I take it, no confidence in Walker; but he should have made himself clear. Nor does he establish the charge that Walker coldly planned to wreck the vessel that bore his wife and children. Until excellent proof is adduced, that must be dismissed as incredible, just as Walker's accusations against Cameron are beyond credence. We can, I believe, see our way through some portion of this labyrinth—though not through all, not through all—if we adopt this explanation: the two men hated each other with an intensity that made it impossible for either to be just. If there is a Fiddler's Green, I cannot conceive of the two master mariners being there together. Love does not seem to be immortal; but some hatreds are.

Postscript to Note 40. I ask the reader's indulgence for here making a belated addition to the preceding note. The typographical work of this book has attained such a stage that important new evidence I have received must be presented here, if at all.

A well-known South Sea trading firm has obtained for me a statement from one of its employees, an elderly white man now stationed in the Line islands, who was acquainted with Cameron. This man writes in part: "When the boat containing Cameron, Jorgensen, and Moses arrived in Mille I was trading on Mejit Island (Marshalls) and therefore only heard from visiting schooners about the affair. The story was then that when Cameron was leaving Midway Island there was some shooting done, probably by Captain Walker to prevent Cameron from leaving; but some said that the shooting was done by Jorgensen to prevent Walker and the others from joining Cameron and party in the boat, water and provisions (dried birds' flesh) being scarce."

This, it seems to me, is evidence of great value; it might, indeed, be described as conclusive. Since such a report was current in the Marshalls immediately after Cameron's arrival, it is obvious that the presence of the Walkers on Midway was known and that the only persons who could have published that information in the Marshalls were Cameron, Jorgensen, and Moses. I submit that the Walkers owe Cameron's memory an unequivocal retraction.

This is the first suggestion I have heard that there was any shooting when Cameron sailed from Midway. If something of the sort did occur, it is quite improbable that either Cameron or Jorgensen was responsible, inasmuch as neither possessed firearms: Jorgensen's rifle had been wrested from him by Olsen; Cameron had vainly asked Walker for a

revolver with which to wing one of the insubordinate crew. Nor does it seem at all likely that Walker tried to prevent Cameron's departure; we have Hanker's testimony that the boat sailed "with the full permission of the captain." Perhaps Walker had to intervene to prevent the Oriental sailors from piling into the boat; if so, it is singular that Cameron does not mention such an incident.

41. In 1852, only thirty-two years after the conversion of Hawaii to Christianity began, Caucasian and Hawaiian missionaries were sent to the Carolines, and the work was gradually extended to the Gilberts, Marshalls, and Marquesas, first by the American Board and its Hawaiian auxiliary and afterward by the Hawaiian Board, successor to the American Board in Hawaii. The stations were served by the brig *Morning Star*, which made her first voyage in 1857. Most of the missionaries were Hawaiians.

Due to changes in the poljtical status of the Micronesian archipelagoes, the missionaries of the American and Hawaiian boards slowly withdrew. The last minister on duty in the Gilberts, a Hawaiian, returned to his home islands in 1904; and at the present time, I am informed, the American Board has only one worker in Micronesia. But the London Missionary Society, under agreement with the American Board, assumed evangelical direction in the Gilberts and most of the remainder of Micronesia, as well as elsewhere. In general the relations of British and American missionaries of Protestant churches in the Pacific have been close and cordial.

It is true that most of the white missionaries to Micronesia did pass by the atolls for the high islands. One conspicuously did not. He was the Rev. Hiram Bingham, who went to the Gilberts with his wife in 1858. He accomplished the notable work of reducing the Gilbertese language to writing, compiling a dictionary, preparing schoolbooks, and translating the Bible into Gilbertese. Even a trader should pay tribute to such a man. But if all white missionaries had shunned the atolls, I myself could not join in Captain Cameron's censure. Doing the Lord's work, it seems to me, should not necessarily entail toiling in an earthly hell, and an equatorial atoll is hardly anything else to a Northerner: it is cramped, heat-smitten, light-blasted; it offers little fresh food, and that little is not of a sort to which the white stomach is accustomed.

42. The Rev. Edward Morris Pease, M.D. (he was a doctor of medicine as well as a clergyman), and Mrs. Pease went to Ebon, Marshall Islands, in 1877. From Ebon they removed in 1879 to Kusaie, where Dr. Pease assisted in the training school of the American Board of Commissioners for Foreign Missions. In December, 1884, Dr. and Mrs. Pease and their two sons arrived at Honolulu; and returned to

Kusaie in 1885 with more helpers. "They remained through many discouragements, sickness, the opposition of the Spaniards, etc., hoping for relief, which did not come till March of 1894," says a memorandum prepared for me from missionary records. It is likely enough that this "opposition of the Spaniards" was due in no small measure to Captain Cameron and King Charley. In 1895, leaving his family in Pomona, California, Dr. Pease sailed for the Marshalls to assist a missionary named Dr. Rife. In 1897 Dr. Pease was back in California, engaged in translating the Psalms into the Marshall language. He died at Claremont, California, in November, 1906, at the age of eighty-seven.

43. Early in the occupation of the Carolines by the Spaniards they had trouble with the natives. Forty Spaniards were massacred in 1887. According to accounts received in Honolulu, a Spanish man-of-war had gone to Ponape with eighty persons who were to be landed on the island. Among them were a governor, several priests, and some women. After the departure of the naval vessel they took up their quarters in the stranded hulk of an old trader, which served as a storeship, and the governor sent a deputy ashore to confer with thirty or forty chiefs. Twice the natives refused to meet the emissary, whereupon the governor, convinced that they were plotting against the Spaniards, dispatched a sergeant and twenty-four soldiers to a council of chiefs. Once again the brown men refused to speak with the whites. Acting on the advice of an interpreter, who urged that the shooting of a few persons would establish a precedent and make Spanish authority secure, the sergeant ordered a volley fired into the throng. One chief was killed and many were wounded. An army of natives seemed to spring from the earth; fifteen Spaniards were slaughtered and others captured, to be butchered later, and still other Spaniards, who had built a small fort ashore, were slain. Because of the presence of women aboard the storeship, the natives did not attack it. Although American, British, and other traders on Ponape had been on friendly terms with the natives, they fled to other islands in fear of meeting the same fate as the Spaniards.

44. Captain Cameron's manuscript contains nothing further regarding Cole's power over Christian. One of the letters mentioned in the introduction says that Cole never would divulge his secret.

45. Stevenson heard Captain Walker's narrative at first hand. In a letter to Sidney Colvin, written in Honolulu in June, 1889, the novelist said: "I am going down now to get the story of a shipwrecked family, who were fifteen months on an island with a murderer." Why a man of Stevenson's romantic temperament should have waited two months to interview the Walkers is beyond me, but he did delay that much, for he was in Honolulu when they landed from the *Norma*, and finally

did see them only a short time before he departed from Hawaii. He also must have heard details of the wreck of the *General Seigel* and how and why Jorgensen was abandoned on Midway; and now we find him gaining Cameron's version of the *Minstrel* epic. The Stevensons made their voyage on the *Janet Nicoll* from April to August, 1890; on July 13 the steamer was off Peru, Gilbert group, as a letter to E. L. Burlingame witnesses, so that the meeting with Cameron occurred about this time. Now "The Wrecker" had been planned a good year before, but it went forward slowly, it was only a little more than half completed when Stevenson listened to Cameron's account of the *Minstrel* affair, and not until the autumn of 1891 was it finished; hence abundant opportunity offered to incorporate in it any additional details or ideas gathered from Cameron.

In June, 1889, while R. L. S. was bound from Honolulu to the Gilberts in the schooner *Equator*, he and Lloyd Osbourne, his collaborator on "The Wrecker," formulated a plot that matured into the romance. The two men, according to Mrs. Stevenson's preface to "The Wrecker" volume of the "Biographical Edition" of her husband's works, "had been continually recurring, in their talk, to the mystery of the *Wandering Minstrel;* it now struck them that they might collaborate on a novel, founded on the episode of the wreck." In their own epilogue to the book Stevenson and Osbourne say that one night, when they were near Johnston Island, they "were amused with several stories of the sale of wrecks. The subject tempted them; and they sat apart in the alleyway to discuss its possibilities. 'What a tangle it would make,' suggested one, 'if the wrong crew were aboard. But how to get the wrong crew there?'—'I have it!' cried the other; 'the so-and-so affair!' For not so many months before, and not so many hundred miles from where we were then sailing, a proposition almost tantamount to that of Captain Trent had been made by a British skipper to some British castaways." This "proposition" was that a castaway crew should surrender practically all the considerable money they possessed in payment for passage from their island prison—from no other island, in fact, than Midway. In "The Wrecker" this leads to a carnival of murder, and the slayers masquerade as the crew of the dead men's ship.

What is all this? Surely the authors do not mean that Captain Johnson of the *Norma* made such a shameless proposal to Captain Walker, hardly less than "your money or your life." But no wreck except the *Minstrel's* answers the conditions of time and place as outlined in the epilogue: "not so many months" before June, 1889, "and not so many hundred miles" from Johnston Island. No other wreck, indeed, was in the authors' minds. Mrs. Stevenson, lacking her husband's canny Scotch reserve, gives unequivocal testimony in her preface. The circumstances of the *Minstrel* episode, she says, "were unusual and mysterious"; Captain Walker's story "was far from convincing," it contained "many discrepancies and evasions"; and it was plain to her that

"fishing for sharks was not the sole object of the *Wandering Minstrel.*" When the *Norma* found the Midway colony, she continues, Captain Johnson "first ascertained exactly what amount of money had been saved from the wreck; it was just this sum, several thousand dollars—comprising all the sailors' wages as well as the entire means of the captain—that the stranger demanded as his price for carrying the miserable creatures" of the *Minstrel* to Honolulu, "where they were dumped, penniless, on the wharf."

This is exceedingly strange. Such ruthless extortion is not impossible, the Stevensons are decidedly credible witnesses; and Captain Walker, ruler of a pitiable band, had little choice except submission; but it is astonishing that he should not have denounced Captain Johnson in Honolulu. What a storm would have roared about Johnson's head had Walker told his story! The two master mariners, however, gave similar brief and guarded accounts: Walker that the *Norma* had transported his company to Honolulu "under agreement"; Johnson that his vessel was "chartered." On the surface, it is true, such a contract could pass muster: if Johnson had to abandon his fishing in order to relieve the distress of the *Minstrel's* crew, I see no reason why Walker, if he was able to do so, should not have made reasonable recompense. But what are we to think of piracy such as Mrs. Stevenson discloses? What are we to think of her devastatingly frank opinion of Walker and the *Minstrel's* business?—an opinion which we have every reason to believe her husband shared, if indeed she is not merely reflecting his conclusions. How are we to explain such a bewildering array of fact and suspicion? Stevenson himself, Mrs. Stevenson states in "The Wrecker" preface, "tried in vain to solve the mystery of the *Wandering Minstrel.*" If he failed, when the affair was fresh and the principals were living, how can any one hope to succeed to-day? But I wish I knew what that uncanny Scot thought after he heard Cameron's blistering diatribe against Walker.

