



Kalalau Valley, Kauai. Photo by Fred Stimson.

by Wayne C. Gagné

Hawaii's Tragic Dismemberment

Natural heritage is being destroyed by impact of modern world

TO UNDERSTAND the plight of Hawaii's native biota—the flora and fauna—is to understand the fragile nature of oceanic islands in a biologically murderous onslaught from the modern world. A recent issue of this magazine dealt with the unique fauna and the impact of humanity on the continental island of Madagascar. A frightening theme expressed there was the loss of isolation to detrimental outside influences and the subsequent devastation of that island's forests and fauna. This phenomenon is a recurring one and is particularly applicable to Hawaii.

Oceanic islands always had the ocean to screen out all but select groups of plants and animals. In this respect, the Hawaiian Archipelago is, or at least was, the earth's most isolated land mass. The nearest continent lies some 2,500 miles to the north. Hawaii's geological and biological evolution,

its partial, then radical demise due to loss of isolation, can be encapsulated into three time frames: prehuman, Polynesian, and "modern" contacts. The prehuman contact period was of such length that islands grew, matured, and were eroded to atolls and pinnacles. Similarly, whole floras and faunas colonized, evolved, and vanished, surely many without a trace. Even as mature islands were being pounded away, new ones arose to the southeast as that portion of the ocean's floor passed over the "hot spot"—the tectonic plate on which the Hawaiian chain rests—in the earth's crust. New islands that formed were colonized from the older ones. After these millions of years, there results an island chain ranging in age from 30-million-year-old atolls in the northwest that were once high islands, to new, still growing islands such as Hawaii, the "Big Island," at the southeastern extremity.

Ever since Kure, the first island in the Hawaiian chain breached the ocean's surface by repeated volcanic eruptions some 35 million years ago, the biota had to get here by one of three means: ocean-borne, bird-borne, or wind-borne. The vagaries of the open ocean can be eliminated from all but a small fraction of the precursors of Hawaii's terrestrial biota, since the currents, both to the north and south of Hawaii, run parallel to the Archipelago rather than towards it. Inadvertent carriage by the wind would apply especially to birds, small-bodied insects, spores, and seeds. Larger-seeded plants and eggs of invertebrates more likely were brought here in or on migratory birds. That describes the predominant composition of Hawaii's terrestrial natural life before the advent of man: plants, insects, snails, and birds. These are the very groups that now show the highest endemism here,

