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TAKAPOTO ATOLL, TUAMOTU ARCHIPELAGO: TERRESTRIAL VEGETATION
AND FLORA

BY

M.-H. SACHET

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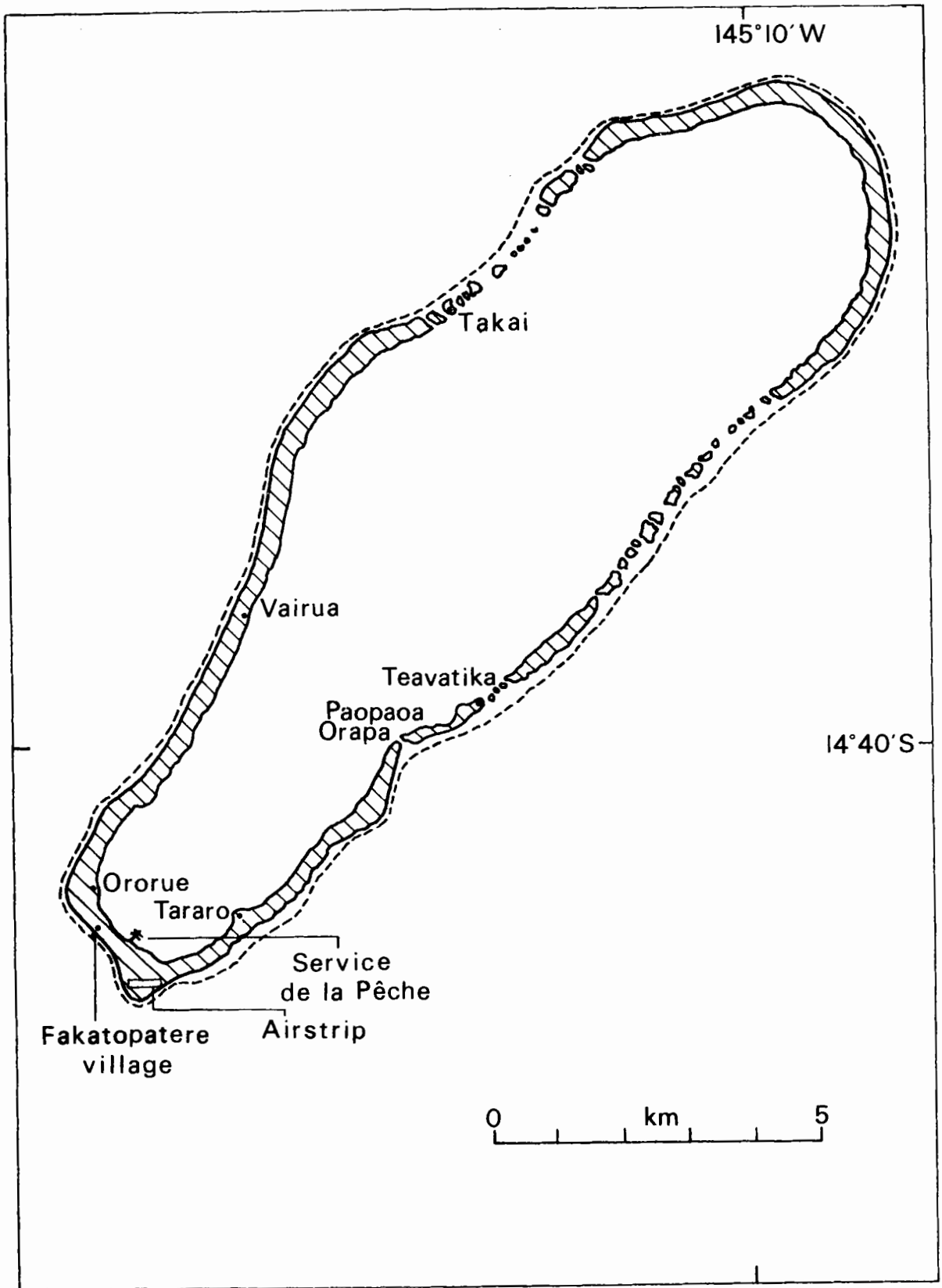


Fig. 1. Takapoto Atoll

TAKAPOTO ATOLL, TUAMOTU ARCHIPELAGO: TERRESTRIAL VEGETATION AND FLORA

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INTRODUCTION

The Man and the Biosphere (MAB) programme of UNESCO, first thought of in 1968, launched in 1970 and endorsed by the Stockholm Conference of 1972, includes a number of scientific projects, of which No. 7 is devoted to the Ecology and Rational Utilization of Island Ecosystems. All the programmes are to be interdisciplinary and intergovernmental. Among member countries which developed their own national plans within the framework of the separate MAB projects, France drafted a vigorous one in MAB 7 in French Polynesia, under the leadership of Dr. B. Salvat (1977). The French programme includes a detailed study of an atoll, Takapoto in the Tuamotus, and comparison of its ecosystems and their functioning with those of a high island already under scrutiny, Moorea in the Society Islands.

Teams of over 40 scientists representing many disciplines visited Takapoto over a period of several years (1974-1976). Several research organisations participated, in some cases bending their own study goals to fit the MAB-7 framework, so that an extensive body of information has become available and lends itself to integration and synthesis. Preliminary reports, as well as some final papers have been published.

I was already in SE Polynesia in 1974-75 and it was arranged that I would visit Takapoto in Dec. 1974 to study its flora and vegetation. The host institution was the Service de la Pêche, and I stayed in one of the bungalows of their Pearl Experiment Station. These were built on pilings over the quiet shallow lagoon, and linked by wooden walkways, forming a small attractive over-the-water village. I am very grateful to Philippe Siu, then of the Service de la Pêche, and to B. Salvat for this opportunity. Unfortunately I could not take the fullest advantage of it because the person in charge, Danny Carlson, was on leave. I could have learned much from her about the flora and its native names and uses. No boat was available at that time, so I could not visit the

* Dept. of Botany, Smithsonian Institution, Washington, D. C. 20560.
Antenne du Muséum et de l'Ecole Pratique des Hautes Etudes, Centre de
l'Environnement, Moorea.

NE half of the atoll. My principal guide was Huri Maire then school-teacher in the village, and I remember with gratitude his friendly company and eagerness to inform, as well as that of other inhabitants I met. All Polynesians are passionately interested in plants and enjoy sharing their knowledge of them, and it is a pleasure to work with them.

GEOGRAPHY

The Tuamotu Archipelago, between 14° and 24° S and 134° and 149° W, is the largest group of atolls anywhere (about 75), and includes low islands of every size and shape. Some are tiny single motus with no lagoon, others are very large atolls with enormous lagoons, which may be very deep or shallow and cluttered with scattered reefs or coral pinnacles, widely opened to the ocean or closed or almost so. A few are somewhat elevated. Distances between the islands vary, but altogether the group creates a formidable obstacle to navigation, and sailing through the maze was considered very hazardous, hence the name Dangerous archipelago coined by Bougainville. Sailing vessels tried to avoid it as much as possible and quite a few, as well as modern ships with sophisticated navigational aids, finished their career on the reefs. The chain stretches in a general NW-SE direction and many of the atolls in the main alignment are so oriented. Others, along the NE edge of the group especially, are arranged at right angle, with their larger dimension SW-NE. Takapoto (14° 40' S, 145° 10" W) and its sister island Takaroa (King George's Islands) are so oriented as are the nearby pair of Manihi - Ahe.

Takapoto is an atoll, about 17 by 5.5 km, with a continuous reef and no real pass, the only communication with the ocean consisting of slight depressions of the reef surface devoid of land deposits but forming shallow channels called "hoa." The emerged land strip on the reef, about 40 km long, varies in width from 350 to 800 m at the SW point where the only village is located and where an airstrip has been established between it and the ocean-side reef. The reef flat is relatively narrow all around the atoll. The lagoon bottom slopes fairly regularly down to 40 m, with a few deeper basins (45 m). Many coral pinnacles rise from the bottom to varying heights, some almost breaking the surface of the water. The SW end of the lagoon is a conservation and research area for the Pearl Oyster Experiment Station.

The reef and especially the lagoon were studied in great detail by French biologists and oceanographers and their observations assembled by Salvat (1977) and in a special issue of the *Journal de la Société des Océanistes*, 1979. The geomorphology is described in some detail by Chevalier et al., 1979.

CLIMATE

The humid tropical oceanic climate of the Tuamotus, including Takapoto, varies little over the year. Atmospheric humidity is always high (80%) and temperatures are only slightly higher during the "summer"

(Nov.-April) and change little during the day (average 21° C). Atmospheric pressure, sunshine and cloud cover remain also relatively even except in stormy weather.

The NE trade winds predominate during most of the year, passing to the SE during the "winter" when stormier conditions may occur. The principal disturbances come with winds from the W and NW quadrant, with rain storms and high winds. Because the atolls rise so little above sea level, windstorms can bring very high and powerful waves and some land areas may be inundated and reef and beach sediments redistributed. Large blocks of coral torn from the undersea slopes of the reefs and thrown up on the reef flats are evidence of the power of such waves, and are especially noticeable on Takapoto along the NW reef near the several shallow "hoa."

Rainfall is the most seasonally variable factor in the climate. The "winter" season corresponds roughly to a dry season, and if the rains are slow in returning in November, a water shortage may occur. Water supplies have two main sources, ground water percolating through the porous substratum to the ground water lens and reached by shallow wells, and rain water collected from roofs into cisterns. Rain water collectors are not always maintained in good conditions, and wells, which are not habitually used nowadays for drinking or cooking, are often polluted or neglected, and do not suffice to replenish the supply.

Tsunamis generally do not affect atolls severely, except under very special conditions, because the wave, oscillating vertically, can pass an atoll with almost vertical submarine walls without breaking and releasing the enormous amount of water and energy it carries. Cyclonic storms and other violent storms, however, can be devastating in their effects on low islands which are not only vulnerable to high winds, but suffer great damage from flooding. The Tuamotus are generally said to be in a zone relatively free of cyclonic storms (cyclones, typhoons or hurricanes), but such are in fact frequent enough to need taking into account in planning construction and settlement.

Giovanelli (1940) and Teissier (1969) have published lists of tropical storms and hurricanes known to have affected French Polynesia and especially the Tuamotus (a tropical storm becomes a hurricane when the winds reach 65 knots = 120.5 km/h). The records go back to 1822 when the atoll of Anaa is known to have been devastated (Morenhout 1837, 1:365), as well as several neighboring atolls. Anaa was hit again in 1825. In Jan. and Sept. 1877, several storms caused important damage to various atolls including Manihi. The hurricane of 6-7 Feb. 1878 was extremely violent and 117 persons were killed in Kaukura.