Well, I have no positive solution, as such, to offer; yet I do believe that we might profitably consider certain aspects of the *Minstrel's* voyage with a view to forming a tentative, a very tentative, theory. The vessel is bound from Hongkong, a British port in China, that country where only the improbable is true; she arrives at Honolulu in unusual circumstances, and lies at anchor outside the harbor instead of entering,—natural enough that, as a stratagem to prevent the desertion of a disaffected crew, but something not to be ignored; she is, at best, a singular shark-fisher. Cameron's surprise at the lavishness he discovers aboard her leaps at us from his pages; and Mrs. Stevenson stresses that the sailors' wages are "to be far beyond the usual rate of payment." Then we find Captain Walker possessed of money described by Mrs. Stevenson as amounting to "several thousand dollars"; he hands it over in submission to a gross and inhuman demand,—and keeps his counsel after he is safe in Honolulu. For I cannot find that he ever publicly

exposed Johnson. Why should Walker have had such a large sum on a shark-fishing vessel, lavishly supplied and equipped, which was to return after a few months to the port whence she sailed, her home port, the headquarters of her owners? How did Johnson learn that Walker had so much money? Did Johnson, perchance, hold some menace over Walker?—something more than a threat to leave the shipwrecked colony on their island? That last alone, in all conscience, was grave enough; but to me this appears indubitable: Johnson would not have dared to act as he did, as Mrs. Stevenson says he did, if he had not possessed means of sealing Walker's lips. How the Stevensons got wind of the story I do not know; perhaps Walker, in a burst of confidence, or weakening under grilling, told them. In this connection the reader should bear in mind that Stevenson, the man, does no more than hint, though pointedly, at the *Minstrel;* it is Mrs. Stevenson, the woman, who writes freely and gives the world, so far as I can ascertain, the first intimation that something strange occurred on Midway.

To me the whole *Minstrel* transaction reeks with opium smuggling. I prefer, however, merely to advance that as a working hypothesis, for although it does have the great merit of explaining much in a simple manner, there may be numerous significant facts of which we know nothing. Here I would submit that the San Francisco *Call* article, which I discussed in another note, said that the *Minstrel* had been "closely watched" in Honolulu, "being suspected of opium smuggling." This suspicion may have been altogether unjust, as my own hypothesis may be, and I have never seen that distrust expressed in print elsewhere, but it was one likely to arise, for there was much smuggling of opium into Hawaii in those days, more than one fortune that now commands respect was being based on five-tael tins of the black stuff, and all shipping, that from the Orient especially, was regarded warily. All that, indeed, holds true to this hour. Again, opium plays no little part in "The Wrecker" plot:—Stevenson may have heard rumors or formed conjectures concerning the *Minstrel* that led him to give the drug such weight. Moreover, the *Norma* herself at one time or another was a notorious opium runner.

Let us, then, for the sake of argument, assume that Walker landed much opium in Honolulu from his anchorage outside the reef and that Johnson knew of it. We observe how, in the light of this supposition, things are clarified: we can understand Walker's possession of considerable money; his surrender to Johnson's brigandage lest worse befall, lest he go to jail and perhaps lose the money to boot; his failure to stigmatize Johnson; the evasions that Mrs. Stevenson noted, the reticence that I found; the "heckling" to which Walker was subjected at the British consular inquiry in Honolulu; the British commissioner's instructions to Cameron, that he should make a detailed report on the *Minstrel* to the British authorities in Hongkong; Walker's indifference to the success of his shark-fishing, a secondary mission if he had, as I am

supposing, sold opium; and still more, yes, and still more, which I leave for the reader to discover. That this hypothesis should, as by magic, dispose so many disjointed odds and ends of fact and suspicion into a coherent whole is most impressive.

It seems not improbable, in view of the *Norma's* own unsavory reputation for opium dealings, that diamond cut diamond there on Midway: that sort of thing is a commonplace in these piping times of bootlegging: when I review accounts of the smuggling of opium into Hawaii I am struck by the truth that history is merely repeating itself to-day in the illicit liquor trade. I wonder, indeed, whether the *Norma* may not have been keeping an eye open for the *Minstrel* amid the Northwestern islands of Hawaii, for the *Minstrel* that had been missing so long, for the *Minstrel* that may have had the proceeds of opium sales aboard. I merely wonder: I make no statement. I speculate further: what a prodigious possibility I glimpse!—how it would cleave through all this maze! But I dare not utter it: the reader might throw this book into the fire, and I probably would be called to face an inquiry into my sanity. Yet if I only dared, if I only dared! However, I may say this: if I could summon the ghosts of all the actors in the *Minstrel* drama, my first question would not be put to Walker, or to Johnson, or to Cameron, or to Hanker.

If the *Minstrel* did smuggle opium into Hawaii, I must believe that Walker succeeded in concealing the fact from both his old and new officers. The two mates discharged at Honolulu were not at all friendly to Walker, but it does not appear that they ever charged him with smuggling. Nor did Cameron. I doubt, indeed, whether he knew Walker had any considerable sum of money: if Cameron had been aware of that, he probably would have mentioned it as a matter of interest, and well might have insisted on payment of his wages, whereas he was penniless when he landed in the Marshalls. And here the reader would do well to recall that an article in the Honolulu *Advertiser,* from which I quoted in a preceding note, asserted, apparently on Hanker's authority, that "there was no money among the castaways." Cameron ignorant of the money; Hanker ignorant of the money; yet Captain Johnson of the *Norma,* with a scent like a bloodhound's, noses it out!

A minor conflict remains to be noted: Stevenson speaks of a "proposition" made by a "British skipper" to the castaways, while Cameron refers to the master of the *Norma* as "Swedish" Johnson.

46. Charles Walker, of Honolulu, one of Captain Walker's sons, is credited with this story of Jorgensen's departure from Micronesia: "Jorgensen got into more difficulties in the Marshalls. He was accused of murdering a native woman. A British gunboat called and the natives asked to have Jorgensen tried. The man was tried and guns were given to the natives to carry out the death penalty. The gunboat left and then the *Montserrat* [*Montserrat*] came in. She was a blackbirder [labor-

recruiter]. Her captain was a rough one. He heard about Jorgensen and threatened the natives, resulting in Jorgensen leaving with him, finally ending up in Guatemala. As far as I have ascertained he was killed there in a brawl."

Mr. Walker said that he learned all this on a cruise he made to the Marshalls in "later years," when he also, so he said, heard "that Cameron, Jorgensen and the Chinese cook had said they were the [only] survivors of the *Thistle,* not the *Wandering Minstrel.*" Nevertheless this yarn about Jorgensen, in the form given, is most absurd. In the first place the British would not have intruded upon the German administration in the Marshalls, and would not have been permitted to do so had they manifested an inclination. If Mr. Walker meant the Gilberts, although he said Marshalls, then I submit further that no British man-of-war would have left the execution of a white man to natives, and if it had, would not have permitted the natives to keep the weapons. Captain Davies, that consummate British officer and administrator to whom Cameron pays high tribute below, must have turned in his grave when Walker perpetrated such rot.

The Walkers cherished no love for either Cameron or Jorgensen. In an interview given on his return to Honolulu, supplementing his written statement, Captain Walker said that Cameron and Jorgensen made a great deal of trouble; several times, Walker continued, he was about to shoot the Dane, but always was restrained by Mrs. Walker. When Cameron heard of this assertion he denounced it as false and indicated that Walker lacked sufficient courage to do such a thing; Cameron added that "Jorgensen was an abstemious man and not addicted to quarreling." I must confess that Captain Cameron's attitude appeared to be that he himself could criticize Jorgensen whenever he saw fit, but any one else did so at his peril. Persons who have never loved or hated intensely, whose emotions are colorless and whose blood is lukewarm, are welcome to make the most of that.

Much ado has come from the Walkers concerning Cameron's friendship for Jorgensen. To this it is sufficient to retort that Captain Walker himself appointed Jorgensen second mate of the *Wandering Minstrel* after the disrating of Hanker, despite the fact that Walker, as he and his family have stressed, was aware that Olsen had accused Jorgensen of murder. An old adage warns occupants of glass houses against throwing stones. In addition, I think, there may be circumstances in which a hearty man would welcome the companionship even of a slayer.

47. The De Greves brothers were in Honolulu in or about June, 1889. In that month Robert Louis Stevenson sailed for the Gilberts in the schooner *Equator,* and the pair vainly importuned him to grant them passage to the South. How long they remained in Hawaii before continuing their travels I do not know, nor have I been able to ascertain anything concerning Smith-Orloff in addition to what Cameron says.

48. H. J. Moors is known to readers of Stevenson as a trader of Apia and a close friend and adviser of the author. I am informed that Moors went to Apia in 1874, or about seven years before Captain Cameron was in Tahiti, where he says he first met Moors; but Moors did retain trading interests elsewhere than in Samoa, and well might have been in Tahiti in 1881. Mr. Moors died at Apia early in 1926. He had quite a career; as a friend of his put it, he "lived more stories than Stevenson could invent."

49. Charts and pilot books still warn the mariner against danger from the Grand Cocal, although different vessels, notably two British naval craft, have failed to find it, and the natives of two of the near-by Ellice Islands deny its existence. Hydrographers feel a natural and commendable reluctance to remove from a chart any possible menace to navigation until its existence has been conclusively disproved. Nevertheless Captain Cameron's suggestion is sensible, that conditions in the vicinity of the reported shoal may be extraordinarily conducive to the formation of mirages.

50. On January 28, 1887, the ship *Rock Terrace,* while bound from Point Breeze, Pennsylvania, to Hyogo, Japan, grounded on a coral reef in the Pacific. She got clear, although making much water. Severe pumping exhausted the men, and the vessel was headed for Guam, where the captain intended to beach her. She fetched Guam on March 1, but could not make harbor, and the crew abandoned her without furling all sail. Apparently she grounded a second time, but blew off the reef, and after some five months went ashore on Tarawa, Gilbert group. She struck only a few yards from the channel into the lagoon, where she would have been safe.

51. This king is the celebrated Tembinok' of Stevenson's "South Seas." Cameron's manuscript makes the name Tim Benoka. It certainly is composed of two words instead of one, and I do not believe that Stevenson's apostrophe suggests the final sound as well as the letter "a" does; but I have preferred Tem Binoka because it is accepted in the Gilberts to-day as correct.

52. Many Micronesian chiefs are truly enormous, tall enough, in all conscience, but heavy out of proportion to their height. Heredity has had much to do with their weight and stature, no doubt; a Catholic priest who had made quite a study of the phenomenon suggested to me, however, that systematic stuffing during infancy and childhood was no inconsiderable factor.

53. Stevenson says that Paul was a nephew and adopted son of Tem Binoka.

54. A British protectorate over the Gilbert and Ellice Islands was proclaimed on May 27, 1892. The two groups were annexed by Britain on November 10, 1915. Thanks to Captain Davies and the commissioners who have succeeded him, the Gilbertese are intensely loyal to the empire.

55. Japanese bird poachers once did their sincere best to exterminate sea fowl on the Northwestern islands of Hawaii, but they have offended little since 1912 or 1913. For several years now the uninhabited islands have been a bird reservation. The poachers were atrociously cruel: frequently they drove fowl into pits and left them there to starve as the easiest means of disposing of them. Many a European woman (the plumage was sent to Europe) may guess how the wing she wore on her hat was obtained. This method of disposing of the creatures could be employed successfully because some sea birds need quite a take-off, like airplanes, before they can rise, and so the captives were unable to fly from the excavations.

There is no reason whatever to doubt that Japanese did steal the provisions and wreck the house on Ocean Island:—such vandalism would appeal to their Oriental minds as high humor; but the destruction was not at all recent when the *Ebon* was at Ocean, as Captain Cameron seems to think. Prior to her call at Midway, which resulted in her rescuing the *Minstrel* castaways, the schooner *Norma* stopped at Ocean and there discovered that the building "had been blown down and mostly buried in the sand." Captain Johnson of the *Norma* "dug up the remains of the house and staked it up to catch rain water in the tanks." This was, of course, in 1889, only five months after Cameron began his voyage with Jorgensen and Moses. It is not unlikely that the structure had been leveled and that the provisions had been taken or had spoiled before that time, and that Cameron would have got nothing of value if he had succeeded in reaching Ocean Island. Captain Walker, indeed, is authority for the statement that "the provisions were stolen in less than twelve months" after they were placed on the atoll by the Hawaiian Government in 1886. I do not know how he fixed the date so precisely.