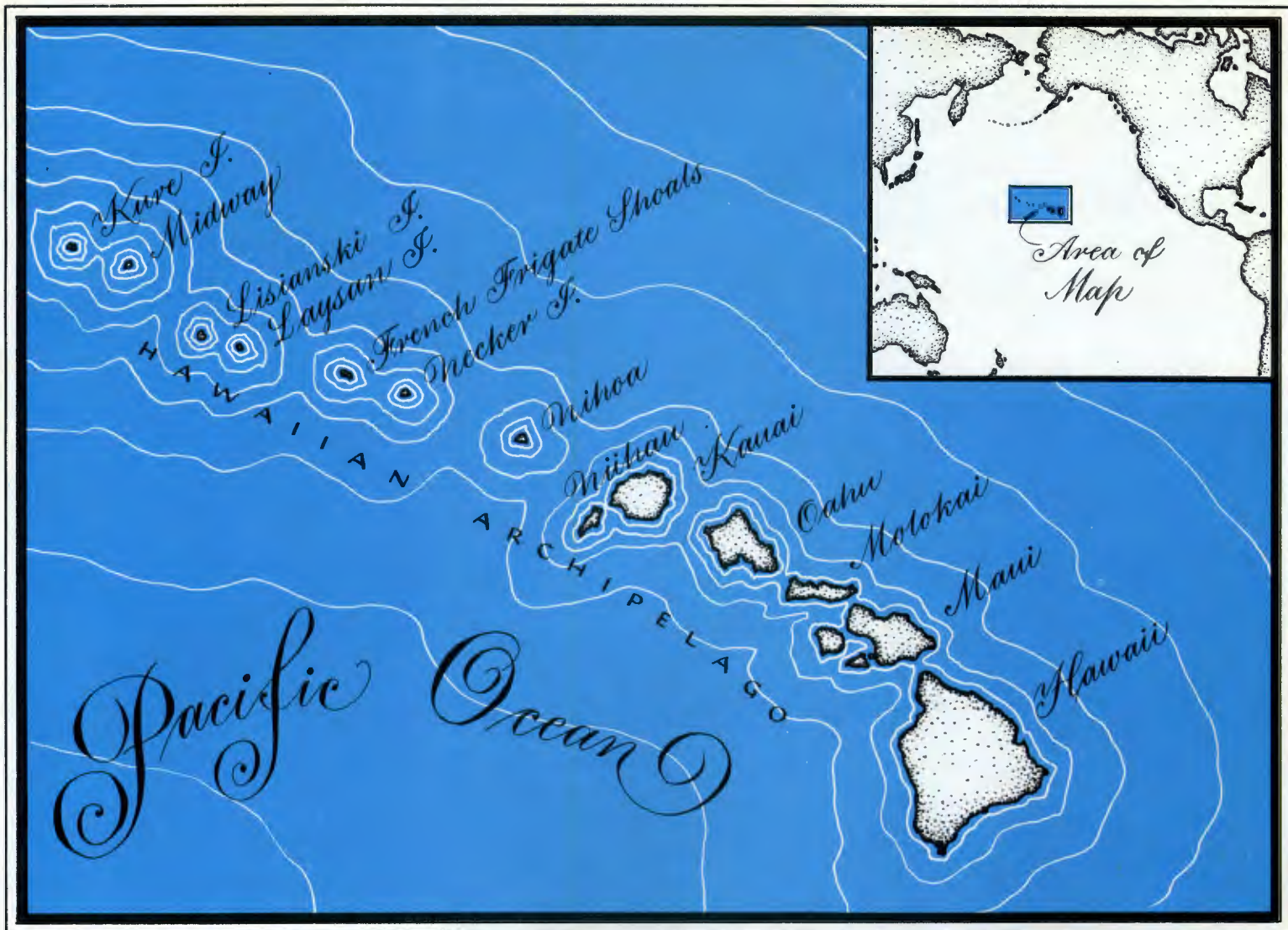
that is, the quality of being unique to Hawaii. By contrast, much of our marine life such as fish, molluscs, corals, and algae have planktonic juvenile stages and so are more amenable to continual oceanic dispersal, so the endemism of those much lower.

But, successful colonization of Hawaii by terrestrial life was a rare event. To account for the composition of Hawaii's terrestrial

life at the time of human discovery only 1,200 years ago, scientists have postulated *one* successful colonization by a plant or animal *once* every few *tens of thousands* of years. Isolation, indeed, and subsequent speciation too! A lack of continental competitors, a myriad of possible niches ranging from sea level to over 13,000 feet, a climate ranging from desert leeward habitats to fog enshrouded windward jungles all helped set

the stage for a living laboratory of evolution. For example, from the successful immigration of a small finch-like passerine bird arose the endemic Hawaiian honeycreepers with 23 species and 24 subspecies showing all manner and degree of adaptation and specialization; enough to make the much better-known Darwin finches of the Galapagos pale by comparison. The prospect of Darwin's reaction, should he have





Map by Ron Baker

reached Hawaii instead of the Galapagos, is the stuff of which the dreams of biologists are made. Albeit, the *Beagle* did not get to Hawaii, so it has taken another century for the world really to begin to appreciate the heritage that was and is Hawaii.

Plants or animals that successfully reached the Hawaiian Islands were faced with several unique situations. They were cut off from all other individuals of their species, and remained cut off. They arrived, in most cases, only as a small number

The history of the Hawaiian Islands starts in the west and works east. A sequence of volcanic eruptions has reached Hawaii, which is still quite active. The atolls of the Leeward Islands were once high volcanoes. Like icebergs, the Hawaiian chain is mostly underwater, rising more than 15,000 feet from the ocean depths. The islands as a whole range in age from one million (Hawaii) to five million years.