The first well documented hurricane known to have hit Takapoto is that of Jan. 14-15, 1903. This terrific storm devastated a large number of atolls and 515 persons died, 377 of them at Hikueru where pearl divers and their families had assembled from other atolls for the diving season.

Another storm (March 23-25, 1905) caused extensive damages on Manihi and Takaroa. The hurricane of 6-8 Feb. 1906 was also a tremendous storm, causing immense damage in the Society Is. and Tuamotus, including Manihi and Takaroa, where the N. coast was so pounded and flooded that there would have been many victims, except for the lucky fact that the population was on the other side of the atoll. Still, almost all the casualties (at least 121) occurred in the atolls. In those three great hurricanes (1878, 1903 and 1906) most of the damage was caused by the storm tides rather than directly by winds.

Teissier mentions only one more storm to hit the Tuamotus, in Jan. 1958. But there must have been others in pre-European times, and perhaps also since 1958, to reach Takapoto.

According to DeAngelis (1983:108) only 6 tropical storms formed east of 160° W between 1969 and Nov. 1982. But from Dec. 1982 (Lisa) through April 1983 (Veena), 6 formed in this region and affected French Polynesia, 4 of them some of the Tuamotus. Of these, Nisha/Orama (Feb. 20-28), Rewa/Reva (March 6-15) and Veena (Apr. 8-14) passed close to the Takapoto-Manihi area, the first demolishing buildings and other installations such as airstrips, defoliating and breaking coconut palms and other trees. Piling up sheets of coral shingle on shores and occasionally far into the land strip is probably the worst and most durable effect of these storms. Waves tear up large blocks of coral from reef fronts and throw them on reef flats, across "hoas" or, in some lagoons, on top of coral pinnacles. Small sandy islets can be built up or swept away, channels opened or closed. In the case of large lagoons, storm waves of sufficient height and energy may carry sheets of coral shingle onto lagoon shores. At Rangiroa, Orama and Rewa piled coral from the lagoon into both of the large and handsome villages.

Most trees and shrubs commonly native on atolls are relatively resistant to the effects of storms. Even Pisonia trees, with their shallow root systems, brittle wood and thin leaves, survive rather well. They leaf out quickly and branches of fallen trunks grow vertically and become new trunks of trees. Nothing can be done to save coconut palms that have been snapped or completely uprooted, and coconuts and copra crops are lost for some years even after the palms recover. Introduced trees and plants tend to be much more vulnerable than native species and are often killed. Breadfruit trees never thrive if underground water is too salty or if they are exposed to sea spray, and they are easily killed when villages or plantations are flooded with sea water, or hit with strong salt-laden winds.

In the 1983 series of hurricanes, aside from anxiety and fright, lack of food and more crucially water, one of the worst hardships the people had to endure especially on those atolls, including Takapoto, which were hit more than once, was lack of protection against the sun: buildings had been flattened, roofs swept away, trees defoliated and when clear weather returned, there was no shelter from heat and glare.

DISCOVERY AND EXPLORATION

Takapoto was probably discovered by Dutch navigators early in the 17th century, and in 1622 Roggeveen lost a galley on its reef; the wreck was seen by Byron, Cook and other navigators; eventually (Moerenhout), only the guns could be observed; these guns were located anew by Danny Carlson and are described by Chazine (1977: 197-198). The two atolls, Takaroa and Takapoto, were named King George's Islands by Byron in 1765. During his second voyage Captain Cook (1961: 376-379) located them (April 17, 1774) and landed on the easternmost, called Teoukea [Takaroa]. This is an important botanical landmark, as some of the Forsters' atoll plants are labelled Teoukea and represent some of the earliest collections from the Tuamotus. They found (1777, 2:41) "a scurvy-grass, which was common, and seemed to be very wholesome. The natives showed us that they bruised this plant, mixed it with shell-fish, and threw it into the sea..." to intoxicate fish. "The name which they give to this useful plant is e-Now [Lepidium piscidium Forst. = L. bidentatum Montin]. We likewise met with plenty of purslane, resembling the common sort, which the natives call e-Tooree." The Forsters described the natives, their huts and canoes, their dogs, the clumps of bushes and trees, and the abundance of coconut palms. Incidentally, while sailing past many Tuamotu atolls, but especially at Takaroa, J. R. Forster described the process of soil formation and vegetation development (1983, 3:494-495), a view which he expanded in a more general account of atoll formation (1778, 2:148-159).

After this landing, Cook passed Takapoto (Oura, Taapouta), and then sailed on through the archipelago. Voyages became fairly frequent in the 19th century. Navigators who have published descriptions of Takapoto include Turnbull on the Margaret, Capt. Byers, in 1803, cited by Robineau (1977: 4), Kotzebue in 1816 and 1824, Moerenhout in 1830, Dumont d'Urville with l'Astrolabe and la Zélée in Sept. 1838, and Wilkes with the U. S. Exploring Expedition in 1839.

Moerenhout describes the atoll as follows:

"L'île de Taapouta n'a aucune ouverture par où la moindre embarcation puisse entrer dans son lac intérieur; mais comme la mer était belle, nous débarquâmes facilement sur le rescif, où je fus reçu par une vingtaine d'Indiens, qui m'accueillirent avec des démonstrations d'amitié, et me conduisirent à leurs maisons, toutes construites, comme dans l'île de la Chaîne, à l'intérieur, sur le bord du lac. Là, ils me montrèrent une quantité de nacre qu'ils avaient entassée dans une de leurs habitations;

"Je ne voulus pas quitter cette île sans l'examiner un peu. Le sol en est assez étendu pour qu'on y puisse cultiver le taro, dont je trouvai des plants en divers endroits. Quoique le lac soit très-petit et déjà presque comblé, il ne s'y trouve que fort peu de cocotiers. Je présume qu'ils ont été détruits, dans cette île comme dans toutes les îles voisines, pendant les guerres de ses habitans avec les habitans d'Anaa. Elle possède, comme les autres, le fara (pandanus odoratissimus), et autres arbres propres à divers usages. Pendant notre promenade, les Indiens me parlèrent de canon."

Dumont d'Urville (1842, 4:53) passed "Tiokea" and "Oura" and wrote of the first (Takaroa) that it was low, well-wooded, with a lagoon and enormous clumps of coconut palms. He noted a large hut and many smaller ones and perhaps 50 inhabitants. Of Takapoto, also low, well wooded and with a lagoon, he remarked that it was well furnished with coconut palms, which must have become more numerous since Moerenhout's visit 8 years before.

The Wilkes Expedition (1845, 1:336), on the Vincennes, did not land at Takapoto but did at Manihi and Ahii on Sept. 6 and 7, 1839, and the Flying-Fish surveyed Takaroa and Takapoto a few days later. Charles Pickering, botanist and biogeographer, sailed with the Vincennes. In his *Distribution of Plants ...* (1876) he gives accounts of vegetation and plants for areas he visited (this volume was never officially published, but some copies were assembled from printed stock). Pickering's method in describing floras consisted in listing the plants observed on the first island encountered in a particular group, and thereafter in referring to this list, according to his "geographical order of numbering," with a mention of additional or missing species for each island visited. Thus of Manihi he says (p. 232): "The vegetable growth, as far as examined by myself, proved entirely the same as on Taiara coral-island; but with less variety, nearly one-half of the species being absent. An additional species [a sedge] was however discovered by Mr. Brackenridge..." The plants these botanists collected are almost always labelled by island group only. They are preserved principally at the Gray Herbarium, Harvard, and in the U.S. National Herbarium. Many shells were collected on Manihi also.

Among the other great natural history expeditions, the Whitney South Sea Expedition did stop at Takapoto, Manihi, and nearby atolls to collect birds and a few plants, in Aug. 1922 and Feb.-March 1923. E. H. Quayle also examined and perhaps preserved corals and other reef animals, and algae.

VEGETATION

As with all (or most) atolls in regions of moderate to heavy rainfall, much of the landstrip of Takapoto was probably covered by forest before the arrival of human settlers. Areas with very thin or no soil may have had a scrub vegetation or even bunch-grass. With the coming of European man, much of the forest was destroyed and replaced by coconut groves or plantations.

During my stay of only 5-1/2 working days (Dec. 12-18), I was able to visit only the S half of Takapoto, from Takai to Orapa and Teavatika. Most of the time was spent exploring on foot and collecting around the village and airstrip, and between Vairua and Tararo and a little beyond. Two trips by car, walking back on a track which follows the lagoon shore, led me to the hoas at both ends of the V-shaped South islet.

Woody vegetation

Along the West arm of the V, the geometrically planted coconut palms extend only part way from lagoon toward ocean in most places, probably because the ground is very rocky nearer the ocean shore; but along the lagoon, they frequently come almost to the shore, which is lined by a narrow very gently sloping beach.

On the ocean side, extends a strip of rather poor scrubby open forest, perhaps resembling what was there in pre-human times and including Guettarda speciosa, Pandanus tectorius, Tournefortia argentea, and Pipturus argenteus, with a shrub layer of Timonius polygamus, Scaevola sericea var. tuamotuensis and Suriana maritima, and a ground cover of grasses, Heliotropium anomalum and Euphorbia near E. atoto. The shrubs scattered under the forest become dominant as an irregular hedge as the ocean shore is approached. Where the soil is sandier or of fine gravel, Suriana maritima is common, frequently parasitized, often covered, by tangles of orange to greenish strings of Cassytha filiformis, a leafless parasite. On bare limestone, reef or island conglomerate, or where this is only thinly covered with sand, the vegetation is a dense, tough scrub or scrub-forest of Pemphis acidula, which is seldom seen except in such habitats. It can reach a height of 3 or more meters. Suriana and Pemphis have a very similar habit, and seem to replace each other as the substratum varies from limestone sand to rock. These two plants are much in demand, especially Pemphis (mikimiki), as bunches of their tangled branches and twigs are cut or uprooted and used in the lagoon as collectors for pearl-oyster larvae ready to become attached (spat) (Reed, 1973, Robineau, 1978). Occasionally, the lagoon shore is formed by island conglomerate (called papa in the Tuamotus) with or without a sand cover, and Pemphis forms small clumps of wiry shrubs; elsewhere Suriana (u'u) is found scattered on the sand.