56. Captain Cameron seemingly did not make a very thorough search. One anchor of the *Minstrel* was found at Midway and taken to Honolulu by the U. S. S. *Iroquois* in August, 1900. In 1891 Captain Walker, on a second visit to the island, saw anchors, chains, and iron tanks in the water.

57. Rodents can multiply appallingly on the Northwestern islands of Hawaii, where they have few natural enemies, except themselves, to reduce their numbers. In the spring of 1923 a party from the U. S. S. *Tanager* ran across many bones of rabbits on Lisiansky, but no living animal was to be seen, and not enough vegetation remained to support one. Like a wave the little fellows must have overtaken and passed

their food supply. One can imagine all perishing of starvation well-nigh simultaneously. Perhaps the mice of Lisiansky met a similar fate, for no one else, so far as I know, has referred to the hordes that Captain Cameron saw. On the other hand there were many mice on Ocean Island in 1923.

58. The canary-like bird is Telespiza cantans, popularly known as the Laysan finch or the Laysan canary. The "cantans" of the scientific name recognizes its singing powers. It is now extinct on Laysan, because of the destruction of vegetation by rabbits, but it has been introduced to Midway, and there thrives. The second bird is Prozanula palmeri, or Laysan rail. It still persists on Laysan (or did in 1923), though in small numbers, and was also introduced to Midway. An early introduction of the rail to Midway, perhaps the first, was made by the schooner *Kaalohai*, which cruised to the Northwestern islands under command of Captain Walker in 1891. "Our mate," said he, "brought some wingless birds from Laysan and let them go on Green [Eastern] Island. Some five years afterward the island swarmed with them."

59. This man's name was Kasten, or something resembling that. He died late in 1893 or early in 1894.

60. Three whalers, *J. A. Howland*, *Abram Barker*, and *Reindeer*, sailed from San Francisco on November 1, 1889, for a cruise in the South Seas and thence to the Arctic. After calling at Honolulu they proceeded south. Between three and four o'clock in the morning of December 26 the *Howland* struck a shelf of reef off Johnston Island; and the crew, having failed to get her free, took to the boats with their effects. In attempting to reach shore through great waves a boat capsized, and three men were missed, but two of them, it was discovered, regained the wreck, and only one was drowned. For two days the crew remained on the island; then decided to leave in their boats for the Marshalls, since Johnston had neither vegetation nor fresh water. (They did find the well and pump reported by Captain Cameron, but they said that the water was too brackish to drink.) When they were on the point of embarking, however, the *Abram Barker* hove in sight, took them off, and sailed with them for Hawaii. The *Barker* herself was crushed by ice in the Bering Sea in May, 1895.

61. What Captain Cameron says of the coconut crab is true, but the reader probably will not believe it, for the crab is almost invariably the object of loud and scornful incredulity. Even the catholic Darwin would not concede that it climbed coconut palms to clip off the nuts. In "The Voyage of the *Beagle*" the great naturalist tells of the crustacean stripping away the husk of a nut and opening the shell, but as for scaling a tree,—no. "I very much doubt the possibility of this," says he. Never-

theless the fact is established and is now, I believe, admitted even by un-Darwinlike, self-styled "scientists" who pass judgment on what they have never seen. Astonishing power resides in the two great anterior claws, one or the other of which is always noticeably larger. Cameron's sailor was fortunate, indeed, that his thumb was not amputated. The taste of the crab's meat is suggestive of coconut. Some of the animals attain a weight of twenty pounds or so.

62. She was the *Lady Lampson*. The wreck occurred on January 16, 1893, while she was bound from Sydney to Honolulu with coal. One boat, in which were the captain, his wife, and five other persons, arrived at Honolulu on February 13; a second boat was picked up at sea.

63. By the most direct routes the length of this voyage was at least 8,933 miles. The *Ebon*, a sailing vessel, would cover many hundred miles more. The following table shows the length of each leg, beginning at Kusaie, where the cruise may be said to have started:

From — *To*	*Nautical Miles*
Kusaie—Caspar Rico	660
Caspar Rico—Bikar	158
Bikar—Ocean	1100
Ocean—Midway	55
Midway—Lisiansky	270
Lisiansky—Laysan	125
Laysan—Johnston	560
Johnston—Fanning	1000
Fanning—Washington	90
Washington—Palmyra	125
Palmyra—Kingman's	45
Kingman's—Neckar	1000
Neckar—French Frigate Shoals	75
French Frigate Shoals—Gardner	120
Gardner—Maro	145
Maro—Laysan	65
Laysan—Lisiansky	110
Lisiansky—Laysan	110
Laysan—Lisiansky	110
Lisiansky—Pearl and Hermes	170
Pearl and Hermes—Midway	100
Midway—Bonins	2150
Bonins—Kobe	590
Total	8933

Captain Cameron does not give the date of the *Ebon's* arrival at Kobe, and I have been unable to determine it. All evidence, however,

indicates that it was in 1895. If this is correct, Cameron spent two years in Japan before he made his last voyage on the *Condor*, with which he closes his narrative.

64. At this time the Russo-Japanese War was in the making. Some two years before, in 1895, Russia, Germany, and France had prevented China from ceding Port Arthur to Japan; and a year or so afterward, in 1898, Russia herself leased Port Arthur and the Liaotung peninsula from China for a term of twenty-five years. Hostilities were thus made inevitable.

Hawaiian Reef Animals 137p.
Revised Edition
EDMUND HOBSON
EIHI CHAVE
UH PRESS HONOLULU
1990

(29) = Kalakaua, D. 1888. The legends and myths of Hawaii NY CL webster Co. 530p.

(7) = Cobb 1902 Comm. Fish. Hawaiian Is. 1900-1901 p.383-499

'o'opu hue (stomach like a gourd), or kēkē (pot-bellied). The name refers to their most outstanding characteristic: an ability to inflate themselves like a balloon by swallowing water or air. Another characteristic of these fishes presents a paradox: although the puffers are among the most poisonous of all marine animals, many of them are highly prized as food. Certain internal organs and the skin contain a potent nerve poison. Although the flesh is edible, a human who eats a piece that has been contaminated during preparation by poison from an adjacent organ has better than a 60 percent chance of a painful death (15).

Sea Turtle

There is only one species of sea turtle common on Hawaiian reefs, but this one, the green turtle, *Chelonia mydus* (Plate 65), is abundant throughout the archipelago (1). Called *honu* by early Islanders, green turtles were a highly esteemed food in the old days, but their numbers were effectively conserved because they were reserved for royalty (29). *Honu* were caught several ways. One common method was to harpoon them from a rocky shore; another was to snare them using a pair of hooks fastened to a flat stone (7). Probably threats from humans have kept *honu* off the beaches of the major islands since early times. These animals come ashore to bask on islands in the northwestern part of the archipelago that were unknown to early Hawaiians, but they do not do this on the long-inhabited major Hawaiian Islands (1). Apparently basking ashore, a rare behavior among marine turtles, is inhibited by contact with humans.

Green turtles establish what may be lifelong residences in coastal areas where there are beds of the marine vegetation that is their food and places that serve as shelter when they are at rest (1). These residences occur throughout the archipelago, from the island of Hawai'i to tiny Kure atoll, but when time comes to breed virtually all *honu* migrate to certain islands at French Frigate Shoals, in the center of the archipelago. This is a trip that adult males may make each year, but one that females make less often (1).

Clearly, conditions for nesting are favorable on the low sandy islands at French Frigate Shoals. Not only are these small islands composed of materials suitable for digging, but they are also remote from humans and other predators that would threaten the eggs. Similar conditions exist at other islands in the northwestern part of the archipelago, and in fact some nesting occurs at several of them. There has also been breeding at some beaches on the major islands in years past, for example at Polihua Beach on Lāna'i. But at the present time over 90 percent of all breeding by Hawaiian green turtles occurs at French Frigate Shoals (1).

Apparently each breeding turtle returns to the site of its

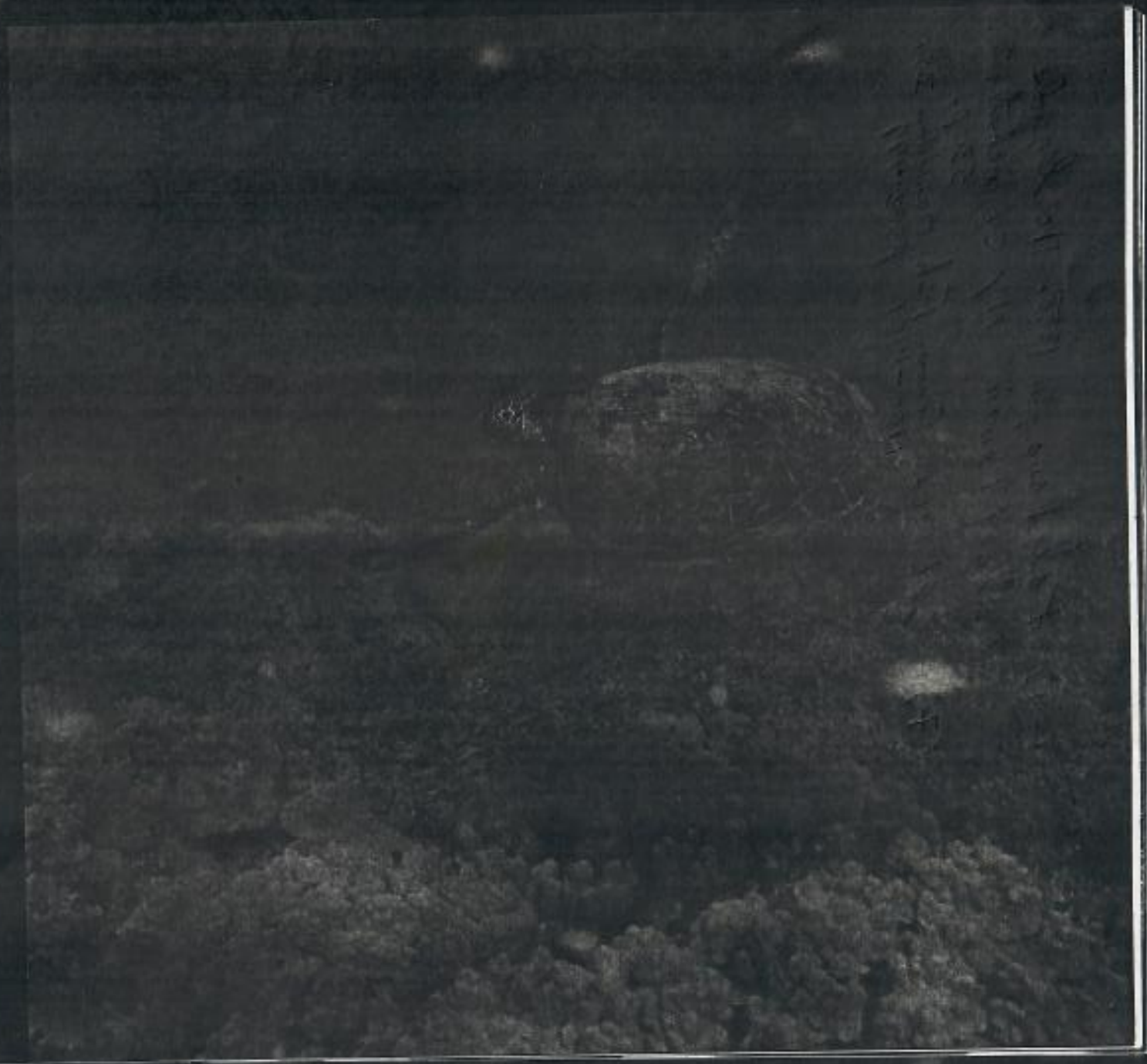


Plate 65. Green turtle, *Chelonia mydus (honu).*

birth. They arrive in the shallow waters off the nesting islands during April and for the next two months are busy with courtship and then mating. The females start nesting during mid-May, with most doing so in June or July and very few after that. They come out of the water and begin digging the pits that will be their nests late in the afternoon, but do not lay eggs until after dark. The number of eggs laid and then buried by each turtle averages about 100. These hatch about two months later, leaving the hatchlings to struggle up through about 2 feet of sand to reach the surface. They emerge from the sand at night, usually shortly after sunset, and then head for the water. They are only about 2 inches long (shell length) at this time, and a number of them fall prey to ghost crabs, *Ocypode ceratophthalmus*, near the water's edge. Only relatively few are taken, however, compared to the numbers of green-turtle hatchlings taken by sea birds elsewhere in the world where the trip to the water is made in daylight (1).