Photos by Robert Wenkum (opposite) and Wayne Gagné





Photo by Robert J. Shallenberger

Once nearly wiped out by goats and mountain climbers, the silversword survives only in Haleakala Crater. Some 2,000 plants remain.

of individuals, ranging from a single individual to a small flock, or perhaps as the eggs contained in a single gravid female. In the beginning they often had a finite, small land area occupiable.

A diversity of potential and climatic zones was then variously exploited. New life forms and behavioral and dietary modes evolved and character displacements occurred, for example, the appearance of a variety of bill shapes in the honeycreepers to utilize different substrates and foods so as to avoid direct competition. Successive ecological shifts occurred; some shifts so striking as to the appearance of predaceous caterpillars from plant-feeding ancestors are termed "adaptive shifts." All of this facilitated by the characteristic quality of insular biotas in being "disharmonic"; that is to say, the variety of ecological niches available to a specific group are not already efficiently or effectively occupied, which in turn is a product of difficulty of dispersal to such island areas. The recentness of the phenomenon as compared to continental situations tends to preserve many of the products of such diversification. These products, or species, though closely related, are often strikingly different. Superb examples of adaptive radiation here are the land shells, the honeycreepers, the lobelioids and silver-sword plants, as well as numerous insect groups.

Instead of depositing a broad spectrum of plants on an island, long-distance dispersal favors nonwoody plants-herbs most; it favors trees least. On continents, forest trees mostly have large seeds, poor for dispersal. Herbs exploit open situations, so are most successful when they reach new, pioneer situations, and tend to have smaller seeds better adapted for dispersal. The process of evolution from herbs into large shrubs, even trees, is shown by group after group in the Hawaiian Islands. Probably no other area has fostered such remarkable changes in growth form.

FLIGHTLESSNESS in insects and birds is a phenomenon repeated on islands everywhere. Order after order and family after family of insects that are perfectly normal on continents have taken up the wingless, or at least flightless, habits on islands. The case for our birds, although considerably more conservative when compared with New Zealand and Madagascar, nevertheless had its startling products. In addition to the more familiar flightless rails, recent discoveries in cinder cones, sand dunes, and lava caves have unearthed such bizarre creatures as flightless geese and the world's only flightless ibis. I take considerable pride in having shared in the discovery of the latter. There is potential for more



of the same.

Is there an explanation for all of this? The best hypothesis I have seen advanced for the occurrence of flightless birds on islands is that of Dr. Storrs Olson of the Smithsonian Institution. He believes that flightlessness may be derived through retention of juvenile characteristics into adult life, a process called neoteny. Young birds lack well-developed flight muscles; and their sterna, or breastbones, to which such flight muscles are attached, are cartilaginous. When the sternum remains so, the bird is incapable of flight, a drastic situation in a continental environment with a host of potential ground predators such as foxes, weasels, and so on. No big thing on islands, however. And, if the bird in question feeds, nests, and rests on the ground, does not have to migrate, and finds other factors of the island environment hospitable—and such was the case in Hawaii—flightlessness, thinks Olson, occurred quite quickly.

The whys and wherefores as it pertains to our flightless insects is not so succinctly hypothesized. But it probably correlates with their variety of ecological habits and habitats. Although different evolutionary mechanisms would be involved—neoteny

not pertaining—abundant food, poor representation of ground predators, and an equitable climate, among others, seem to have produced this.

The loss of dispersibility in plants is a phenomenon akin to flightlessness. The reasons are not identical, but similarities can be found. Although excellence at dispersal was a prerequisite for arrival in the first place, many of the plants lost dispersal mechanisms in subsequent evolution.

When a plant becomes better adapted to a condition limited in geographical extent, poorer dispersal would permit most seeds or spores to land in favorable sites near the parents. In adapting also to the predominating forest condition, small seeds with poor food storage potential to get the seedling through the shade and up to sunlight would be at a disadvantage. A number of plants which presumably got here by clinging to the feathers of migratory and marine

Aided by easily dispersed spores, ferns gain a foothold on new lava (above). Lava favors plant growth because it contains crevices that provide shade and retain water. Cooled pahoehoe lava blocks a road (right).