Approaching the hoas at Takai, the coconut plantation thins out and the trees look sickly, yellowish, giving way to scrub of low Timonius polygamus with scattered rather chlorotic Tournefortia bushes. The ground is very rocky with a layer of papa emerging from under the islet at the edges of the hoas. On such bare conglomerate, which also forms flat islands above the level of the rocky hoas, Pemphis is usually the only plant to be found.

Near Vairua, about 8 km NW of the village, inside the coconut plantation, groves of tall Pisonia grandis rise above the nearby palms. Contrary to what has been assumed in descriptions of Takapoto and other atolls, Pisonia does not occur where there is deep rock soil. It is the other way round: This tree, which can reach enormous size, is exceptional in the tropics in producing an acid, peat-like or mor-like raw humus, forming a layer on the coral sand and gravel floor of the forest. Locally these trees are a favored roosting and nesting place for white-capped noddies (Anous tenuirostris), red-footed boobies (Sula rubripes) and fairy terns (Gygis alba). Where abundant white excrement from these fish-eating birds accumulates on the litter of leaves and the humus layer and is washed down through it by rain, a hard-pan of phosphatized coral

limestone is likely to form beneath the humus. Such formation of Jemo soil, first described from the Marshall Islands (Fosberg 1954), was observed at Vairua.

I was told that the Pisonia groves at Vairua had been left as a sort of bird reserve, since noddies were eaten, but whether this information was correct, and whether the groves survive I do not know.

Under the tall dense Pisonia trees, the dark somewhat spongy soil is bare of vegetation but around them, where the shade is less, occur larger Guettarda and Tournefortia, smaller trees of Pipturus argenteus, sprouts of Morinda citrifolia, and other scattered trees. Tall clumps of gray Achyranthes velutina fill a sunny clearing. The ground cover here includes Polypodium, Boerhavia tetrandra, Laportea ruderalis and where the shade is less dense, Lepidium, Digitaria and locally Hedyotis romanzoffiensis.

The coconut plantation itself is very neat or "clean", which means that brush and ground cover are regularly cut or burned. This practice is intended to make it easier to collect nuts at harvest time, and to discourage rats. However, it also results in impoverishing the ground of part of its meager organic matter supply, and in impeding soil formation. The shrub or small tree layer which keeps sprouting from cut plants includes Guettarda speciosa, Calophyllum inophyllum, Morinda citrifolia, Timonius polygamus and, when the canopy is not too dense, some Suriana. On the ground are Triumfetta procumbens, Polypodium scolopendria (also on palm boles), Lepidium bidentatum, Lepturus repens and other grasses, Portulaca johnii and, especially on bases of coconut trees, Psilotum nudum. Nervilia aragoana, a very small ground orchid with a single plicate deciduous leaf, replaced at the flowering season by raceme of small flowers is quite rare. Tufts of a rather coarse grass, Digitaria stenotaphodes, are distributed here and there.

Where the sandy ground slopes toward the lagoon occur taller trees of Guettarda, Calophyllum and other species.

Along the East arm of the V, on the other side of the village, the coconut plantation seemed rather poorer, except for an experimental plot of a dwarf coconut variety of a beautiful orange color not far past the airstrip. At Tararo, the sandy lagoon shore was lined with Suriana shrubs, and locally with Sesbania coccinea, a shrub or small tree with feathery paripinnate leaves, sweet-pea size orange and red flowers and long thin hanging pods (kofai). Whether they survived increased construction and effects of storms is problematical.

Beyond Tararo, the coconut plantation was locally interrupted by fields of coral blocks and boulders which appeared to be ancient hoas completely filled in by masses of coral shingle possibly carried in and deposited by storm waves. Such boulder fields are entirely covered by a pure scrub of tangled Timonius polygamus about 2 m high and practically impenetrable, the long arching woody branches of the shrubs being intertwined into a very dense, scratchy thicket. It is the most unpleasant

type of vegetation because even only a short distance into it, the total lack of air circulation makes the heat and humidity appear much worse than anywhere else in the atoll.

Herbaceous vegetation

In former times, taro (Colocasia esculenta) was cultivated in Takapoto and all other inhabited atolls of the Tuamotus. This involved a tremendous amount of very hard work, because pits or winding trenches had to be dug down to the water table (1 to 1.8 m down), often through a layer of conglomerate (papa). From all accounts, the taro tubers produced in such pits were small and of poor quality. Other food plants were most probably grown with the taro. At present all such cultivation has been abandoned in Takapoto, as in most if not all of the Tuamotus. The trenches or "maite" can still be recognized in the form of ditches more or less filled in (Chazine, 1977). Near the village, near the Service de la Peche buildings, a low muddy area locally with open water, was filled with sedges and gelatinous mats of blue-green algae drying to a crust. Dense thickets of Hibiscus tiliaceus line this marsh. Other small depressions occur locally in the coconut plantation and the village.

Village vegetation

The population of Takapoto is now concentrated in a village (Fakatopatere), very open and attractive as are those I saw on other atolls, Mataiva, Tikehau and Rangiroa. Roadways of white compacted sand or gravel separate large holdings with scattered buildings. Everything gives an impression of care and neatness, the white or pastel colors of fences and structures, the flowering shrubs very bright and cheerful. At the time of my visit there were not many actively cultivated gardens, much of the village vegetation consisting of an herbaceous cover with scattered shrubs and trees, both useful and ornamental, such as oleanders of many colors planted along fences or walk, crotons and Acalypha varieties, bright red Ixora sp., Russelia equisetiformis forming cascading bushes with scarlet flowers, Plumeria rubra (frangipani, tipanie) of many shades, Delonix regia (flamboyant) and Adenantha pavonina as isolated specimens. Fruit trees included Muntingia calabura planted along the road to the airstrip, papayas, citrus fruit, a few large Eugenia cuminii, some breadfruit trees including an enormous one shading the main store and the street along it, many large Terminalia catappa and especially Pometia pinnata or kava, the fruit of which are so much prized by both adults and children that they seldom have a chance to ripen and fruit-bearing branches are broken off repeatedly giving the trees a strange shape.

The herbaceous cover includes grasses, sedges, weedy Euphorbia spp. and many other species.

Of the more actively cultivated gardens, one included a small patch of taro plants carefully kept wet and weed-free, cuttings of Plumeria

obtusa recently brought from Tahiti, and other relatively uncommon plants. Another garden had a hedge of Acalypha with colorful foliage, and of Cryptostegia grandiflora vines covered with rose-mauve flowers, as well as a cactus-like Euphorbia which served as support for drying small children's clothes. This garden also included a fine Zoysia lawn, and all sorts of potted plants arranged on the ground, on the house steps, or hanging in trees.

On the ocean side, the village ends with a wharf where whaleboats load and unload passengers and supplies across the reef while ships wait outside the line of breakers. There were copra sheds, an old light-house and a grove of large old trees including the only large Thespesia populnea seen. Nearby a garden enclosed with chicken wire included some vegetables such as "chou chinois", Brassica pekinensis and vines of watermelon bearing fruit (pastèque). These may have been growing in soil brought from Tahiti or the Marquesas.

As described above (p. 6), the repeated blows of hurricanes in the first months of 1983 brought considerable devastation to Takapoto. The buildings of the Service de la Pêche over the lagoon were wiped out, the airstrip piled up with coral gravel and boulders, many houses and other structures lost their roofs or were flattened, debris of all sorts scattered in the yards and gardens, including roofs, overturned cisterns, boats and worst of all sheets of coral shingle. The attractive and colorful village was a pitiful sight immediately afterwards. This type of damage is very quickly and industriously cleared up, as well as broken or uprooted shrubs and trees. Generally, the remaining vegetation leafs out rapidly, but it takes a long time for the surviving palms or fruit trees to bear again, and some years before newly planted replacements can develop and fruit and coconut crops become available again.

MARINE FLORA AND VEGETATION

The role of algae in the fabric and ecology of Takapoto atoll is discussed and illustrated in several papers (Chevalier et al., Chevalier & Denizot (1979), but no enumeration of algae or list of collections is included anywhere except for the phytoplankton (Ricard et al., 1979).

FAUNA

Rivière (1979) paints a picture of the five main Takapoto biotopes placing the elements of the fauna within each and indicating their relationships to the landscape and substrata and among themselves (food chains, public health). A check-list of species collected in the Tuamotus is appended

Some elements of the marine fauna, especially corals, are mentioned and their role briefly described in other papers of the special issue edited by Salvat (1979). Lagoon invertebrates and especially molluscs, are discussed by Richard et al., and the fish fauna by Bagnis et al.

SYSTEMATIC LIST OF LAND PLANTS

Because I stopped several times at the Manihi airport in 1974-75, and had seen herbarium specimens from that atoll, I have included records of Manihi plants in the list below.

In size and orientation Manihi (14°26'S, 146°04'W) is very like Takapoto, 71 km away. However, Manihi has many more reef openings, including a pass deep enough for ships, at the SW tip of the atoll. Near it a deep concrete basin holds fish alive until ready to ship or use. The village, on the E side of the pass is very different from the Takapoto village, and most others in the Tuamotus, in that the buildings are much closer together, with small enclosed gardens. It looks more like a small city. But as elsewhere, everything is white-washed, bright and very neat. The 1983 hurricanes, unfortunately, demolished the village, and caused much damage to installations and vegetation.

The airstrip is on a separate motu, reached by boat through coral shoals and fish traps. This motu consists almost entirely of a large ridge of coral fragments, and pioneer shore vegetation extends all the way from ocean to lagoon at least in the vicinity of the airstrip. Some ornamentals had been planted near the "airport."

I have included English and other common names of plants when known. Those marked (P = Paumotu) or (T = Tahitian) were given to me by Huri Maire originally from Takaroa. The names for the Manihi plants are from the specimen labels of W. T. and C. C. Brooks who made an extensive collection of plants there in 1967, not all of which I was able to examine.

All my collections are deposited in the U. S. National Herbarium (US), with duplicates for the Bishop Museum (BISH) and the Paris Museum.

BRYOPHYTA

Brachymerium melanothecium (C. Mill.) Jacq.

Bright green moss, fairly common on ground in coconut plantation.
Vairua, Sachet 2060 (US).

Calymperes tuamotuense Bartram

Manihi, Bartram 1933 p. 6, citing Whitney Exped. 1929.

PSILOTACEAE

Psilotum nudum (L.) Beauv.