After the hatchlings enter the sea they are not seen again until they appear at locations near shore throughout the archipelago, and by this time their shells have grown to about 14 inches long (1). Nothing is known of their early lives in the open ocean, but once back in coastal waters they settle in the areas where, except for breeding migrations as adults, they will spend the rest of their lives (1).

Monk Seal

Hawaiian monk seals, *Monachus schauinslandi* (Plate 66), have long been among the rarest and least known of marine mammals. They inhabit the low sandy islands and atolls that are the northwestern part of the archipelago and fare poorly when in contact with humans. Probably because they evolved where all threats were in the sea, monk seals seem oblivious to danger when ashore and show little concern when humans approach. This trusting nature was exploited by sealers during the 1800s, and the species was headed toward extinction before conservationists intervened early during the present century. Salvation of the monk seal and other fragile forms clinging to existence on the northwestern Hawaiian Islands came when federal and state law designated all of that area a refuge for wildlife. The monk seal has since inceased in numbers, with breeding populations from Nihoa to Kure atoll (18), and under continued protection as an endangered species its future appears secure, at least for the moment.

Monk seals grow to a large size—more than 8 feet in length and over 600 pounds in weight (32)—which probably is why they have few natural enemies. Sharks are a threat, particularly the tiger shark, *Galeocerdo cuvier*

(26), but a greater danger may be entanglement in fragments of fishing nets and other drifting debris—a common and sometimes fatal experience (17, 18). Sometimes female monk seals are mobbed in nearshore waters by numbers of males attempting to mate, and some of them die from injuries received (26).

Monk seals on shore spend most of the time basking on the sand, and only infrequently do they reveal how awkward they are out of water. Their clumsy undulations in moving about on land, however, contrast sharply with their fluid movements in the sea. Nevertheless, although they have clearly evolved as aquatic animals, the need to give birth and nurse young on land (32) ties them to their island homes. They also remain ashore for most of the nine or so days that it takes them to shed hair during their annual molt (27).

Monk seals feed mainly on fishes and cephalopods (32) and must strongly affect the populations of these prey close to their home beaches. This seemed the case during a study of reef fishes at Laysan Island, where reef caves near shore lacked the concentrations of soldierfishes, *Myripristis* spp., and other nocturnal species that generally are numerous in places remote from humans. One wonders whether tropical reef fishes are particularly vulnerable to monk seals. They experienced little or no contact with seals during their evolution and so may lack an effective defense against these predators. Tropical seals are rare. There are only three species of pinnepeds adapted to tropical conditions, all of them monk seals (i.e., of the genus *Monachus*), and they have extremely limited distributions. In addition to the Hawaiian species, there is one in the Mediterranean and another (which may now be extinct) in the Caribbean. Otherwise, seals have always been animals of temperate latitudes (46).

If the food needs of large monk-seal colonies exceed the numbers of prey immediately available, which seems probable, this would explain why these seals regularly spend weeks and even months away from their home beaches. It remains unknown how far they range during these extended forays, but when they return their bodies often are covered with barnacles and algae (49). It seems that they have access to extensive feeding grounds. Hawaiian monk seals live on the eroded remains of what once were much larger islands, and the submerged crests and slopes of these ancient structures are richly populated by potential prey (24, 55). Reefs abound over these broad areas, and monk seals, which can dive deeper than 500 feet (47), are capable of getting to most of them.

A KAHO'OLAWE TRIP by Glenn Ikemoto

FILE- KAHOOLAWE April 1983

The "Fearless Threesome" on the beach of Kaho'olawe — (l-r) Stan, Glenn and Mike — pose for the camera prior to the hunt!

Glenn with a bag of some nice-sized Kaho'olawe opihi.

■ The adventure begins! It is 3:30 in the morning, and the dock is ALIVE with activity and excitement! For months we had been anticipating this trip, and, almost unbelievably, the moment is finally at hand. We are on our way.

This long-awaited trip to Kaho'olawe actually began back in 1981 when a friend of mine, Dorothy Tao, casually asked if I'd be interested in going to Kaho'olawe. (Does Wayne Jacintho like to tell stories?) She also asked if I knew anyone else who might be interested in going. Considering the number of times they had fished around Kaho'olawe by boat, Stan Wright and Mike Sakamoto seemed to be the answers to that question. Sure enough, when contacted they were just as enthusiastic as I was.

The reality of the trip began to materialize early in 1982 with orientation and informational meetings. Access to Kaho'olawe was being provided through the Protect Kaho'olawe Ohana's access agreement with the United States Navy. The purposes of this trip were several. Some Ohana members were to survey and document historical sites, others were to continue work on ongoing projects, and still others were to be tour guides for us newcomers. Although there were planned activities, we could do what we wished, such as going fishing. However, because of live ordnances, we were to stay within strict boundaries specified by navy personnel who would be on the island with us. There would also be three doctors to provide medical aid for all but the most serious emergencies.

The trip itself would cover a period of three days and two nights. We were to depart Ma'alaea Harbor, Maui, on the cruise catamaran, *ONOMANA*, on Friday and return on Sunday. Because of space limitations, we could take only minimal clothing and belongings. They also had to be packed in waterproof containers since they were to be carried to shore by a small Zodiac and a human chain. A double wrapping of heavy-duty trash bags or two 5-gallon plastic buckets were the most popular containers. Also, each person was required to supply 5 gallons of drinking water to be taken to the island.

The aspect of the trip that worried me the most was the fact that because of a total lack of any docking facilities, we would have to swim the last 150 yards from the ship to Kaho'olawe. Not being the world's greatest swimmer, I could feel hydrophobia setting in. I was reassured, however, that a safety line would be strung from ship to shore. We could merely grab the line and pull ourselves in. It had been done many times, they told me, even by little old ladies.

And so it came to pass on a Thursday evening, a few months later, that I found myself on a flight to Maui with Stan Wright. Mike Sakamoto had flown in earlier from the Big Island and would meet us at Ma'alaea Harbor.

At Kahului Airport we were met by Ohana members and another good friend of mine, Andrew Nagata. Andy volunteered to take Stan and me to the harbor although it was many miles out of his way. On the way, we stopped at a supermarket and picked up drinks and snacks for the night. Stan also picked up 2 POUNDS of M&M's chocolate candy. I thought that was a little unusual until Mike told me Stan had taken along 4 POUNDS of M&M's on a Big Island fishing trip. I'm still wondering how he stays so slim.

At Ma'alaea, the other people who were going on this trip were gathered at the old Seaflite terminal. After checking in with the group leaders, we picked out a likely spot to settle down for the night, then unpacked and rechecked our equipment.

Sleep was impossible. The impending adventure was too exciting to allow any relaxation. Laughter and good-natured chatter lasted the whole night. Snacks and thirst-quenching juices were shared with newly-made friends. The camaraderie was very satisfying.

At 3:30 in the morning, the rhythmic throb of the *ONOMANA*'s engines stirred everyone to instant activity. After loading all our belongings, water and other supplies, and sharing a moving dockside "pule" (prayer), we were on our way.

By 5 a.m. we had reached the north shore of Kaho'olawe. Our destination was Hakioawa Bay. A group that had landed on the island earlier lit a fire on the beach as a signal beacon. Our ship lay to about 150 yards offshore, and passengers with their belongings began disembarking. The landing had to be made in the very early hours of dawn while the winds were still calm. The swim to shore really wasn't too bad. I borrowed a foam life preserver and simply floated to shore.

Our camp was under the kiawe trees back off the beach along a dry stream bed. Salvaged cargo nets hung from the trees and served as hammocks. Except for the kitchen area, there was no overhead cover. We would sleep under the stars for the next two nights.

After a camp orientation meeting, Mike, Stan and I unpacked our gear and went to look for the happy fishing grounds. While Mike and Stan had the foresight to bring two sets of rods and reels, I only had my ultralight tackle.

The morning was turning into a beautiful day. Fishing along the rugged shore, we had a fantastic panorama of Haleakala and the West Maui mountains. From that angle, with the sun coming up over its shoulder, Haleakala uncannily resembled Mt. Fuji in Japan. With the warm sun shining on relatively calm seas, it was very pleasant fishing as we hopped from rock to rock on this desert isle.

With their heavier gear and longer poles, Mike and Stan were able to cast far out from shore and were getting many papio strikes. I was struggling just to get my ⅛-oz lure into fish-holding waters. I only had two small strikes.

After awhile, Stan and I were lagging far behind Mike

Stan with one of several papio.

Stan with his prize "catch."

Proof of release.

who was really gungho. The sun was getting very hot, and the lack of sleep the night before certainly didn't help matters. As we were resting, however, we spotted some nice-sized opihi and decided to pick them. I always suspected that Stan was crazier than I, and he proved it. He was constantly getting down right to where the waves were breaking to get the biggest opihis. More than a couple of times he was totally submerged in white water as a wave came surging in. However, he was happy as a lark because he had gotten his prize. He was really enjoying himself!

On the other hand, I was starting to feel weak and dizzy and decided to head back to camp. There was no doubt that I was having a bout with heat prostration (as did several others), but some careful ministrations by Dr. William Sage and Dr. Emmett Aluli had me back to normal by dinner time. Their quick treatment was really appreciated! Many thanks, doctors!

In the late afternoon people filtered down to a rocky pool to 'au'au (bathe). It was surprising how refreshing a saltwater bath could be. If you used a dishwashing liquid instead of soap, you could work up quite a lather. The ones with lemon in them were the most popular.

Dinner was a noisy affair around the big kitchen area. We were all excited and telling each other of our experiences on the island. The singing and storytelling continued late into the night. We slept on the beach under a breathtaking display of stars.

We were up early the next morning. The weather and the vistas were just as fantastic as they were the day before. As soon as breakfast was over we headed west along the coast, fishing every rocky point and sandy bay.

With their longer rods, Stan and Mike were again getting all the strikes. This time, however, I managed to catch a couple of small papio, too. Over on a large rock, Mike gave out a loud "Wow!" as a large ulua charged unexpectedly out of the white water, grabbed his Mirro-Lure, and with a flip of his tail rocketed out towards the deep water. With his 15-lb test line Mike had a terrific fight on his hands. . .for about 10 seconds. Then the line parted like weak thread, unable to take the strain of the ulua's run. I don't know about Mike, but that left me shaking.

In the meantime, Stan had made an interesting "catch," too. He had literally stepped on a sea turtle sleeping on the shore. After taking a few pictures, we let him go.