Photo by Robert Wenkum

Koa trees, used by the ancient Hawaiians to carve canoes, bowls, and furniture, dominate the transition zone between the dry and wet forests on mountain slopes. When rain falls, the roots give off a sharp ozonelike odor.

birds would, upon reaching an environment devoid of furry land animals, find hooks, awns, and stickiness of little value. Such structures of neutral or even negative value will, sooner or later, tend to be lost.

This resulting lopsided, fragile world—*kapakahi*, as the Hawaiians would call it—was nature's grand experiment in supreme isolation. Everything was working so nicely until *Homo sapiens* appeared upon the scene. So many of these former strengths of island existence were for naught when the outside world appeared. No need before for an island plant to be poisonous or thorny, no need for the island bird to be eternally vigilant, no need for an island insect to guard against the voracious ant—those were all continental constraints.

THE NATURAL DIVERSITY that developed in the ever-so-fragile balance from those few colonizers (about 200 kinds of plants, 300 of insects, 25 of snails, and 15 of land birds) has been severely altered, sometimes obliterated, with the advent of man. Not so much by the Hawaiians, it seems; granted they altered the alluvial valleys for agriculture and seem to have banished the once great colonies of sea birds, as

well as green sea turtles and monk seals, on the main islands to the remote Northwest Islands and off-shore pinnacles. Like most colonizing cultures in new lands, the Polynesians also had this exploitive phase as evidenced by the predominance of bird bones in the earliest layers of archeological digs here. But, Polynesians have had a long history of living within the firm constraints of tropical island environments, with its misleading aura of easy living.

The great forests with their biological riches for the most part remained intact from direct impact. The indirect impact on the forests resulted from their introduction of the first true land mammals, the pig and the rat. Exactly what ramifications these had in the forests will never be known. But, one can imagine that any number of defenseless, flightless birds, succulent plants, and plump land snails fell early prey, especially in lower, warmer elevations where these mammals were better adapted.

Of lesser impact were some two dozen food, fiber, and medicinal plants that the Polynesians also brought with them. Only one of these, the *kukui* (now our State tree), naturalized to any extent. Presumably, it displaced what native trees then predom-

inated in most lowland valleys and gulches. It might also be noted that the coconut, which most visitors and residents alike consider almost synonymous with Hawaii, was almost certainly also brought by the Polynesians. Native coastal loulou palms were presumably displaced by these.

A new balance in the Hawaiian ecosystems was struck through 1,000 years of Polynesian colonization preceding the advent of European contact by Captain Cook almost two centuries ago. Conservation of native resources through an elaborate *kapu* system enforced by an absolute monarchy sustained several hundred thousand Hawaiians. The ocean and the lowlands provided day-to-day needs while the upland forests provided logs for outrigger canoes, implements, and fiber. From the forests also came bird feathers, the symbols and trappings of the *ali'i*, the monarchy.

The comparative isolation of the Hawaiian Islands continued. The evolution of the distinctive Hawaiian language and other unique developments, such as the culturing of mullet in extensive coastal fishponds, indicates that little contact was maintained between Hawaiians and other Polynesian groups several thousand miles to the south.

Once Captain Cook broke the previous stage of isolation, the stage was set for a cultural and biological barrage of continental influences which continues unabated to this day. In short order, goats, sheep, cattle, horses, pigs, cats, roof rats and Norwegian rats were introduced purposely and inadvertently. Most of these quickly became feral or wild. The Hawaiian monarchy looked upon many of these with favor and placed a *kapu* on their killing. Roving herds of grazing mammals quickly wrought great changes in all areas excepting the rain forests. Particularly heavily impacted were the drier leeward areas and the alpine areas of Maui and Hawaii islands. Whole forests and their flora were rapidly decimated. Several of the recently landed missionaries and seafarers became large land-holding ranchers and comparatively massive areas on the major islands were then cleared for ranching.