Broom-like green or orange tufts of prismatic, dichotomously branching stems bearing large yellow or orange spore-cases on side of terminal branchlets.

Area around first cistern, Sachet 2021 (US). Quayle 1953 (BISH).

Occasional on bases of coconut trees and on coral sand in shaded interior.

Manihi, Quayle 1914; 1922 (BISH).

POLYPODIACEAE

Asplenium nidus L.

Birds-nest fern

Nest-like light-green rosettes of ascending broadly lance-shaped undivided fronds, the fertile ones having a zone of pinnately arranged parallel, crowded, linear fruiting sori on the under sides.

Vairua, Sachet 2063 (US). Whitney Exped. 1956 (BISH).

On ground and bases of coconut trees in shaded interior of plantation.

Manihi, Whitney Exped. 1919 (BISH).

Nephrolepis hirsutula (Forst. f.) Presl

Short erect stems above ground, slender cord-like runners which bear the roots, and with erect or ascending fronds with many pinnately arranged pinnae or leaflets that bear kidney-shaped spore-dots or sori on under surfaces; pinnae shed when old, leaving stiff persistent rachis.

Village, Sachet 2077 (US).

Planted in yards and gardens, very common, probably spreading.

Polypodium scolopendria Burm. f.

kikipa (P)

Creeping stem or rhizome bearing scattered erect, long triangular-ovate deeply and coarsely pinnately divided fronds with two rows of brown fruiting dots or sori beneath, fronds shed from rhizome when old.

Vairua, Sachet 2069 (US). Jones 1011 (BISH), Quayle 1948, 1953 (BISH). Very common everywhere in shade on ground and on bases of coconut trees.

Manihi, Jones 1908 (BISH, BKL, US), Whitney Exped. 1871 (BISH).

PANDANACEAE

Pandanus tectorius Park.

tima; fala; fara; hinano (flower)

Screw pine

Small trees, sparsely and grotesquely branched, pyramidal, branches thick, bearing 3 spirally twisted ranks of long, strap-shaped, prickly, tough leaves with slender whip-like points; male and female flowers on different trees, the male in long branched pendent catkins with white leaf-like bracts, odor rather unpleasant; female in globose tightly packed heads; fruits packed in a tight head-like cluster, 15-20 cm in diameter, individual fruits or keys lobed at apex, distal part hard and bony, lower half or third fleshy, orange, fragrant, acrid sweet.

Seen by Sachet, December, 1974.

Very common everywhere, probably one of the most important trees in original vegetation now replaced by planted coconut palms. Generally distributed, especially on peripheral ridges of islets.

Manihi, seen by Sachet and earlier collectors.

GRAMINEAE (POACEAE)

*Cenchrus echinatus L.

Sand-bur

A small tufted grass, bearing spikes of prickly burs that stick to clothing, shoes, etc.

Area just behind Service de la Pêche, Sachet 2033 (US).

Common in weedy yard and roadway, very common in village and plantation.

Manihi, seen by Sachet in 1974 near airstrip.

*Cynodon dactylon (L.) Pers.

Bermuda-grass

A thick, creeping, mat-forming fine-leaved grass with long runners, digitate inflorescences and fruit clusters on erect stems.

Along runway and near airport, Sachet 2011 (US).

Abundant locally in weedy areas.

Digitaria stenotaphrodes (Nees) Stapf

A stiff, tufted, erect grass, with stiff spikes of flowers and fruits, crowded in 3's or 4's at tops of erect stems. A native species in the Society and Tuamotu atolls.

Along runway and near airport, Sachet 2012 (US).

Scattered tufts in open scrub forest and along top of seaward beach.
Also in coconut plantations.

Manihí, U.S. Expl. Exped. in 1839, cited by Fosberg 1939, p. 45.
Seen near airstrip by Sachet in 1974.

*Eleusine indica (L.) Gaertn. Goose-grass

Tufted, tough-rooted grass, with several broadly linear divergent
spikes of flowers radiating from end of stems.

Along runway and near airport, Sachet 2010 (US).
Local in weedy places.

*Eragrostis tenella (L.) Beauv. ex R. & S.

A fine, delicate grass with a diffuse feathery flower cluster.

Village, Sachet 2071 (US).
Common in village and along paths.

Lepturus repens (Forst.) R. Br. var. repens

Tufted to creeping stiffish grass with long, awl-shaped jointed flower
spikes, in fruit disarticulating into small cylindric floating segments,
each carrying seed.

Along runway and near airport, Sachet 2013 (US).
Generally common or abundant.

*Sporobolus fertilis (Steud.) Clayton

Grass with stems and leaves in small tufts, leaves very slender, narrow,
tightly rolled when old, much shorter than flowering stems, inflorescence a
very narrow rather dense spike-like panicle, flowers and fruits green, not
much over 1 mm long.

Village, Sachet 2074 (US).
Occasional in weedy yard in village.

*Zoysia matrella var. pacifica Goudsewaard

A fine wiry matted grass with slender awl-shaped leaves.

Village, Sachet 2040 (US).
Cultivated in garden, forming dense carpet under shrubs.

CYPERACEAE

Cyperus javanicus Houtt.

Coarse gray-green sedge with several stems from the base, elongate
minutely roughened leaves and bracts, loosely branched cluster of brownish
fruits.

Area around first cistern, Sachet 2022 (US).

*Cyperus kyllingia Endl.

Small tufted grass-like sedge, with small, white, globose clusters of tiny flowers.

Village, Sachet 2056 (US).

Local in damp spots, not common generally.

*Cyperus polystachyos Rottb.

Slender smooth sedge forming small tufts, leaves shorter than culms, spikelets many flowered, thin, flattened, lance-linear, greenish brown, crowded in dense heads, surrounded by several leaf-like bracts.

Area between Service de la Pêche and runway, Sachet 2015 (US).

Common in low wet places here and elsewhere on atoll.

*Cyperus rotundus L.

Plant with scattered, often solitary culms, small hard tubers on the roots, few dark green glossy leaves, loose clusters of few linear dark-brown many-flowered spikelets.

Village, Sachet 2047 (US).

Very common generally in weedy areas.

Fimbristylis cymosa R. Br. var. pycnocephala (Hbd.) Kük. ex F. Brown

Forming small tufts, roots fragrant; leaves linear, blunt, slightly stiffish; small button-like tufts of small scaly spikelets.

Area just behind Service de la Pêche, Sachet 2038 (US).

Forming tufts in low, damp place, frequent in openings.

Manihi, seen by Sachet in 1974.

PALMAE

*Cocos nucifera L.

hakari, niu; coconut

Tall tree with columnar trunk and enormous pinnate leaves in a giant rosette at top of trunk; flowers both male and female, borne in large complex branched clusters among the leaves, protected by a woody boat-shaped bract which falls off as the flower cluster expands; flowers cream color, with stiff sepals and petals; fruit a large fibrous drupe with a hard stone 10-20 cm in diameter with one seed completely filling the cavity, shell filled with excellent water when immature, with a layer of white oily flesh when ripe .

Seen by Sachet, December, 1974.

Generally planted on all the islands. A dwarf, early bearing, variety is planted near Tararo Point, East of Village. The small palms and their nuts have a generally orange hue.

Manihi, seen by Sachet and earlier collectors.

ARACEAE

*Caladium bicolor (Ait.) Vent.

Stemless plant with long-stalked leaves arising from a tuberous root-crown, blades large, thin, variously marked with pink and white spots, heart-shaped, the stalks attached well inside the margin at base; flowers rarely if ever produced.

Seen by Sachet, December, 1974.

Cultivated in village garden.

*Colocasia esculenta (L.) Schott taro

Stemless plant with stalked leaves arising from an edible tuberous root-crown, leaf blades large, dull grayish or bluish green, heart-shaped, stalk attached well in from the margin at base, flowers very rarely produced, in a spike enclosed in a rolled tubular bract.

Seen by Sachet, December, 1974.

A few plants cultivated with great care in damp area of garden.

BROMELIACEAE

*Ananas comosus L. Ananas

Cited as sparingly cultivated in village by Robineau (1977:22)

COMMELINACEAE

*Rhoeo spathacea (Sw.) Stearn

Erect, often clustered short-stemmed dark purple plants with large crowded spirally arranged broadly lanceolate pointed leaves, flowers white, in small clusters in boat-shaped pairs of bracts on short stalks in the axils of the leaves.

Seen by Sachet, December, 1974.

Commonly cultivated in village.

LILIACEAE s.l.

*Asparagus setaceus (Kunth) Jessop

Vine-like, with flat sprays of extremely fine green hair-like branchlets in place of leaves, round black berries.

Seen by Sachet, December 1974.

Cultivated in village.

*Cordyline fruticosa (L.) Chev. ti

Singled-stemmed, or slightly branched shrub with ascending tufts of large lanceolate leaves, among which are large branched open clusters of purplish-white flowers. Leaves glossy green or variously striped with red, or white.

Seen by Sachet, December, 1974.
Planted in village.

*Crinum sp. aff. asiaticum L.

Rosettes of spirally arranged large sword-shaped leaves, with tall erect somewhat flattened fleshy flower-stalks arising from between the leaves, bearing large tight clusters of tubular white or pinkish flowers with 6 long strap-shaped lobes, protruding stamens and style; seeds large, irregularly marble-like, fleshy.

Seen by Sachet, December, 1974.
Cultivated in village.

*Zephyranthes rosea Lindl.

Small plant with dark green linear leaves growing from a bulb, with single pink flowers, several cm across, six-parted, on stems about as high as the leaves are long.

Village, Sachet 2081 (US).
Cultivated in gardens and persisting in weedy area.

TACCACEAE

Tacca leontopetaloides (L.) O. Ktze. pia; island arrowroot

Bearing potato-like underground tubers, no above-ground stem; erect terete leafstalks, large palmate, deeply and complexly divided leaves, tall erect hollow flower-stalks with umbellate clusters of small greenish flowers, filiform conspicuous bracts; fruits globose, marble-like, packed with seeds. Tubers an important source of starch for the ancient Polynesians, but bitter and needing processing before use.

Area just behind Service de la Pêche, Sachet 2032 (US).
Common locally in coconut groves.

MUSACEAE

*Musa sp.

Banana

Giant herb with pinnately-veined leaves, bracted racemes of male and female flowers, later producing large clusters of fleshy, edible fruit, usually seedless.

Seen by Sachet, December, 1974.
Growing in village.
Mahihi, seen by Sachet in 1974.

ORCHIDACEAE

Nervilia aragoana Gaud.