Dinner that night was again a noisy, excited affair. The cooks outdid themselves as we feasted on kalua-style turkey, salad, jumbo hotdogs, and a wild goat which one of the Navy men had run down and caught with his BARE HANDS! They were calling him the Wildman after that. The entertainment was also first-rate with a show put on by a hula halau. I could think of no better way to end our stay on what I felt to be the most Hawaiian of all the islands. Except for our modern equipment, I felt that we were visiting Kaho'olawe under relatively the same conditions that greeted the ancient Hawaiians when they first inhabited the island.

Someday, perhaps in the foreseeable future, maybe everyone will get the chance to go to Kaho'olawe and enjoy and experience the island as we did. If anyone asks, I'd be the first to sign up to go again. And I'm sure that Mike and Stan would be right behind me to sign up too. In the meantime, Good Fishing! . . .Glenn

...Indians, was judged the

"I fish extra strong

DISTURBANCE TO SEALS AND ADULT TURTLES ON EAST ISLAND, FRENCH FRIGATE SHOALS, DURING TURTLE HATCHLING RECOVERY PROJECT 3 - 20 August, 1982.

Ruth Ottner

Three[1] people camped on East Island five nights during the project. Different hatchling collection methods were used each night and therefore the disturbance potential varied. Also the search for hatchlings was conducted at different times of the day which can also vary the potential for disturbance.

In general, disturbance to other animals was kept down as much as possible. A few individuals of both species did leave the island because of us but as the project progressed a night-time technique using stationary lights was developed allowing minimal disturbance and a very high catch rate.

When five people were on the island together, 3 August, looking for partially emerged nests to dig up, a subadult seal saw us and hurriedly left the island. Several other seals gave indications of nervousness by changing positions and watching us closely. I attribute that to the number of people on the island. Digging nests during dawn and dusk as we did can be productive and nondisturbing if conducted by two people who are conscientious toward the basking seals and turtles. All subsequent trips were accomplished by three people with two of them doing the dawn and dusk excavations and one surveying monk seals.

One time a mother with pup in shallow water about 30 meters away yelled at us for several minutes while we were digging a nest about 3 meters from the beach crest. We continued digging with our bodies low to the ground and soon she and her pup returned to their normal hauling area about 100 meters away.

These two examples of disturbance to seals are the most extensive that I am aware of. Both could have been avoided using strictly the stationary light method.

The most disturbing time for adult turtles seemed to be soon after sundown. Any time we saw turtles we turned our lights out but sometimes the impact was made before we got the light off. This could be avoided entirely using the stationary light technique. The stationary lights apparently had no effect on adult turtles

1. Five people camped on East the night of 3 Aug.

since several hauled up and dug pits within]0 -]5 feet of the lights.

Seal surveys were done early evening and the following morning for four of the trips.

		Adult	Sub Adult	Juvenile	Weaned Pup	Nursing Pup	Total
7 August	]600-]745	]5	7	5	23	5	55
8 August	0800-0930	]6	6	6	]3	5	46
]0 August	]6]5-]800	]6	6	3	25	4	54
]] August	0745-0900	]6	7	2	]6	5	46
]3 August	]600-]730	]9	]0	6	]8	4	57
]4 August	0700-0830	]5	2	6	5	4	32
]6 August	]600-]745	]5	7	8	22	3	55
]7 August	07]5-08]5	]0	8	]	5	3	27

Collection Techniques

#] Digging — Partially emerged nests are located during daylight hours and excavated by hand and shovel.

#2 Roving with lights — a.) Workers walk around the island at the waters edge scanning the beach for hatchlings on their way to the water. We used two-D cell flashlights.

b.) Workers walk both the beach and the island platform with flashlights looking for hatchlings on their way to the water.

c.) - Not Tried - Workers walk the waters edge scanning the beach with red lenses in their lights.

#3 Stationary lights — Light stations are established along the mid-line of the island during daylight hours. A light station is a 4 - 6 foot length of PVC with a 6 volt head lamp fastened at the top. A short

piece of rebar, half buried, holds it upright. The lamp is directed down and turned on from 2030 to 2300. The hatchlings are collected as they come to the light.

Methods Overview

Method	Number of Workers	Disturbance Factor	Camp	Number of Hatchlings Collected
#1	1 - 2	low - medium	no	medium
#2	3 - 4	medium - high	yes	low
#3	2 - 3	low	yes	high

My Recommendation

If 300 or fewer hatchlings are needed, technique #1 is most appropriate. By visiting the island (East) at mid-day for a few hours every second or third day, 50 or more hatchlings could be collected each trip with little disturbance to other animals.

If more than 300 hatchlings are needed for a project, technique #3 is most appropriate. At about 1700, before seals begin hauling up for the night, set up three 2 - light stations. Set the two lights at each station about 20 meters apart so one person can attend both with very little walking. Work only the middle third of the island to avoid bothering any groups of basking animals on the ends of the island (see diagram). Turn the lights on from 2030 to 2300 and collect the hatchlings as they come to the lights.

One goal of this method is to minimize the amount of roving so I also recommend that workers avoid looking for emerging nests when hatchlings begin to gather at the stations. Also, since it's so easy for a worker to focus entirely on hatchlings, I suggest that a person with bird/seal experience and interest be included in the party as one of the three workers when possible.

This recommendation applies to East Island, French Frigate Shoals, only. From our experience I estimate that 200 hatchlings could be collected per night.

Some of the participating high schools have started their own projects. For instance, Pearl City High School students built several saltwater aquariums. "They have an aquarium that holds nearly 100 gallons," Alan said, "and a couple of others that hold about 20 gallons each. The teacher takes them out to Maile to collect specimens."

When the topic of the annual science camp for high school students came up this year, it was agreed that the theme of the event should be oceanography, since there was so much interest in that subject. A representative from each school attended once-a-week strategy sessions for several months to work out an agenda for the three-day camp-out at Camp Kokokahi.

High school students learn about the sea cucumber under the tutorship of MOP students participating in the high school orientation program.

Alan Hong arranged for the 120 campers to visit the marine science facilities on Coconut Island and at Hanauma Bay. Doug Pendleton gave a talk about the Blue Water Floating Lab and Charlie Rolison presented a slide show and talk about Hanauma Bay. Charlie also conducted guided tours.

Dr. John Craven discussed the transportation situation in Hawaii. The basic problem, he said, is that the state has become too car-oriented. With a marine transportation system, Hawaii could probably solve its traffic woes and over-crowding.

Students got their feet wet, too. They measured the salinity of Kaneohe Bay, took productivity counts and water nutrient measurements -- things they couldn't do surfing or snorkeling.

"It went a lot smoother than I expected," Alan said after the camp was over. "I'm really proud of the way the students pulled it off."

randy chau: *We plan to begin tagging turtles soon to determine the population.*

The first MOP students to work with the aquaculture research group on Coconut Island is still there after a year and a half. As a marketing major, Randy Chau has had valuable skills to offer the staff which is primarily science-oriented.

Saving the turtle is a major concern to George Balazs, researcher at the Hawaii Institute of Marine Biology. His research, extensive in scope, has been aided by MOP students.

Under Dr. Philip Helfrich, Chau helped research the marketing potentials of *Artemia salina*, brine shrimp, the food widely used for aquaculture and pet aquariums.

Chau is currently involved in turtle research under George Balazs, to learn more about the life history of the green sea turtle as it relates to feeding grounds around the islands. Chau has also gathered information from the State Division of Fish and Game on which to base turtle conservation legislation.

Before Balazs began his turtle research, little was known about them except that they were dwindling in number.

"We plan to begin tagging turtles soon to determine the population," Chau said. "We're going to the island of Hawaii aboard the VALIANT MAID in late May."

glenn sato: *They catch all kinds of diseases and fungi. They bite each other. They fight a lot.*

Glenn Sato, a senior in marine biology and a MOP student, wanted "some experience in other marine-related fields," so he went to George Balazs and Bob Brick on the research staff at Coconut Island and volunteered his time.

"For three or four months, I went there on my own and worked about four hours every Saturday," Glenn said. "Then they gave me $1.60 an hour to help pay for gasoline. Other students were going over the same way. They have a lot of volunteer help and they really need it. Any help is really appreciated."

His first two tasks were to cut up eels for food and to segregate fish that were caught in trawl nets. He also cleaned lobster and octopus tanks. Then, when Balazs started to ship turtle eggs to Coconut Island to try to hatch them there, Glenn "had to dig holes in the coral and put screens around them so the mongooses and the dogs wouldn't get the buried eggs."

The peaceful, picture-book scenery on Coconut Island belies the constant level of research activity conducted on it. Projects encompass thermal red pollution and aquacultural research on octopus, baitfish, shrimp, molluscs, and prawn.

"When Balazs' efforts to hatch turtle eggs in Kaneohe Bay did not produce sufficient numbers for experimentation, Glenn started tending turtles in tanks kept on the Manoa campus. One-day old hatchlings were collected and transported from the French Frigate Shoals. "We feed them, clean their tanks, treat them," Glenn said. "They catch all kinds of diseases and fungi. They bite each other. They fight a lot."

"It is really fun getting the feel of it," Glenn said. Among the things that he has learned is that he definitely enjoys field work better than "being stuck in a lab."

He has taken a scuba diving course and has found that, even though he passed, it was not an easy course.

"The Marine Option Program offers a lot for anyone who is really interested," Glenn said. "I don't think you even have to be marine-oriented. If you want to find out about something, they send you out and you get first-hand experience."

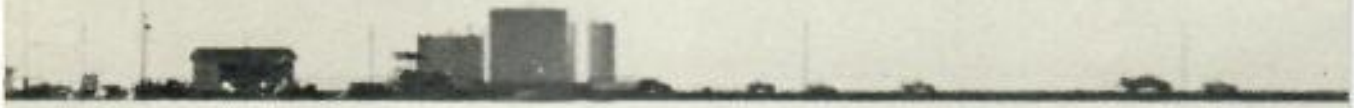
clark lewis & richard fernandez: *We'll be fiberglassing water tanks, pouring cement, and building fish traps at first.*

On a jutting peninsula of Coconut Island, there is a row of outdoor tanks surrounded by a maze of plastic pipes and hoses. All of the hoses seem to emerge from the shed-like thermal pollution study center. Inside are Ric Guinther and Gerry Key, two doctoral candidates who recently hired a couple of MOP students to work on this project.

"It is not all scientific work," Ric warned Clark Lewis and Richard Fernandez. "Sorting samples is very boring, tedious work. It is something most people don't get at the college level, but everyone should be exposed to it."

Both Clark, a zoology major, and Richard, a psychology major, looked dubious. But the following week, they reported for work. And since their arrival, a new network of pipes and a low wooden tower have been added. The pair has also been seen in wet suits measuring the water depths and con-

HAWAI'I
IN HARMONY WITH THE SEA



ILLEGAL FISHING TECHNIQUES IN HAWAI'I

ILLEGAL FISHING

Fishing always has been very important to the people of Hawaii, either for recreation, for food, or as an occupation. It's not surprising, therefore, that over the years hundreds of different fishing techniques have been developed and employed in the islands.

Most of these techniques do not destroy Hawaii's fish resources, but provide an opportunity for the recreational fisherman to catch his limit, and the commercial fisherman to harvest the optimum sustainable yield of his fishery. Some fishing techniques, however, are destructive and if not regulated, could easily wipe out whole species or reef fishing areas for all time. Here are some destructive fishing practices to avoid to assure the continuation of fish resources in the future.

Explosives

The use of explosives to kill and catch fish probably began hundreds of years ago, as early as 1600. In Hawaii dynamite was used for fishing in the 1800's until 1872, when a law was passed prohibiting this practice.