In the middle 1800s a sugar industry grew rapidly. Then followed another massive alteration of the land in wetter windward areas and drier areas which could be irrigated. The dry forests in the lowlands became a memory; only fragments remained



Photo by Fred Stimson

Perennially awed by the vastness of the Pacific, modern visitors, like ancient Hawaiians, are drawn to the seashore.

into the 20th century at the time botanists began a more thorough inventory of the flora. The alarming disappearance of the forests prompted early botanists such as Dr. William Hillebrand to press for the establishment of forest reserves for watershed in the 1850s lest the islands be turned into a desert. His pleas went virtually unheeded for another half-century.

Concomitant with the destruction of the flora was the introduction of numerous alien or exotic plant species from throughout the tropical world. Some, such as the *kiawe*, a relative of mesquite, and *koa haole*, have so extensively naturalized that most residents have come to accept them as part of the natural lowland flora. Other introduced plants, which were adapted to browsing and grazing animals by virtue of spines or poisonous qualities, quickly began to overrun pasturelands and disturbed forests alike, and so seriously that the first attempts at finding natural insect enemies of these plants (a procedure now called biological control) were started early in this century.

Not only weeds gained footholds here, however. A grim "biological roulette," with humanity center stage, began to take a frightful toll of native land birds. The roof rat, which gained an early foothold via the whaling fleet in the early 19th century, made depredations on native birds and sugarcane alike. Cane growers introduced the small Indian mongoose to prey upon the rats, but the scheme had little impact since the prey is largely nocturnal while the predator is diurnal. What flightless birds the rats left

were rapidly exterminated by the mongoose.

Remember those early whalers, the very ones about which so much romantic literature fills bookshelves? Well, they also foisted such exotic vermin on Hawaii as mosquitoes, roaches, and who knows what else! With the now understandable disappearance of native birds from the lowlands and the increase of insect pests (agricultural inspection and quarantine were still far off) came the efforts to bring in foreign birds to fill the "void." Mynahs, house sparrows, house finches, barred doves, rice birds, and others were imported and established in short order. Notices were placed in newspapers urging ship captains to bring in more.

The first scientists to survey native land birds at the close of the 19th century were perplexed to find that many native forest birds were becoming extinct, some almost as soon as they were discovered. Even in the mountain fastness of the rain forests, all the honeyeaters save one and a sad array of honeycreepers vanished. Oahu alone lost eight kinds of birds. The answer to this stunning turn of events was decades in coming. Few of the general populace knew of this; far fewer cared. Even today this bleak chapter in Hawaii's natural history

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holds many secrets. Topping the list of conjecture, smattered with occasional scientific facts, are: (1) the roof rats quickly did in the honeyeaters which were tree hole nesters; (2) mosquitoes spread bird malaria and poxes from the relatively immune introduced birds to the susceptible native species; (3) the impact of the destruction and/or impoverishment of native forests; and (4) a combination of these factors. So much for the extinct native birds. May they rest in peace.

When watershed protection finally became the rallying cry early in this century, the eyes of the foresters turned to Australia, North America, Africa—about everywhere *but* Hawaii. Native trees were said to be too specialized, too slow growing, too this, too that. Denuded slopes had to be clothed in forests and quickly. A diverse assemblage of tropical and subtropical trees was established. Another onslaught of reforestation was given an impetus during the make-work programs of the Great Depression of the 1930s; then again beginning after World War II when commercial forestry became the political drawing card. Plans were made for the conversion of comparatively vast tracts of "noncommercial" native forests to exotic tree plantations in most areas which could be easily leveled by bulldozing, this under the umbrella of federally funded "reforestation" funds. But, extensive plans are still on the books and political backing is still evident both at the state and federal levels for more of the same if we conservationists do not remain vigilant.



ALL LEGAL GAME species in Hawaii, at present, are exotic in origin. Among the greatest political conflicts in preserving the native biota is the use of conservation-districted lands by the State Division of Fish and Game for recreational hunting, on a sustained-yield basis, of several species of feral mammals which are destroying the native flora. Unfortunately, the largest natural ecosystems are in these conservation districts. There is continuing pressure on the Division by hunter-backed lobbies to introduce and distribute more exotic game species throughout the major islands of the archipelago. These are proposed under the guise of wildlife "restoration" programs. The bulk of the funds for these programs is derived from federal Pittman-Robertson funds which, in fact, constitute federally subsidized destruction of natural Hawaii.