A small ground orchid, with a small fleshy underground corm, a single expanded plicate leaf, and when this disappears, a short raceme of whitish delicate flowers appear. From Eastern Asia at least to the Tuamotus.

Area around first cistern, Sachet 2020 (US); also seen in damp area between Service de la Pêche and runway.

Occasional but very local in sandy, usually shaded, soil, uncommon.

CASUARINACEAE

*Casuarina equisetifolia L.

Aito, Toa; Ironwood;
She-oak; Beef-wood

A tree with no normal leaves, but with needle-like green jointed branchlets which drop as do leaves; flowers very reduced, in catkin-like clusters; fruits like diminutive pine-cones. Yields a very hard, extremely heavy but brittle timber.

Seen by Sachet, December, 1974, probably native in the Society Islands. Planted as hedges or windbreaks.

Manihi, seen along airstrip in 1974.

MORACEAE

*Artocarpus altilis (Park.) Fosb.

Breadfruit

A large tree with milky sap; large alternate deeply cut leaves, flowers very reduced, the male in large club-shaped clusters, the female in light green balls; fruit large, globose or slightly elongate, with geometrically roughened surface. Fruit cooked in various ways and eaten; the staff of life for the ancient Polynesians, still extensively used.

Seen by Sachet, December 1974.

Planted in village and elsewhere, one very large tree, healthy and bearing well in center of village near store.

Manihi, seen in 1974.

*Ficus carica L.

fig

The cultivated fig, a shrub or small tree with rough hand-shaped lobed leaves, milky sap, and purple or green pear-shaped fruits or figs, filled with tiny hard seeds in a sweet juicy pulp.

Seen by Sachet, December, 1974.

URTICACEAE

Laportea ruderalis (Forst.) Chew

A small succulent-stemmed herb glossy, with alternate broadly ovate toothed leaves, flowers very small and inconspicuous in reddish, branched clusters; fruit small, grain-like.

Area around first cistern, Sachet 2023 (US).

Very common locally, but generally distributed, mostly in shaded places. Manihi, U.S. Exp. Exped. in 1839 (GH), seen by Sachet in 1974.

Pilea microphylla L.

Artillery-plant

Much branched fleshy-stemmed spreading herb, with small unequal roundish or obovate leaves and inconspicuous greenish flowers, with stamens that dehisce explosively, producing a small puff of pollen, resembling smoke, hence the vernacular name, "Artillery-plant."

Village, Sachet 2041 (US).

Cultivated in pot.

Pipturus argenteus (Forst. f.) Wedd.

Roa (T); Ronga (P)

Large shrub or very small tree, leaves alternate, broad, toothed; flowers green with white stigmas, in tiny clusters on a string-like spike; fruits resembling a very small white strawberry. Inner bark tough, used by ancient Polynesians for cordage and bark cloth.

Both Takapoto and Manihi plants are of an unusual form with leaves green on both sides, the under leaf surface strongly papillose beneath the pubescence.

Vairua, Sachet 2064 (female plant) (US), 2065 (male plant) (US).

Common in coconut plantation and Pisonia grove, and everywhere on atoll.

Manihi, seen by Sachet near airstrip in 1974.

OLACACEAE

Ximenia americana L.

Shrub or small tree, at times tending to be scandent, with or without stipular spines, branches and leaves glabrous; leaves alternate, elliptic to obovate, 3-5 cm long, obtusish to rounded at apex; flowers small, yellowish, in small axillary racemes, corolla lobes conspicuously coarse pilose within; fruit a plum-like orange drupe with thin sour flesh, endocarp thin, seed one, large. Pan-tropical strand or coastal plant.

Manihi, Quayle 1920 (BISH).

POLYGONACEAE

*Coccoloba uvifera (L.) L.

Sea-grape

Shrub or small tree with thick twigs, large round leathery leaves, cordate at base, with short petioles sheathing the stem at base; elongate pendent spike-like racemes of small white 3-parted flowers developing into globose grape-like fleshy fruits, purple, rather acrid.

Seen by Sachet, December 1974.

Planted in village. Increasingly introduced in Tuamotus and to Marquesas, where it prospers and may spread.

Manihi, seawall of village, Brooks & Brooks 106 (BISH).

NYCTAGINACEAE

Boerhavia tetrandra Forst.

Prostrate elongate creeping stems from a thick root crown; opposite oblong-elliptic leaves pale beneath; small clusters of tiny pink flowers; sticky, ribbed club-shaped tiny fruits that stick to clothing. Often affected by a white rust fungus, Albugo platensis, that causes branches to become erect, condensed, distorted, and witches-broom-like.

Vairua, Sachet 2068 (US).

Very common, especially in openings and sparse places in coconut groves, where abundant forming a mat on the ground.

Pisonia grandis R. Br.

puatea (T); puka (P)

Large trees with pale creamy-gray trunks, soft brittle wood; large, usually smooth, opposite, broadly elliptic leaves, clusters of small, pale greenish flowers, dry, very sticky, minutely spiny club-shaped fruits, admirably adapted to be carried sticking to birds' feathers.

Area along runway, Sachet 2034 (US); Area near first cistern from village, Vairua, Sachet 2019 (US); Jones 1005 (BISH).

Grove of very large trees remaining in section of coconut plantation, sprouting abundantly from fallen trunks and branches, heavily used by noddies. Very black humus forming under trees. Common locally forming groves and forests, but these mostly cleared away when coconuts were planted.

AMARANTHACEAE

Achyranthes velutina H. & A.

Gray-green woolly suffrutescent herb with stiffish ascending or spreading stems, to 1 m tall, leaves ovate to broadly elliptic, acute; flowers in spikes elongating to 1-several dm, rachis woolly, perianth 5-parted, the parts chaff-like, pointed, purplish within, stamens 5, staminodia 5, both on margin of a membranous cuplike structure of united filaments surrounding the ovary; fruit sharply reflexed, prickly from hardened pointed perianth closely investing matured ovary.

Area near first cistern from village, Vairua, Sachet 2018 (US).

Large patch in open spot among Pisonia trees.

* Amaranthus sp.

Weedy herb with ovate leaves, terminal clusters of small inconspicuous garden flowers, black seeds in tiny membranous sac-like fruits.

Seen as weed in village near store, Sachet, December 1974.

PORTULACACEAE

Portulaca johnii v. Poelln.

pokea (P); Purslane

Spreading prostrate herb, rarely erect, with bright red fleshy stems with obovate leaves; flowers bright golden yellow, rather large, opening late in morning, closing in late afternoon; many stamens; seeds tiny, black, borne in small capsules with lids.

Vairua, Sachet 2066 (US).

Very common in openings and edges of woods.

Manihi, airstrip, seen by Sachet in 1974.

Portulaca oleracea var. granulato-stellulata v. Poelln.

Fleshy herb with alternate to opposite small obovate dull green leaves, apex rounded to subtruncate, base V-shaped, petiole very short; flowers yellow, in heads subtended by involucre leaves, opening after sunrise, closing usually before noon, petals thin, emarginate, deliquescent; stamens about a dozen, pistil with 4-5 palmately spreading stigmatic branches, fruit a pyxis, dehiscing by lid or operculum, seeds small asymmetrically kidney shaped, black, tuberculate.

Vairua, Sachet 2070 (US).

Uncommon in coconut plantation near Pisonia grove.

ANNONACEAE

*Cananga odorata (Lam.) Hook. f. & Thoms.Ylang-ylang,
muto'i

Manihi, village, Brooks & Brooks 80 (BISH).

LAURACEAE

Cassytha filiformis L.

Giant dodder

Leafless, tangled, string-like, rootless plant, yellow to greenish, twining around other plants, penetrating them with tiny sucker-like haustoria to get nourishment; flowers very small, white, fruit globose, small, white, fleshy.

Lagoon side near first cistern, Vairua, Sachet 2026 (US).

Whitney Exped. 1960 (BISH).

Abundant locally, here on ground and on Triumfetta procumbens. Very common locally, especially in open or bushy areas, parasitic on other plants, especially Suriana, often killing it.

Manihi, seen by Sachet in 1974.

CRUCIFERAE

- *Brassica pekinensis (Lour.) Rupr. chou chinois = celery cabbage.

Low herb with broad thin crowded green leaves with wide white midribs, erect clusters of bright yellow flowers. Raised as a vegetable.

Seen cultivated in small patch in village, Sachet, December 1974.

Manihi, seen in village by Sachet in 1974.

- Lepidium bidentatum Mont. Scurvy-grass.

An herb, sometimes rather woody at base, with alternate usually coarsely toothed leaves, elongating racemes of tiny whitish flowers and small dry elliptic capsules bearing 2 orange seeds each. Said to have been eaten by early sailors to prevent or cure scurvy.

Area southeast of airport, Sachet 2004 (US).

Locally common in semi-open places.

CRASSULACEAE

- *Kalanchoe pinnata (Lam.) Pers.

Erect slightly woody herb with fleshy, opposite, simple or pinnately compound leaves, blades with very shallowly scalloped or crenate margins, the notches giving rise to plantlets when they fall on the ground or are pinned up on a wall; flowers in large open clusters with opposite branches and long pendulous flowers, calyx inflated, cylindric, corolla tubular, deeply lobed, exceeding calyx.

Seen cultivated in village, Sachet, December 1974.

- *Kalanchoe tubiflora (Haw.) Hamlet

Erect herb with opposite almost cylindric brownish-gray variegated leaves with a few teeth at tips, producing new plants when they fall on ground; flowers in large open clusters, pendent, calyx short, deeply lobed, corolla red, tubular greatly exceeding calyx.

Seen cultivated in village, Sachet, December 1974.

LEGUMINOSAE

- *Adenanthera pavonina L.

Tall tree with well-developed trunk, leaves alternate, bipinnately compound, leaflets oblong-elliptic; flowers in narrow elongate racemes, regular, small, yellow, fragrant; pods in clusters, thin, dehiscent and becoming twisted, shedding the bright scarlet lens-shaped seeds.

Village, Sachet 2079 (US).

One very large umbrella-shaped tree, flowering and fruiting.

*Cassia occidentalis L.

Coarse erect herb to 1 m tall, leaves alternate, pinnate, leaflets ovate, slightly acuminate, 4-5 pairs, flowers in terminal leafy racemes, yellow.

Village, Sachet 2055 (US).
Local in weedy yard.

*Crotalaria pallida Ait.