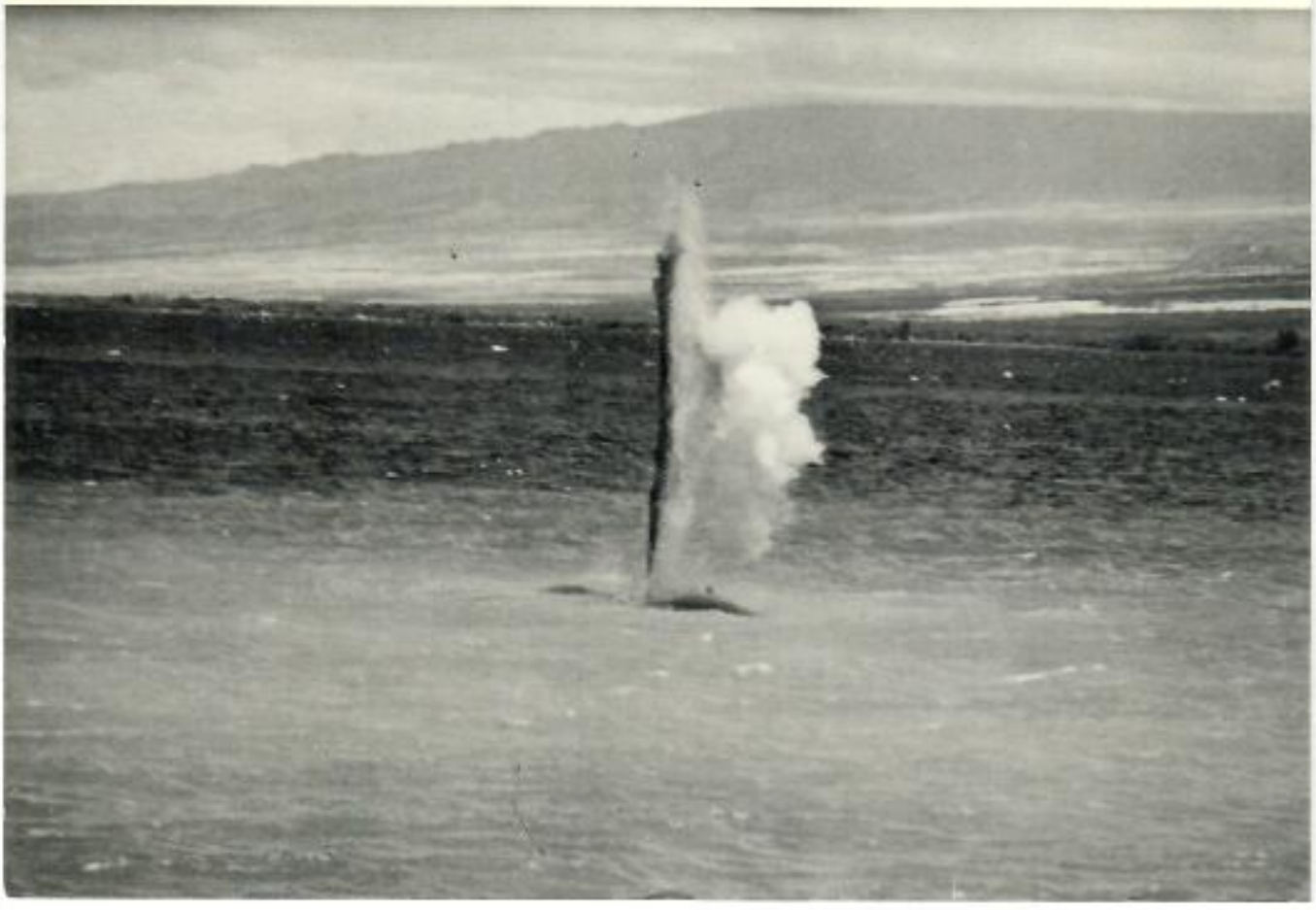
That law, which makes it *illegal to fish with, attempt to fish with, or to be in the possession of explosives on or near the shore*, is still in effect today throughout the State.

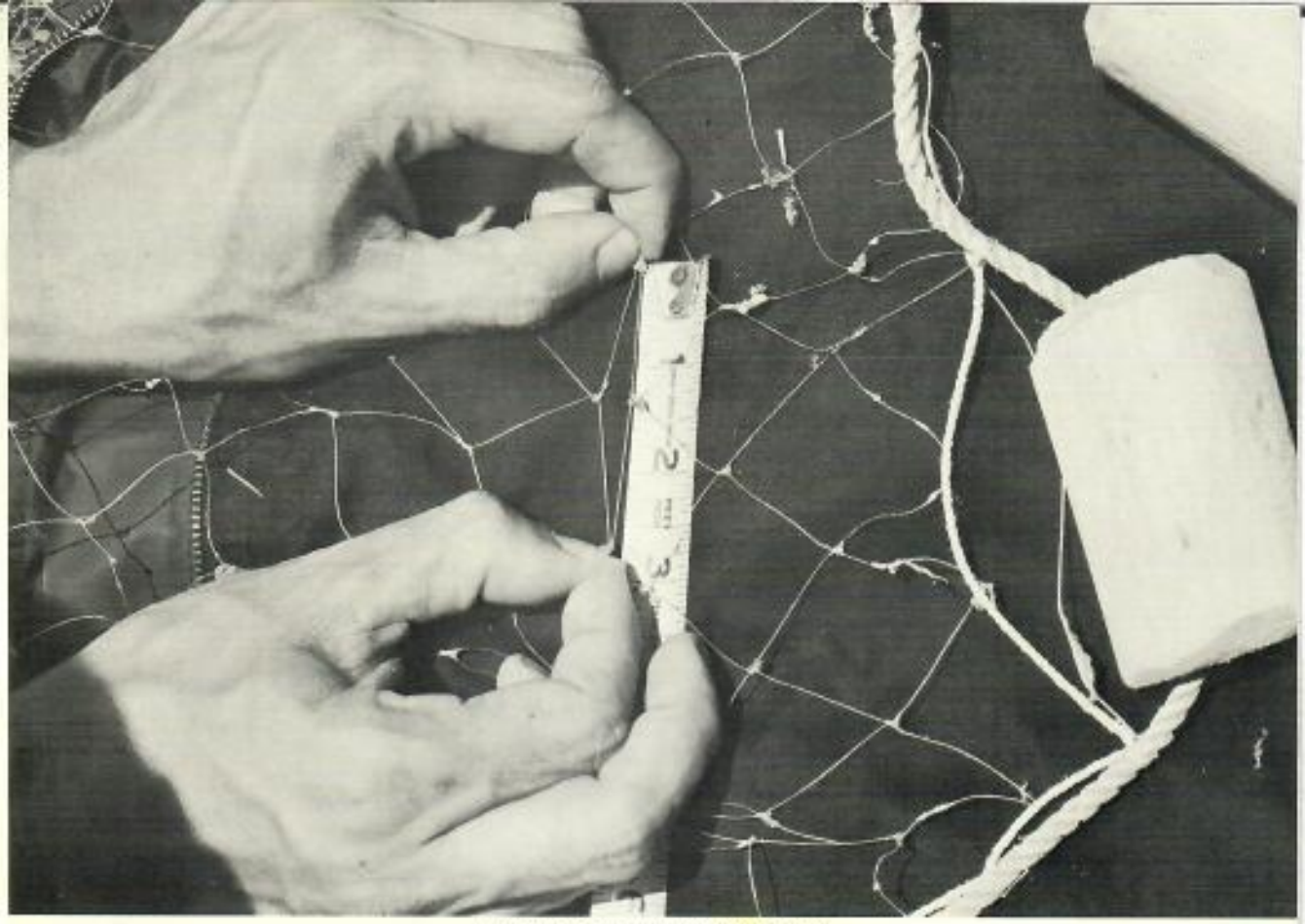
The reason for this law is obvious; explosives are indiscriminate killers. When there is an explosion in the water, all the animals in the area are killed, not just the desired fish. This means that unedible species and young fish also are destroyed. By wiping out the young before they can mature and reproduce, thousands of other fish are never born.

Many of the fish that are killed in underwater explosions sink to the sea floor, out of the fisherman's reach, because their air bladders have been destroyed. It has also been learned that many of the fish that initially are only stunned by underwater explosions die later of internal injuries.

FISHING WITH EXPLOSIVES

Explosives are indiscriminate killers and seriously damage living marine resources. Their use for fishing in Hawaii is strictly prohibited.





MEASURING THE "EYE" OF A NET

The "eye" or mesh measure of a net is determined by pulling the knots of an "eye" taut and measuring the distance between the knots. The net above has a 2¾ inch "eye."

Nets and Traps

Two popular fishing methods in Hawaii that are extremely efficient and can be destructive to fish populations, and therefore must be regulated, are netting and trapping. By using nets with small mesh, the fisherman catches small, juvenile fish before they have a chance to grow and reproduce. Of course, if the young of one generation are seriously depleted, it means far fewer fish in the succeeding generations. For this reason, the law requires that all gill, draw, drag, or seine nets have minimum mesh size of 2 inches stretched measure. The "eye" or mesh measure of a net is measured by first pulling the opposite knots of an "eye" taut, and then measuring the distance between the knots.

There are some exceptions to this 2 inch mesh law. Pond owners or operators with a license to sell pond-raised mullet may use nets of smaller mesh to take young mullet or pua to stock their fish pond. Licensed commercial fishermen may also use nets of smaller mesh to take nehu, 'iao, Marquesan sardine, tabai, piha, and threadfin shad for use as bait. Only aku fishermen can use a net longer than 50 feet to catch bait.

Anyone may use nets of smaller mesh to take shrimp or 'opae, 'opelu, makiawa or mikiawa, and nehu (50 foot net or less); a net with mesh of not less than 1½ inches may be used to take akule. Akule less than 8½ inches, however, shall not be taken with a net during the months of July to October inclusive.

The mesh size of throw-nets is also regulated in Hawaii. Recreational fishermen may use throw nets with a 1½ inch mesh, while commercial fishermen must have at least a 2 inch mesh.

A recent law regulating the use of gill nets makes it *unlawful for any person engaged in gill net fishing to leave his net unattended for a period of more than twelve hours.* Any fisherman who violates this law shall be fined not less than $100 nor more than $500 or imprisoned not more than six months or both.

Traps must also have a minimum mesh size of 2 inches and they must be portable, not more than 10 feet in length or 6 feet in height or width.

Aquarium fishermen may use fine meshed traps or nets, other than throw-nets, to take non-game aquarium fish. To do this, however, the fisherman must first get a permit from the State Division of Fish and Game, and he must have facilities to maintain the captured fish alive and in reasonable health.

Be certain to learn and follow these basic conservation rules and practices the next time you go fishing. Remember, only if you obey today's kapu system, will you have fish for the future.

ILLEGAL SHOTGUN FISHING

In Hawaii it is illegal to fish with firearms for all species of fish except sharks.

Firearms, Spears, Spear Guns

With the increased use of the aqualung in Hawaii, spear fishing has grown in popularity in the Islands. While it is legal to take or kill fish with a spear for home consumption, it is *unlawful to spear fish or be in the possession of speared fish which are smaller than the minimum size.* It is also *illegal to sell or offer to sell any speared turtle or fish (other than shark, ʻūʻū, uhu, and kūmū) at any time.* It should be noted that green sea turtles with the shell length of 36 inches or more can also be taken for home consumption *with a permit.*

Although it is tempting for the diver to spear lobsters that are lodged in holes, it is illegal to do so. In fact, it is *unlawful to pursue, take or kill any crustacean with a spear at any time.* Spear fishermen should be aware that any serious puncture wound on a bagged lobster is viewed as evidence in court of a violation.

Laws regarding spear fishing also make it *unlawful for any person below the age of 14 to fish with a spear gun unless accompanied by an adult.*

Fishing with firearms is prohibited at all times, except when used for defense against sharks.