Other forms of biological pollution are four exotic species of rodents and uncounted numbers of exotic insects which exert subtle (compared to exotic mammal damage), but cumulatively devastating impacts on the non-adapted and usually unadaptable native biota. The present rate of exotic insect establishment, for example, now approaches two dozen species per year. One insect group, the ants, of which 42 species have been introduced, is considered to have great impact as predators on insular invertebrates.

The door to the introduction and release of exotic cage birds will, hopefully, soon be closed through Federal Lacey Act regula-

tions. Since 1965 more than 20 species of exotic birds have been released, accidentally and intentionally, on Oahu alone. Evidence is accumulating that those species which successfully invade native habitats harbor pathogens and parasites which are detrimentally vectored to endemic avifauna, as well as being potential competitors for native ecological niches.

The removal of protective vegetation and consequent overheating of water courses and other impacts impedes or stops passage of diadromous species. All of our native freshwater fish and many of the invertebrates are diadromous—that is, they must reach the ocean at some time in their life cycle. Detrimental marine impacts, espe-

cially from urbanization and agriculture, are siltation of reef environments, eutrophication from sewage, toxic effects from industrial and agricultural wastes and pesticides, all of which help destroy coral reefs and their associated communities. Overfishing, overcollecting of mollusks, and commercial exploitation of colorful reef fish by salt water aquarists and shell collectors also take their toll. Extremely low populations of green sea turtles continue to be harvested. Although exotic species are not considered major impact or concern in the marine environment, an exotic mullet has had detrimental economic consequences.

Intensive recreational activities along the coastline are obliterating coastal strand ecosystems on accessible sand dunes. The coastal strand floras are now practically restricted to the Northwest Islands and to a few isolated areas in the main islands.

Large numbers of plants, over 4,000 species to date, continue to be introduced primarily for commercial purposes. Many hundreds of these have naturalized, competing with the native flora as well as becoming noxious weeds on agricultural lands. These also provide avenues of attack for polyphagous (i.e., can feed on a wide range of plants) introduced insects to gain access to the native flora. Wild plant material (seeds and cuttings) is being collected directly from the continental tropics and sent to Hawaii. Undoubtedly, imbedded insect eggs, latent viruses, and other pathogens are escaping detection and are establishing.



Native plants like these are fighting a losing battle competing against an alien flora now numbering some 4,000 species. The invaders provide an avenue of attack for exotic insects which then turn their attention to the endemic species.

Potential weed species are not adequately screened. For example, members of the Melastomaceae, a family not represented in the native flora, continue to become noxious weeds. These vigorously compete with and displace native species especially in disturbed rain forest habitats. Wild guavas and other species of horticultural interest have also vigorously naturalized. Their dispersal is often aided by exotic birds, feral pigs, and other wildlife which feed upon their fruit.

These multifaceted activities of man in the Hawaiian Archipelago, in concert, create a bizarre "Noah's ark" for a diverse assemblage of the world's biota. The native biota seems seldom, if ever, to be benefited. The destruction proceeds apace, quickly now in the drier lowlands and slowly, but inexorably, in the fastness of now almost pristine, remote rain forest wildernesses. There unmolested feral pigs and exotic rodents and birds reproduce unfettered by nonexistent natural enemies or by human interference. While activities aimed at holding and pushing back the biological tidal wave are only now being conceived, many destructive elements continue to be fostered as part of the "heritage" of Hawaii.