Erect herb to 1 m tall, sparsely branched, appressed pubescent, leaves alternate, trifoliolate, leaflets elliptic to obovate, flowers in terminal racemes, yellow, standard with brown striations; fruit a cylindrical inflated pod several times as long as thick.

Area around first cistern, Sachet 2024 (US).
Local near buildings.

*Delonix regia (Bojer) Raf.

Flamboyant, flame-tree

Flat-topped tree with lacy twice pinnately compound leaves with small oblong leaflets, compound stipules; loose flat-topped clusters of large showy scarlet flowers with petals narrowed toward base, one of them erect, pink and white spotted; pods large, woody, long narrow, pointed, with the seeds placed transversally.

Seen by Sachet, December, 1974.

Cultivated in village.

Manihi, village, Brooks & Brooks 87 (BISH). faefae

*Inocarpus fagifer (Park.) Fosb.

Tree reaching a large size in favorable habitats, trunk buttressed, leaves oblong, petiole short, thick curved, flowers small, white, in spikes a few cm long, fruit a fleshy-leathery indehiscent oblong-asymmetric slightly compressed drupe-like one-seeded pod; seed large, nut-like, edible when cooked.

Seen cultivated in village, Sachet, December 1974.

Sesbania coccinea (L. f.) Poir. s.l.

Kofai

Sesbania atollensis St. John

Sesbania speciosa var. tuamotensis F. Br.

Small trees or shrubs, up to 2.5-3 m tall, with alternate pinnately compound leaves, light green. Flowers deep-orange, streaked with red. Long thin pods.

East of airport, Tararo, Sachet 2007 (US); Southeast side of atoll, between village and first pass (Paopaoa) Rapa, Sachet 2036 (US).

Small group of plants scattered at edge of lagoon.

*Tamarindus indica L. tamarini, tamara, pakai

Manihi, village, Brooks & Brooks 35 (BISH).

Vigna marina (Burm.) Merr.

Creeping herb with alternate trifoliolate, broad obtuse leaves; yellow pea-like flowers on erect stalks; pods small, cylindrical. Roots bear nodules containing nitrogen-fixing bacteria.

Area just behind Service de la Pêche, Sachet 2031 (US).

Extensive vines, forming thick blanket on old fence and ground near old drums and base of rainwater tank. Deep green foliage, probably from nutrients available at this site.

Manihi. Tearamahipa, W.T. & C.C. Brooks 28 (BISH).

Introduced on one piece of land as fertilizer for coconut plantation.

OXALIDACEAE

*Oxalis corniculata L.

Herb with creeping stems with erect branches, leaves alternate, stipulate, palmately trifoliolate, leaflets obcordate, folding at night, sour to taste, cymes 1-5-flowered, flowers 5-parted, sepals elliptic, green, petals obovate, yellow; stamens 10, pistil with ovary and 5 styles; capsule thin-walled, cylindrical or prismatic, seeds many.

Village, Sachet 2045 (US).

Local weed in garden.

RUTACEAE

*Citrus aurantifolia (Christm.) Swingle Lime

Shrub with spines and alternate elliptic slightly toothed leaves, aromatic when broken; fragrant waxy white flowers and greenish sour fruits with glandular aromatic skin. Juice used for drinks, antiscorbutic.

Seen by Sachet, December 1974.

Cultivated in village.

*Citrus maxima (Burm.) Merr. Pamplémousse, Shaddock, pomelo

Small dark green evergreen tree with broadly winged petioles jointed to ovate or elliptic pointed blades; flowers white, fragrant; fruit very large, globose or slightly broader toward apex, yellow or greenish yellow, rind several cm thick, spongy, white within, pulp sections and juice sacs tough, pulp pale yellow to pink, juice pleasantly acid, with strong flavor.

Seen by Sachet, December 1974.

Cultivated in village. (Pomelo rather than grapefruit).

*Citrus reticulata Blanco

mandarine

Small dark green evergreen tree with broadly elliptic leaves and slightly winged petioles jointed to the blades; fruit round, broader than high, orange, with a loose very fragrant skin, pulp juicy pleasantly acid, with a very good flavor.

Seen by Sachet, December 1974.

Cultivated in village.

*Citrus spp.

Manihi, several seen by Sachet in 1974.

SURIANACEAE

Suriana maritima L.

uu (P)

Shrubs with many small flexible branches, simple alternate small spatulate leaves, flowers axillary with bright yellow petals, fruit of 5 separate 1-seeded carpels. Easily confused with Pemphis acidula "mikimiki" when defoliated.

Area just behind Service de la Pêche, Sahet 2028 (US).

Abundant around edges of woods and coconut groves at top of beaches, also in openings in interior. Whitney Exped. 1964 (BISH), Jones 1016 (BISH).

Manihi, airstrip, seen by Sachet 1974

EUPHORBIACEAE

*Acalypha amentacea ssp. wilkesiana (M.-A) Fosb.

Shrub with alternate variegated green and white or bronze-red, broad, toothed leaves, catkins of small reddish or bronze flowers. Widely planted as an ornamental and hedge plant throughout the tropics.

Seen by Sachet, December 1974.

Several ornamental varieties cultivated in village.

*Acalypha amentacea ssp. wilkesiana f. circinata (M.-A.) Fosb.

Shrub with alternate variegated, toothed, strongly curved leaves, flowers dioecious or monoecious, in catkin-like axillary spikes.

Village, Sachet 2043 (US).

Cultivated as hedge in garden. This form a shrub 3 m tall, foliage dark reddish bronze.

*Codiaeum variegatum (L.) Bl.

Croton

Shrubs with simple, alternate, toothed, variegated leaves on short stalks; flowers small, light greenish, in short spikes or narrow racemes.

There are many widely variable leaf forms, mostly variously variegated, and of many different colors. A yellow and a green variegated one seen in Takapoto.

Seen by Sachet, December 1974.

Cultivated in village.

Manihi, cultivated in village in Tahiti soil, Brooks & Brooks 78 (BISH).

*Euphorbia antiquorum L.

Tall shrub or small tree with milky sap and erect candelabra-like branching, branches cerioid (cactus-like), deeply 3-ribbed, margins shallowly scalloped or crenate, spines in pairs; flowers small, greenish.

Seen by Sachet, December 1974.

In garden in village, 3 m tall, used to hang small garments to dry!

Euphorbia atoto Forst. f. s.l.

tahetahe (P)

Plants 50-70 cm tall, but others seen much taller, nodding. White latex in stems, flowers white.

Vairua, Sachet 2067 (US).

Common in coconut plantation and everywhere on atoll.

*Euphorbia hirta L.

Small somewhat lactiferous pubescent herb with ascending stems arching at tips, opposite serrate ovate acute subsessile leaves, flowers in dense axillary cymes, fruit a tiny 3-locular, 3-seeded, septicidal capsule.

Village, Sachet 2051 (US).

Very common in weedy yards in village and elsewhere on atoll.

Manihi, near airstrip and in village, seen by Sachet in 1974.

Taea, Brooks & Brooks 47 (BISH).

*Euphorbia prostrata Ait.

Prostrate small lactiferous much branched annual herb, stems and leaves purplish, leaves opposite, suborbicular or broadly oblong, flowers axillary, ovaries strongly exserted, especially in fruit, capsules trigonous with hairs only on angles.

Village, Sachet 2072 (US) (green form, attacked by fungus); Sachet 2073 (US) (reddish form).

Growing together in weedy yard.

Manihi Atoll, airport, Sachet 1850 (US) (reddish form, attacked by fungus).

*Jatropha heterophylla Jacq.

Shrub with simple oblong to somewhat heart-shaped alternate leaves and terminal stalked clusters of handsome crimson rather bell-shaped or funnel-shaped flowers.

Seen by Sachet, in village, December 1974.

*Pedilanthus tithymaloides (L.) Poit.

Shoe-flower

Fleshy, green-stemmed weak shrub, leaves pointed, arranged in 2 ranks, flowers red, slipper-shaped, pointed. Widely planted in the tropics as an ornamental.

Seen by Sachet, December 1974.

Planted in village.

*Phyllanthus amarus Schum. & Thonn.

Erect herb with very small pinnately arranged, two-ranked leaves, tiny yellowish green flowers, and round capsule-like fruits hanging under slender spreading branches.

Village, Sachet 2044 (US).

Weed in garden and elsewhere.

Manihi, village, Brooks & Brooks 20 (BISH).

ANACARDIACEAE

*Mangifera indica L.

Mango, mako

Manihi, village, planted in Tahiti soil, Brooks & Brooks 58 (BISH).

SAPINDACEAE

*Melicocca bijugatus L.

Quenettes (Fr.)

Tree with compound leaves with 2 pairs of leaflets, clusters of marble-like fruits with a thin outer shell and an edible gelatinous acid pulp around a large seed.

Seen by Sachet, December 1974.

Planted.

Manihi, village, Brooks & Brooks 64 (BISH).

*Pometia pinnata Forst.

Kava

Tree with alternate pinnately compound leaves. Fruit like a green apricot, very much appreciated.

Seen by Sachet, December 1974.

Cultivated and fruiting abundantly in village.

Manihi, seen in village by Sachet 1974; planted in Tahiti soil, Brooks & Brooks 55 (BISH).

TILIACEAE

*Muntingia calabura L.

Small tree; leaves pubescent, alternate, ovate, with 3 strong nerves, margins serrate, apex acuminate; flowers in upper axils, sepals lanceolate, 5 white obovate petals, many stamens, single ovary with sessile stigma; fruit a globose pink sweetish berry with a persistent stigma and many small seeds.

Seen by Sachet, December 1974.

Small planted trees seen on road to airstrip from village.

Manihi, seen near airstrip by Sachet in 1974

Triumfetta procumbens Forst. f.

Vavai oviri (P)

Prostrate spreading creeper with hairy stems and variable often lobed leaves, bright yellow flowers, and burr-like globose fruits.

*Sida rhombifolia L.

Small wiry shrub or suffrutescent herb, leaves alternate, small, narrowly oblong, rhombic, or ovate, toothed distally, tomentose at least beneath, dull green above; flowers axillary on long pedicels jointed near middle, petals weak orange, fruits of 5 segments that separate at maturity, each 1-seeded.

Village, Sachet 2054 (US).

Local weed.

*Thespesia populnea (L.) Sol. ex Correa miro (T), amae (P)

Small trees with alternate simple strongly cordate thinly leathery leaves, flowers on short ascending axillary pedicels, calyx almost truncate, petals large, showy, opening wide, butter-yellow, with maroon center, limb turning maroon and corolla falling in afternoon or evening, fruit dry, indehiscent, 5-loculed, many-seeded.