SPEAR GUN SAFETY

Children under 14 years of age, such as the one in the photograph to the right, must always be accompanied by an adult when they use a spear gun.

TECHNIQUES

Chemicals, Poisons, Intoxicants, Electricity

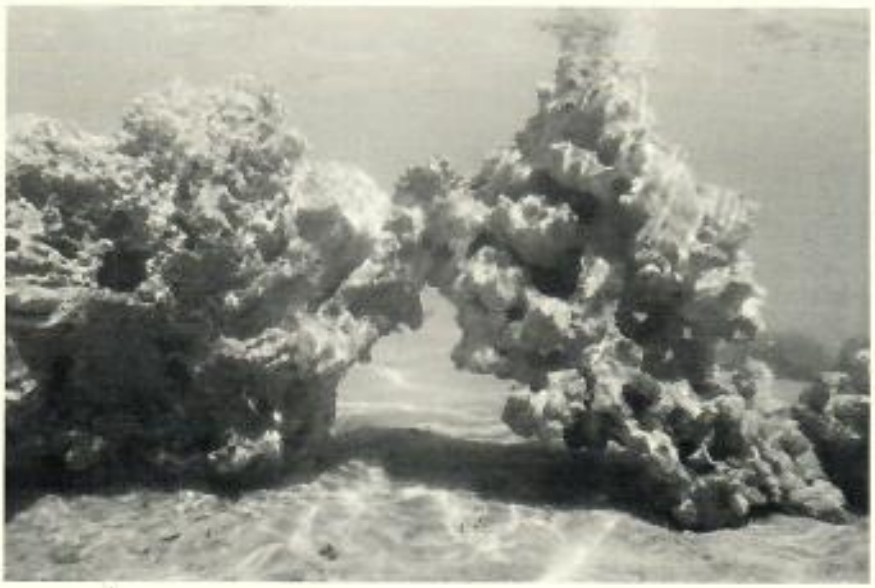
Another fishing technique that has been used for centuries throughout the world is poison or chemical fishing. The old Hawaiians practiced this type of fishing, using the leaves and seeds of the 'ākia shrub *(Wikstroemia sandwicensis)* or the 'ahūhū weed *(Tephrosia purpurea)*. In present day Hawaii these poisons have been replaced by manufactured chemicals such as Chlorox or Rotenone. All of these poisons are extremely destructive to the ecology of the reef, and therefore, all of them are outlawed. As with explosives, it is *unlawful to fish with, attempt to fish with, or to have in your possession, poisons, chemicals, or electrofishing devices on or near the water where fish or aquatic life can be taken.* The use of poisons in fishing, often causes permanent damage to the reef. A fish hole that has been "chloroxed" remains devoid of all life for an extremely long time. As with dynamite, chemicals are generally indiscriminate killers and deplete the fish resources for years to come.

"CHLOROXING" A LIVE CORAL HEAD

Poisoning fish with chemicals such as Chlorox is very destructive to the reef and is illegal in Hawaii.

DEAD CORAL HEAD

A coral head that has been "chloroxed," such as the one in the photograph to the right, often remains devoid of all life for a long period of time. Poisons such as Chlorox are indiscriminate killers.



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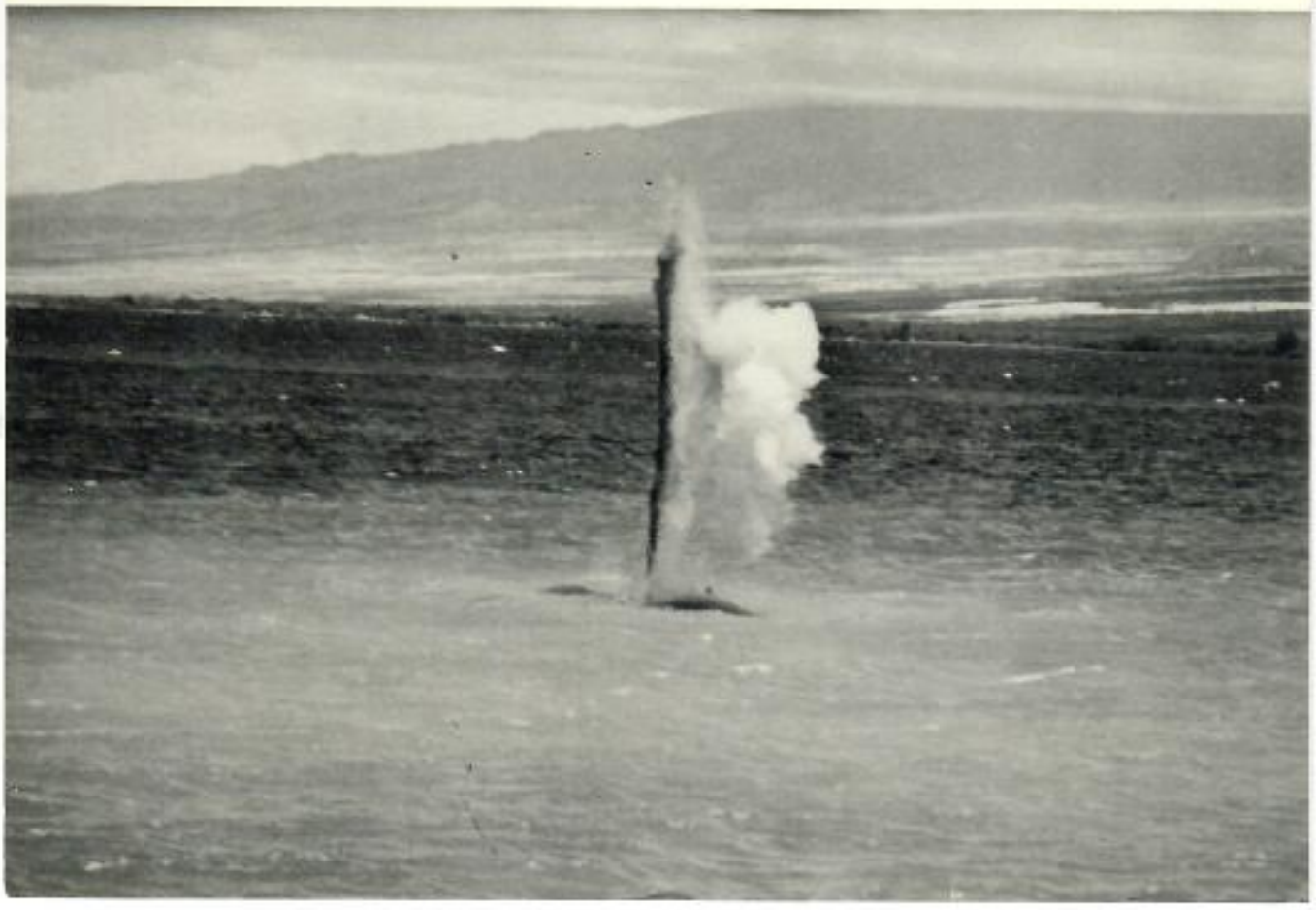

If you are interested in learning more about Hawaii's marine life and its conservation and management, *Native Use of Fish in Hawaii* by Margaret Titcomb is an excellent place to start. The following selected reading list will provide you with additional information on various aspects of the marine environment.

SELECTED READING LIST

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HAWÀII
IN HARMONY WITH THE SEA

Jeremy Harris

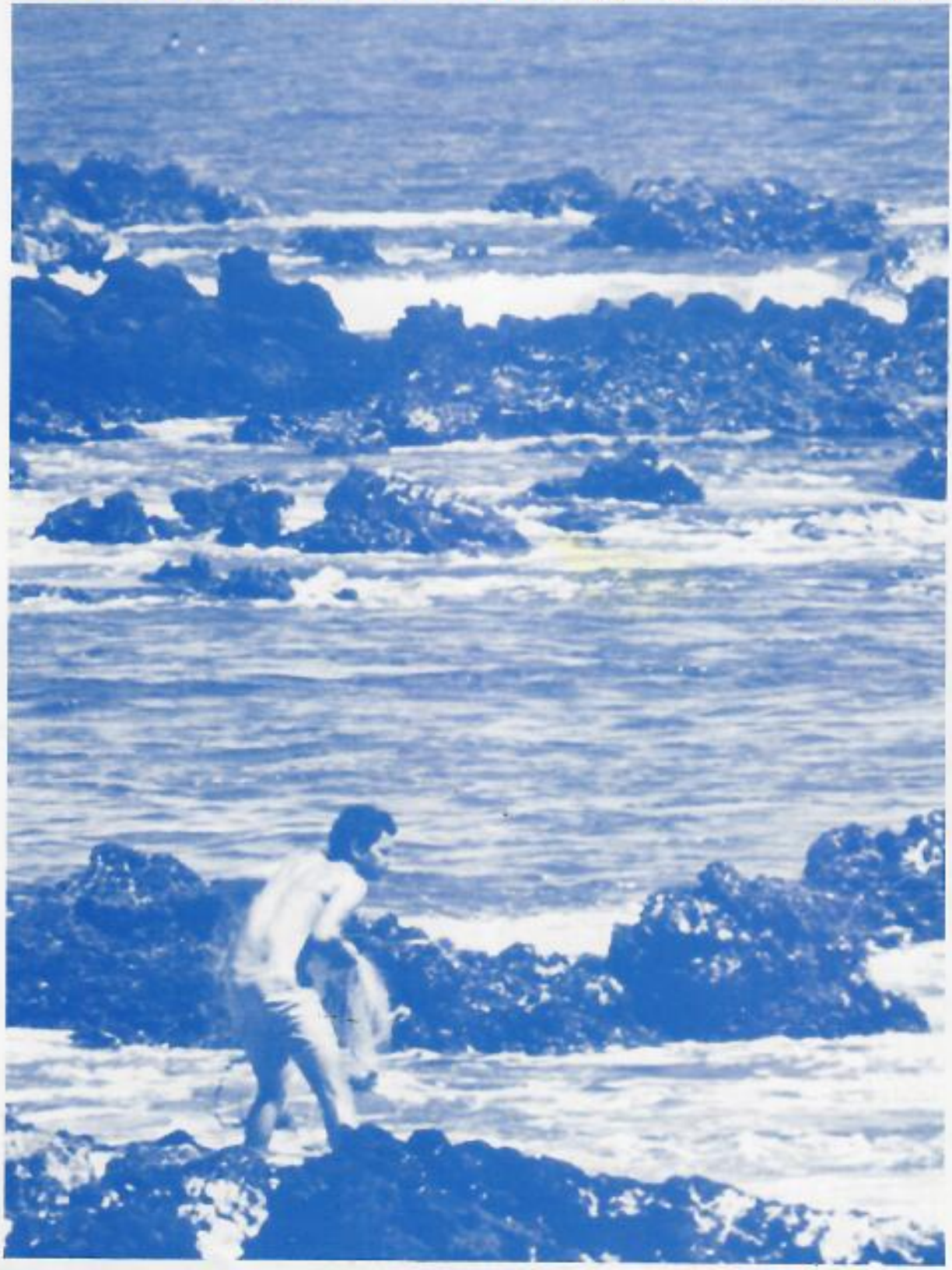
SEA GRANT

This pamphlet is produced by the State of Hawaii Department of Land and Natural Resources, Division of Fish and Game, and the University of Hawaii Marine Advisory Program, funded through grants from the State of Hawaii Marine Affairs Coordinator, Governor's Office and by the N.O.A.A. Office of Sea Grant, Department of Commerce under Grant No. 04-158-44114. The U.S. Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notations that may appear hereon.