Military activities are also having detrimental impacts. Kaula Islet off Niihau is a major pelagic bird rookery that is used by military aircraft as a target. Ordinance impact areas on Oahu such as Kahuku training area and Makua Valley are subjected to repeated ground fires, and since the fire breaks have not been placed in these

Wet forests in Hawaii are coated with mosses, liverworts, and lichens. These are epiphytes, or air plants, which provide a purchase on tree trunks for larger epiphytes such as ferns and flowering plants.

areas, native forests containing endangered plants are being destroyed. When the proposed list of endangered flora submitted by the Smithsonian Institution is accepted by Congress as provided in the Endangered Species Act of 1973, the Department of Defense will find itself in violation of federal law unless these blatant abuses are curtailed.

THERE EXISTS an almost complete vacuum with respect to the presence and availability of materials, particularly at the high school level, in environmental education which specifically relates to Hawaii's natural history. By contrast, many facts of this heritage (i.e., evolution and volcanism) are relatively renowned to scientists throughout the world. Most of Hawaii's youth, however, now progress through an educational system that sheds almost no inkling of their island treasures save an occasional superficial, often incorrectly interpreted, glance. For the very few who are fortunate enough, by happenstance, to encounter a partial introduction to this aspect of our heritage, the encounter usually does not occur until college level at the University of Hawaii where there is a *single* course in Hawaiian natural history.

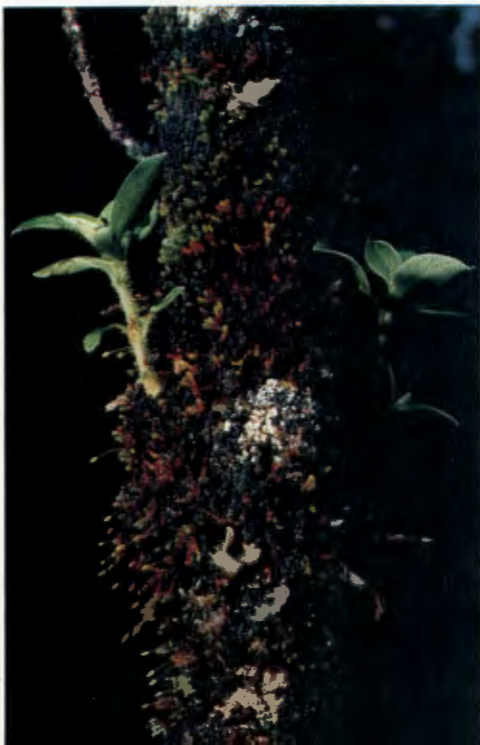
Called the Foundation Approach to Science Teaching (FAST), this program is endeavoring to write Hawaii-based texts for high school use on a broad spectrum of science-related subjects. There is also a small multidisciplinary environmental awareness program for the elementary students called the Hawaii Nature Study Project, which is in its developmental phase. Another commendable effort in the right direction is the four-year-old High School Hiking and Trail Maintenance Programs of the Hawaii Chapter of the Sierra Club. These

help greatly to instill an appreciation for nature and Hawaiian natural resources for the few hundred high school students attracted to these activities each year.

Biological texts used in Hawaii are written by and for a mainland scholastic audience. Our teachers are often mainland trained. There is an almost complete lack of state funding for the development of curricula relating to our unique natural heritage, and the poor political climate makes the immediate prospects for such funding very poor. A recent, substantial citizens' effort, for example, to establish a State Environmental Education Center was vetoed by the Governor. A commendable effort by the Hawaii State Department of Land and Natural Resources to publish a magazine relating to conservation in Hawaii—the *Aloha Aina* magazine—was terminated by budgetary restrictions. Consequently, there exists a general unawareness of our environment, its rich lore, and its importance to ecological stability. The small local base of operations, both geographically and on a population basis, makes it seem unlikely that there will be a ground swell with respect to the development of natural history curricula. Curricula that have been developed under the umbrella of environmental education too often predictably follow the pattern of conventional concern—pollution, population, and "aesthetic ecology."

There also is a lack of "translation" of the comparatively abundant germane material resulting from Hawaii-based research at the academic level to that utilizable at the intermediate and high school levels. We have an impressive body of "ivory tower" research ancillary to Hawaiian natural history. And, because of this small base of operations, those few who take it upon themselves to analyze, simplify, and popularize this body of research are often necessarily constrained to find an audience in national natural history magazines such as this one, which, in turn, reach a comparatively small audience in Hawaii.