Along runway, Fakatopatere, Sachet 2009 (US).

One tree planted in village.

BOMBACACEAE

*Ceiba pentandra (L.) Gaertn. cotton-tree

Tree reaching enormous size, trunk thick, gray-green when young, smooth or with conical large prickles, often becoming buttressed when older, leaves alternate, palmately compound, flowers small one or two cm across, grayish, with 5 stamens, fruit a large thick-walled capsule splitting into 5 valves, releasing cottony masses, small seeds bearing long fine hairs that cause them to be carried by wind. Cotton-like seed-fiber used to stuff cushions.

Seen by Sachet, December 1974.

STERCULIACEAE

*Waltheria indica L.

Suffrutescent prostrate to ascending herbs with alternate, ovate obtuse strongly nerved crenate or crenate-serrate petiolate notably pubescent leaves, axillary cymes of small yellow flowers densely crowded and embedded in pubescence.

Village, Sachet 2057 (US).

Locally common weed.

GUTTIFERAE

Calophyllum inophyllum L. Tamanu (T), ati (P)

Very large spreading tree, leaves oblong, leathery; flowers white with many yellow stamens, borne in clusters among leaves; fruit pendent, globose, 2.5-3.5 cm in diameter. Widely distributed in Pacific, probably

both by human agency and naturally by its floating fruits. Timber hard, workable, highly prized; also a superb shade tree.

Seen in village by Sachet, December 1974.

Manihi, seen in village by Sachet in 1974.

CARICACEAE

*Carica papaya L.

Papaya, pawpaw

An erect, usually unbranched small tree with a soft trunk and milky sap; large palmate deeply divided round leaves on long stalks forming a huge rosette at top of stem; male flowers cream color, in large open clusters among leaves, female sessile on stem among and just below leaves, large, often some bisexual flowers mixed in clusters; fruit orange when ripe, fleshy, melon-like, with many black seeds in large central cavity.

Widely planted in tropics for its delicious fruits and the proteolytic enzyme produced in its sap. Readily becomes naturalized, but then the fruit is commonly small and of poor flavor.

Seen by Sachet, December 1974.

Cultivated in village.

PASSIFLORACEAE

*Passiflora foetida L. var. gossypifolia (Desv.) Mart.

Slender tangled foetid tendriferous herbaceous vine, leaves alternate glandular-pubescent palmately 3-lobed, involucre of 3 pinnatifid bracts, flowers showy, white and purple with 5 green sepals, 5 petals, and a corona of many filament-like staminodes, 5 stamens united into a tube sheathing the stalk of the one-celled subglobose ovary, styles and stigmas 3, placentae parietal, fruit thin-walled, soft, filled with small seeds embedded in a gelatinous aril.

Along runway, Sachet 2008 (US); Village, Sachet 2058 (US).

CUCURBITACEAE

*Citrullus lanatus var. cafferorum (Alef.) Fosb. Water-melon, pastèque

Prostrate herbaceous vines with alternate deeply pinnatifid leaves, the lobes with rounded apices, flowers axillary, yellow, unisexual, monoecious, the corollas gamopetalous, pistillate with inferior ovary, fruit an enormous berry with firm rind, usually red sweet fleshy interior bearing many flat elliptic black seeds, each in a cavity in the flesh.

Seen by Sachet, December 1974.

In garden surrounded by wire mesh, bearing fruit.

*Cucurbita sp.

citrouille

Cited as sparingly cultivated in village by Robineau (1977:22)

CACTACEAE

*Opuntia sp. ?

Figue de barbarie, Indian fig, prickly pear

Erect, spiny, leafless plant with broadly obovate or elliptic stems

thick, fleshy but flattened and jointed; flowers large, fruits fleshy, juicy, with many seeds.

Seen in village, Sachet, December 1974.

LYTHRACEAE

Pemphis acidula Forst.

mikimiki (P), aie (T)

Much-branched shrub or tree with very hard dark reddish wood; leaves small, oblong, thick, astringent when chewed; flowers white, rather small; fruit a round somewhat flattened, dark reddish capsule, seeds many, small.

East of airport, Tararo, Sachet 2006 (US).

Locally common, mostly on rough limestone on seaward coasts and rocks on reef-flat, forming pure stands of low to tall scrub in such places.

Branches used as supports for young pearl-oysters.

Manihī, seen near airstrip by Sachet in 1974.

COMBRETACEAE

*Terminalia catappa L.

Indian Almond, Tropical Almond,
autara'a (P)

A pagoda-form tree with flattish horizontal branches, large obovate leaves that turn red when old, slender spikes of small white flowers, somewhat flattened ovoid corky fruits with 2 keels, almond-like and edible seeds. Widely planted in the tropics, doubtfully native in eastern Polynesia.

Seen in village, Sachet, December 1974.

Very large trees common in village, flowering and fruiting abundantly.

Manihī, seen in village by Sachet in 1974.

MYRTACEAE

*Eugenia cuminii (L.) Druce

pistache, Java plum
Jambulan

Aromatic trees with opposite simple leathery elliptic or oblong gland-dotted leaves, flowers in panicle cymes, sepals and petals small, stamens many, white, strongly exerted; ovary inferior, fruit a dark purple one-seeded berry about 1 cm long, rather astringent.

Takapoto, seen in village, Sachet, December 1974.

Quite a few large trees planted, flowering abundantly. Fruit said to be made into jam.

*Eugenia uniflora L.

Surinam cherry

Shrub with ovate sessile simple opposite thin leaves, flowers on axillary pedicels, sepals large, suborbicular, petals white, not large, stamens many white, ovary inferior; fruit a juicy deeply lobed sweet 1-seeded berry, rather aromatic, becoming red and darkening to maroon or almost black when ripe.

Village, Sachet 2078 (US).

One sterile tree observed, planted.

*Psidium guajava L.

Guava, tuava

Shrub with smooth bark, opposite simple leaves, axillary white flowers with many stamens, inferior ovary; fruit a berry with many round hard seeds, capped by persistent sepals.

Doubtfully seen in village, Sachet, December 1974.

Manihi, village, planted in yard, Brooks & Brooks 34 (BISH).

ARALIACEAE

*Polyscias spp.

Ornamental shrubs with compound variegated toothed leaves, oily aromatic when broken, with a strong coumarin odor when dried, very rarely flowering, flowers in loose clusters, inconspicuous, dull purplish. A number of distinctive forms--species or cultivars--are widely planted in the Pacific Islands.

Seen by Sachet, December 1974.

Several species cultivated in gardens of village.

SAPOTACEAE

*Manilkara zapota (L.) v. Royen

Manihi, village, growing in Tahiti soil, Brooks & Brooks 60 (BISH).

OLEACEAE

*Jasminum fluminense Vell.

Vine-like, somewhat woody, with small compound leaves with 3 ovate leaflets; flowers rather star-shaped, white, in small clusters, very fragrant. Fruit a black berry.

Village, Sachet 2082 (US).

One large clump seen in abandoned garden, flowering and fruiting.

APOCYNACEAE

*Catharanthus roseus (L.) G. Don

Madagascar periwinkle

Erect leafy-stemmed herb, with white or pink flowers, sometimes with dark red eye. Planted and often naturalized in tropical and subtropical areas.

Area just behind Service de la Pêche, Sachet 2029 (US).

Seen established around camp site.

Manihi, Brooks & Brooks 19 (BISH).

*Nerium oleander L. var. oleander

Shrub with opposite lance-elliptic leathery leaves and terminal cymes of showy white to pink or rose-colored flowers, corolla campanulate with a broadly spreading limb, with lacerate scales in the throat; fruit a linear follicle. All parts of this plant extremely poisonous.

Area just behind Service de la Pêche, Sachet 2030 (US).
Several varieties of different colors seen in village.

*Nerium oleander var. indicum (Mill.) Deg. & Deg. Taronia

Differs in having double very fragrant flowers, usually rose colored.
Seen by Sachet, December 1974.
Manihi, Brooks & Brooks 13, 38 (BISH).

*Nerium sp.

Manihi, seen by Sachet in 1974 in village.

*Plumeria obtusa L. Singaporu(=Singapore plumeria)

Small tree with milky sap, with few thick branches, leaves crowded near ends of branches, large, spatulate-ovate, very obtuse or rounded at apices, dark green, thick; flowers in clusters, white with yellow center, 5-parted, tubular below, fragrant.

One small tree seen in village, Sachet, December 1974.

*Plumeria rubra L. frangipani

Small tree with very thick branches; vari-colored, extremely fragrant five-parted large flowers, much used for garlands.

Seen by Sachet, December 1974.

Planted around village, many varieties of different colors.

Manihi, seen near airstrip and in village by Sachet in 1974.

ASCLEPIADACEAE

*Asclepias curassavica L.

Erect wand-like lactiferous herb, leaves linear-lanceolate, opposite; flowers in umbels, on slender pedicels, with dark red petals and orange corona, fruit a lance-fusiform pointed follicle, seed with a tuft of silky hairs.

Seen by Sachet, December 1974.

Uncommon weed.

*Cryptostegia grandiflora (Roxb.) R. Br.

Woody vine with abundant milky sap, opposite glossy ovate somewhat acuminate leaves without stipules, flowers with short tube, campanulate throat, purple spreading limb, anthers sessile at summit of tube, fruit of two spreading smooth follicles.

Village, Sachet 2042 (US).

One large vine seen, very floriferous.

CONVOLVULACEAE

*Ipomoea batatas (L.) Lam.

Sweet potato

Slender herbaceous vine with thick fusiform edible roots, alternate cordate entire to deeply lobed leaves, few-flowered cymes of pale lavender flaring trumpet-shaped flowers, dark purple in center; flowers rather rarely produced, propagation mostly vegetative.

Seen by Sachet, December 1974.

A few small vines seen cultivated.

Manihi, village, at least two varieties seen by Sachet in 1974.

BORAGINACEAE

Cordia subcordata Lam.

Tou

Tangled tree with low branches, leaves alternate, with broad ovate or elliptic, slightly rough blades and often yellow stalks; flowers in small clusters, large, brilliant deep orange, corolla thin, delicate, fruit nut-like, enclosed in enlarged calyx. Wood hard but workable, prized for carving, banded light and dark brown.

Village, Sachet 2083 (US).

Uncommon, one large tree seen near light, obviously planted.

Manihi, large trees seen by Sachet in 1974.