Sea Grant Advisory Pamphlet
UNIHI-SEA GRANT-AB-77-05

ILLEGAL FISHING TECHNIQUES IN HAWAII

HAWAI'I
IN HARMONY WITH THE SEA



I'A OF HAWAI'I: PRESENT-DAY KAPU

Many offshore areas around the Hawaiian Islands have coral reefs such as the one shown above.

BACKGROUND -- PAST

Hawaiian society has long recognized the need to manage and conserve marine resources and to regulate the harvesting of the islands' sea life, or i'a. The kapu system of old Hawai'i was the first and the most successful set of fishing regulations that Hawai'i has ever had. With the influx of new cultures to the islands, however, the traditional kapu system was replaced by new laws.

The first of these new laws was established in the late 1830s by Kamehameha III and was, in some cases, a carryover of the old kapu system. At that time the king divided all the fishing grounds among the common people, the landlords, and himself. To the common people, the king gave all of the fishing grounds without coral reefs. Wherever coral reefs did not exist, fishing grounds adjacent to the ahupua'a were fixed by known landmarks. Seaward of such "fixed boundaries," fishing was available to anyone. To the landlords and their tenants went the fishing grounds from the coral reef to the beach and any single species of fish which the landlord selected as his own personal stock. This included the area shoreward of the "fixed boundaries" (see above). The remainder of the fishing grounds the king reserved for himself. As time went on, the Hawaiian laws were continually changed and redefined, and each year the government printed lists of the fish species which each landlord set aside for himself.

In 1845, the laws were again amended to allow a landlord to exchange his exclusive right to one fish species for the right to make kapu all fish on his fishing grounds for a certain period of time. Five years later, in 1850, all government fishing grounds were turned over to the common people of Hawai'i.

With the turn of the century came territorial status for Hawai'i and, in 1919, the territorial legislature created Hawaii's first Fish and Game Commission. The Commission's functions were almost entirely concerned with the enforcement of fish and game laws, the introduction of new species, and the operation of hatcheries. The Commission was abolished in 1927 and the powers and duties it had were then vested in the Board of Agriculture and Forestry, under which a Division of Fish and Game was established. Finally, in 1961, after statehood, the Division of Fish and Game was transferred to the Department of Land and Natural Resources, where it remains today.

PRESENT DAY

There is a greater need today than ever before for laws to regulate the harvesting of Hawaii's marine resources. With the increasing population, and with most of our society having little or no understanding of conservation ethics and principles, the deterioration of our resources is occurring at an accelerated rate. An example of a wasteful and destructive practice which is depleting some of our marine resources is that of divers taking fish through the illegal use of chemicals. Harvesting of stony corals may become a problem on Oahu, and the once plentiful opihi has become scarce even in remote coastal reaches. The green sea turtle has become a vanishing species, and there are even indications that, in certain areas, colorful reef fishes of little food value are being subjected to overaggressive harvesting for the home aquarium market.

Today, the people of Hawai'i must apply their knowledge of the i'a, or marine life, in the management of their marine resources just as the ancient Hawaiians applied the knowledge of the po'olawai'a (professional fishermen of yesteryear) in the past. Because the marine resources of Hawai'i are common property shared by all, it is necessary to regulate their harvesting. In Hawai'i there are regulations to protect the interests of the community from individual greed. Without regulations and the people to enforce them, the people of Hawai'i could easily lose their marine resources.

FISHING REGULATIONS

At present, there are five different types of fishing regulations similar to the kapu system of ancient Hawai'i to help Hawai'i protect its valuable marine resources. These are discussed below.

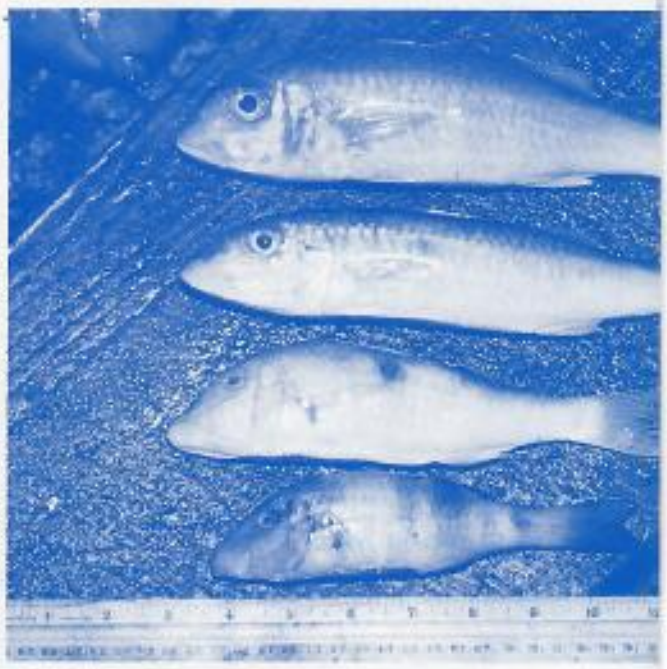
Size and Weight

One type of regulation is based on the size and/or weight of the fish. The goal of this regulation is to protect animals until they mature and reach reproductive age. Remember, if one baby fish is killed, thousands more may never be born. Octopus, often miscalled "squid," and papio are examples of i'a regulated by size and weight. Octopuses must be at least one pound before they can be harvested. Papio must weigh at least a pound in order to be speared or sold and, in Honolulu, must be at least 7 inches long for home consumption. Weke, or goatfish, must also be at least 7 inches long before they can be speared or marketed.

Reproduction Protection

Another type of regulation is designed to protect lobsters and certain crabs during reproduction. It prohibits the taking of Kona crabs, Kuahonu crabs, or lobsters with eggs, no matter what the size or season. The orange mass on one female lobster contains tens of thousands of eggs that will never hatch if the lobster is taken by irresponsible fishermen.

Another reproduction regulation is designed to protect fish during their spawning seasons since, because of their breeding habits, certain animals are easier to catch when they are ready to reproduce. Under this regulation, it is illegal to catch mullet, which has become rather scarce in recent years, during the months of



December, January, and February. Lobsters, both spiny and slipper, and Kona crab are also regulated by season; it is illegal to catch them during the months of June, July, and August.

Total Kapu

Certain of our sea creatures have been almost completely wiped out by man, and, as a result, special laws have been passed to protect them. The Hawaiian monk seal and other endangered species are protected in this way and should not be harmed or bothered. All turtles are off limits. The green sea turtle was declared a threatened species in September 1978 by the federal government.

Prohibited Fishing Methods

Certain methods of fishing which are either too efficient or have long-lasting, adverse effects must be controlled. Spearing of lobsters, crabs, and marine shrimp is strictly forbidden under all circumstances. Any serious puncture on a bagged lobster is considered evidence of a violation and it is never legal to sell speared fish, except ʻūʻū, kūmū, uhu, and shark.

Using chemicals and poisons of any kind are also absolutely forbidden. Nets are regulated according to mesh size, the minimum being 1-1/2 inches for throw nets and 2 inches for all others, with certain exceptions.

Special Areas

The last type of regulation relates to special areas. Some areas are protected for the sake of preserving their natural ecology. Kealakekua Bay on Hawai'i and Hanauma Bay on Oahu are examples. Other areas are subject to specific regulations because of some unique characteristic, such as convenient access by large numbers of fishermen, a situation which could lead to depletion of the marine inhabitants in the area if not controlled. Hilo Bay, the Waikiki Reclamation Ala Wai Canal, and the Waikaea Canal (Kauai) are examples of these areas.

LEFT: Weke, or goatfish, must be at least 7 inches long before they can be speared or marketed.

ABOVE: The green sea turtle is a threatened species.

RIGHT: Hanauma Bay on Oahu is an example of a special area regulated and protected to preserve its natural ecology.

REGULATION ENFORCEMENT

Most people obey laws if they know the laws and especially if they understand the reason for them. Unfortunately, there are a few people who violate the laws and destroy the resources that belong to all of us. It is for this reason that enforcement officers are needed.

The enforcement branch of the Division of Fish and Game, with offices in each county, is comprised of 35 full-time enforcement officers supplemented by a staff of 70 volunteers. The officers are responsible, as were the konohiki of yesteryear, for the enforcement of all laws and regulations relating to the protection, conservation, and harvesting of the fish and game resources of the state. This job requires the surveillance of over 900 miles of coastline, as well as refuges, sanctuaries, and freshwater fishing areas, and the surveillance of hunting activities. Officers check for licenses and permits and inspect catches to make sure bag limits or other conservation regulations have not been violated. Aside from enforcing recreational fishing laws, the enforcement branch also keeps tabs on commercial fishing operations by inspecting fish auctions and markets, commercial fishing boats, and restaurants and peddlers. When an officer finds a violation of any of the Fish and Game laws, he cites or arrests the violator. In many cases, violators who are found guilty by the court face fines and/or imprisonment. In old Hawai'i the penalty for violating a fishing kapu was sometimes death. It is not surprising, therefore, that the fishing regulations of old Hawai'i were more closely obeyed than those of the present day.

Hawaii's marine resources are important to its people for food, recreation, and employment, and must be protected if they are to be enjoyed in the future. All of us can help by learning and following the Fish and Game laws and supporting local Fish and Game enforcement officers.

ABOVE: A violator of Fish and Game regulations is being cited by an enforcement officer.

LEFT: Fish are displayed for inspection before auctioning.

Many offshore areas around the Hawaiian Islands have coral reefs such as the one shown above.

BACKGROUND -- PAST

Hawaiian society has long recognized the need to manage and conserve marine resources and to regulate the harvesting of the islands' sea life, or i'a. The kapu system of old Hawai'i was the first and the most successful set of fishing regulations that Hawai'i has ever had. With the influx of new cultures to the islands, however, the traditional kapu system was replaced by new laws.

The first of these new laws was established in the late 1830s by Kamehameha III and was, in some cases, a carryover of the old kapu system. At that time the king divided all the fishing grounds among the common people, the landlords, and himself. To the common people, the king gave all of the fishing grounds without coral reefs. Wherever coral reefs did not exist, fishing grounds adjacent to the ahupua'a were fixed by known landmarks. Seaward of such "fixed boundaries," fishing was available to anyone. To the landlords and their tenants went the fishing grounds from the coral reef to the beach and any single species of fish which the landlord selected as his own personal stock. This included the area shoreward of the "fixed boundaries" (see above). The remainder of the fishing grounds the king reserved for himself. As time went on, the Hawaiian laws were continually changed and redefined, and each year the government printed lists of the fish species which each landlord set aside for himself.

In 1845, the laws were again amended to allow a landlord to exchange his exclusive right to one fish species for the right to make kapu all fish on his fishing grounds for a certain period of time. Five years later, in 1850, all government fishing grounds were turned over to the common people of Hawai'i.

With the turn of the century came territorial status for Hawai'i and, in 1919, the territorial legislature created Hawaii's first Fish and Game Commission. The Commission's functions were almost entirely concerned with the enforcement of fish and game laws, the introduction of new species, and the operation of hatcheries. The Commission was abolished in 1927 and the powers and duties it had were then vested in the Board of Agriculture and Forestry, under which a Division of Fish and Game was established. Finally, in 1961, after statehood, the Division of Fish and Game was transferred to the Department of Land and Natural Resources, where it remains today.

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I'A OF HAWAII: PRESENT-DAY KAPU

by Jeremy Harris

Sea Grant Advisory Brochure
UNIHI-SEAGRANT-AB-79-04

February 1979

This brochure is published in part with funding received from the University of Hawaii Sea Grant College Program under Institutional Grant No. 04-8-MO1-178 from NOAA Office of Sea Grant, Department of Commerce, and the State Marine Affairs Coordinator's Office under Task Order No. 160. The US Government is authorized to produce and distribute reprints for governmental purposes notwithstanding any copyright notations that may appear hereon.