The upshot of all this is an abysmal ignorance or an almost total lack of appreciation for Hawaii's truly unique natural heritage. Consequently, this natural heritage is being constantly, rapidly, and increasingly eroded, modified, or destroyed by the multifaceted impact of modern world in our island ecosystem over the protestations of a harried, small core of individuals. Coupled with this is a general confusion as to the nature, importance, and value of trying to maintain maximum environmental diversity. There then results the familiar loss of native ecosystems, their component endemic species, and a lengthening of our lists of extinct or threatened biota.



Photos by J. Mantner (left) and Robert J. Shallenberger (above)



Opae kala'ole (Atya bisulcata)



O'opu nakea (Awaous stamineus)



Calliasmata pholidota



Procaris hawaiiiana



O'opu hi'ukole (Lentipes concolor)

Irrigation, Pollution Threaten Rare Creatures of Streams and Pools

More than 300 streams flow throughout Hawaii's largest islands. Collectively, they provide an environment for an unusual native community — a once-rich world of curious creatures like gobis (*o'opu*), fishes equipped with a sucking disc for migration upstream from the sea. *O'opu nakea* is the largest and most abundant, while *o'opu hi'ukole* is the rarest and most distinctive. Like the gobis, shrimp (*opae*) have been an important food source. Most numerous is the filter-feeding *opae kala'ole*. Two of several rare shrimp, *Procaris hawaiiiana* and *Calliasmata pholidota*, live at the interface of fresh and salt water on Maui's Cape Kinau. In lava-lined pools — a weird world of crevices and cracks — these blind and almost colorless shrimp may represent an evolutionary step to a cave-dwelling existence. Hawaii's streams have been severely decimated by water diversion, principally for cane irrigation. Increasing population, exotic species, and pollution now leave the State with fewer than two dozen streams of high natural quality.



A remote Hawaiian stream reaches the sea.

Photos collection of John Mack

DECEMBER 1975

Defenders



The Magazine of Defenders of Wildlife

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Pages tell

DEAR EDITOR:

You are to be commended for your October issue of DEFENDERS. As in the classic work of Charles Dickens, David Copperfield in the opening lines begins—Whether I am to be the hero of my life or that that station be held by another these pages must tell. Certainly your open and positive articles have exposed trapping for what it is; you are the heroes of your lives.

*Rudolph A. Peuh
Lynn Haven, Florida*

Impact

DEAR EDITOR:

Not until I opened the front and back covers of your October issue into one picture did the full impact of its terrible message hit me.

I wish this picture could be reproduced in every newspaper in the country. Unfortunately, it will probably be seen only by subscribers to DEFENDERS, who are already aware of and angered by the butchery of innocent animals so their skins can be stripped from them to adorn the pitiless human animal.

*Ginny Schlageter
Denver, Colorado*

Best ever

DEAR EDITOR:

Your last issue (October, 1975) was by far one of your best ever. Never have the pages of any one magazine shown so clearly all animals' right to live. In your magazine I have found all that is good: man's desire to help creatures who cannot help themselves and to speak for those who cannot speak. No aspiration could be nobler or closer to God.

*Joyce Brumitt
Kankakee, Illinois*

Best yet

DEAR EDITOR:

I must congratulate you on the October issue of DEFENDERS, which just arrived. I've read enough of it to see that it is the best issue yet. Special thanks for James A. Cox's "If You Want to Be Good—Join the Big Brotherhood." Maybe he can do one of his epic poems about beavers.

Tomorrow morning New Jersey small-game season begins. From then on, my husband and I will spend much of our time patrolling the [Unexpected Wildlife] refuge, and we will be witness to many atrocities in the name of "sport." It seems to me your magazine is taking a stronger stand than ever regarding hunting, and I'm glad to see it.

*Mrs. Hope Sawyer Buyukmihci
Newfield, New Jersey*

NOTICE

The American Carnivore Series of collectors' prints by Paul Breeden, announced in the October, 1975, issue, has been cancelled. If you have already placed orders, refunds will be made.