Heliotropium anomalum H. & A.

parahiahi (P)

Dwarf shrub with narrow silky leaves, dense clusters of fragrant white flowers with yellow centers.

Along runway and near airport, Sachet 2014 (US).

Common in open places on coral sand or gravel.

Tournefortia argentea L. f.Tree Heliotrope; ngeongeo (P)
tohonu (T)

Shrubs and small trees, leaves obovate, spirally arranged, fleshy, gray-green, silky, flowers small, white, fragrant, in clusters with "scorpioid" or fiddle-neck shaped branches; fruit a pea-like pale green drupe with four small stones, this drying to a small corky globose floating dry fruit.

Vairua, Sachet 2061 (US).

Locally common in coconut plantation, along seaward beach ridges, and in places dominating marginal vegetation, old trees persisting in interior.

Manihi, seen by Sachet in 1974 near airstrip, Whitney Exped. 1915 (BISH).

CHLOANTHACEAE

Nesogenes euphrasioides DC.

Creeping herb, many stems from slender root-crown; leaves small, oblong, stipules lacking; flowers axillary, pedicellate, calyx gamosepalous, corolla gamopetalous, limb bilabiate.

Area southeast of airport, Sachet 2005 (US).

Local in coconut plantation.

VERBENACEAE

*Stachytarpheta urticifolia Sims

Erect shrub or suffrutescent herb, leaves opposite ovate or obovate, sharply toothed, bright green, spikes slender elongate, flowers sessile sunken in grooves in rachis, corolla with tube curved outward, limb spreading, dark blue, falling very readily; fruit oblong, sunken in grooves in rachis, style persistent on young fruit.

Village, Sachet 2053 (US).

Common weed.

LABIATAE

*Plectranthus scutellarioides (L.) R.Br.

Coleus scutellarioides (L.) Benth.

Erect sparsely branched soft herb, leaves opposite, heart-shaped, with scalloped margins, variously colored and variegated, flowers in whorls on a loose terminal raceme, corollas very irregular, blue.

Seen by Sachet, December 1974.

*Ocimum sp.

Basil, miri (P, T)

Herb, strongly and pleasantly aromatic, branched; leaves opposite ovate; flowers in terminal racemes of whorls, calyx united, somewhat 2-lipped, corolla white, 2-lipped.

Seen by Sachet, December 1974.

SOLANACEAE

*Brugmansia sp.

Large shrub; leaves alternate, very shallowly lobed, petiolate, elliptic; flowers solitary, pedicellate, pedicels curved and flower pendent, calyx tubular-prismatic, corolla white, very large, trumpet-shaped, shallowly 5-lobed, the lobes with acuminate tips, these separated by wide shallow sinuses, stamens inserted low in tube, included, style subequal or longer than stamens; flowers very fragrant at night; fruit a large irregularly beaked capsule but seldom produced by cultivated plants.

Seen in village, Sachet, December 1974.

* Cestrum diurnum L.

Arii vahine

Manihi, village, Brooks & Brooks 41 (BISH).* Physalis angulata L.

Erect or ascending bushy herb, stems somewhat angled, leaves thin, broadly ovate, petiolate, base truncate or rounded, apex acute or somewhat acuminate, margins entire to undulate or bluntly toothed, calyx campanulate very much enlarged in fruit, forming a loose envelope enclosing fruit; corolla rotate-campanulate, pale yellow with dark center, stamens not connivent, style filiform fruit a globose yellowish berry with many seeds.

Village, Sachet 2052 (US).

A few plants seen in weedy areas.

* Solanum lycopersicum L.

Tomato

Branched glandular pubescent herb, up to 1 m or more tall when supported; leaves alternate, pinnately dissected; flowers in axillary racemes, calyx deeply 5-lobed, practically to base, lobes lanceolate; corolla yellow, deeply 5-lobed, lobes ovate-lanceolate; stamens 5 closely connivent, opening by apical slits; fruit a globose to depressed globose, soft berry with 2-several cells, axile fleshy placentae, seeds pubescent, disk-like, borne in a mass of jelly, walls and partitions of fruit fleshy, red when ripe.

Seen by Sachet, December 1974.

* Solanum melongena L.

huapua'aniho

Manihi, village, Brooks & Brooks 66 (BISH).

SCROPHULARIACEAE

* Russelia equisetiformis Schlecht. & Cham.

Essentially leafless much branched green-stemmed herb, branches opposite or whorled; flowers pedicellate in short racemes on ends of stems, corolla tubular, bright red.

Village, Sachet 2080 (US).

One large clump seen in garden.

ACANTHACEAE

* Graptophyllum pictum (L.) Nees ex Griff.

Erect shrub with blotchy dark purple leaves, deeply 2-lipped purple flowers.

Seen by Sachet, December 1974.

* Pseuderanthemum carruthersii var. atropurpureum (Bull) Fosb.

Shrub with opposite dark-purple variegated often misshapen oblong

leaves, flowers in terminal branched racemes, sepals free, corolla salverform, 5-lobed, somewhat bilabiate, limb so abundantly crimson-spotted as to appear almost crimson.

Seen in village, Sachet, December 1974.

*Pseuderanthemum carruthersii (Seem.) Guill. var. carruthersii

Shrub with opposite bright green oblong to ovate sessile entire leaves, no stipules, flowers in terminal branched racemes, sepals free, corolla salverform, 5-lobed, somewhat bilabiate, limb white with crimson spots especially around the throat.

Seen in village, Sachet, December 1974.

RUBIACEAE

*Gardenia taitensis DC.

Tiare Tahiti; Tahitian Gardenia

Shrub or small tree, leaves opposite, broad, obovate, shiny; flowers solitary among leaves, large, white, very fragrant, corolla lobes 6-7, spreading. Generally planted in Polynesia for its highly prized deliciously fragrant flowers.

Seen by Sachet, December 1974.

Planted around village.

Guettarda speciosa L.

kahaia (P)

Shrub or small to medium-sized tree, with large, broad, obtuse leaves, conspicuous stipules; small clusters of large white flowers, opening and very fragrant at night, losing their fragrance and dropping their corollas during following day; fruit a globose white fleshy-fibrous floating drupe.

Vairua, Sachet 2062(US). Whitney Exped. 1946 (BISH). Jones 1002(BISH).

Very common generally, most common tree on atoll.

Manihi, Whitney Exped. 1923 (BISH); seen near airstrip.

Hedyotis romanzoffiensis (C. & S.) Fosb.

koporoporo (P)

Small shrub with opposite, obovate, small leathery leaves; greenish-white flowers in few-flowered clusters; fruit globose, fleshy, white to purple, opening at one end to let out the small seeds.

Rapa, Sachet 2035 (US).

Southeast side of atoll, between village and first pass. Whitney Exped. 1961 (BISH), Jones 1009 (BISH).

Manihi, seen near airstrip by Sachet in 1974.

*Ixora casei Hance ?

Robust notably leafy shrub; leaves oblong or elliptic, opposite, shortly petiolate, entire, stipules ovate somewhat acuminate; flowers in large corymbiform many-flowered heads, with inferior ovary, short cup-like 4-toothed calyx, showy scarlet salverform corollas with 4 oblong-ovate spreading lobes, anthers exerted from sinuses, style with stigma bilobed, strongly but tardily exerted.

Seen by Sachet, December 1974.

Cultivated in village.

Morinda citrifolia L.

Hora (P), nono (T)

Shrub or small tree, with opposite, large, elliptic, glossy leaves; small heads of small white flowers, fused together at base; fruit dull whitish, potato-shaped, fleshy, with many large seeds, developing a rancid very disagreeable odor when old.

Area just behind Service de la Pêche, Sachet 2039 (US).

Common generally in coconut groves. Whitney Exped. 1968 (BISH). Manihi, seen by Sachet near airstrip in 1974, Whitney Exped. 1906 (BISH).

Timonius polygamus Forst.

Ketoketo (P)

Shrub with opposite obovate leaves, very variable in shape; small white flowers, male in few-flowered clusters, female solitary; fruit black, fleshy, globose, with a number of small stones.

Area between Service de la Pêche and runway, Sachet 2016 (pistillate plant) (US), Sachet 2017 (staminate plant) (US). Jones 1019 (BISH), Whitney Exped. 1959 (BISH).

Very common generally in undergrowth and in scrub.

Manihi, seen near airstrip by Sachet in 1974, Whitney Exped. 1930, 1924 (both BISH).

GOODENIACEAE

Scaevola sericea var. tuamotuensis (St. John) Fosb.

Ngapata (P) apata,

Scaevola taccada (Gaertn.) Roxb.

naupata (T)

Depressed spreading shrub, glabrous except for axillary tufts of white hair, leaves alternate, spatulate, narrowed to base, rounded at apex, flowers in axillary few-flowered dichotomous cymes, ovary inferior, sepals small narrowly oblong or lanceolate, blunt, corolla salverform, tube split down one side, 5-lobes patent, arranged fan-wise, with heavy dark central zones and wide membranous yellowish margins, stamens free, filaments very slender, style with hook-like curve at the apex, stigma of 2 superimposed flaps; fruit a white juicy drupe with a single ribbed stone.

Vairua, Sachet 2059 (US). Jones 1018 (BISH), Whitney Exped. 1958 (BISH).

Very common everywhere especially in marginal fringe vegetation.

Manihi, Brooks & Brooks 61 (BISH), Whitney Exped. 1928 (BISH). Seen near airstrip by Sachet in 1974.

COMPOSITAE

*Bidens pilosa L.

Erect oily-aromatic herb, leaves opposite, pinnately compound, leaflets 3 or 5, oblong to elliptic, serrulate, acute or acuminate; heads of flowers few, pedunculate, rays none or short, broad, whitish (var. minor); disk yellowish; achenes blackish, prismatic, with 3 sharp retrorsely barbed pappus awns at one end.

Village, Sachet 2075 (US).
Occasional in weedy areas.

*Emilia fosbergii Nicolson

Slender succulent-stemmed sparsely branched herb, thinly pilose, leaves thin, slightly glaucous, basal larger, somewhat lobed, terminal lobe larger, cauline alternate, narrowly oblong, toothed, sagittate at base; heads of flowers few, involucre cylindric or narrowed toward summit, of a single series of linear bracts coherent by their overlapping margins; flowers brick-red, exceeding the involucre, achenes prismatic, 5-sided, angles microscopically grooved, with hairs in grooves, pappus of many white capillary hairs. This plant has commonly been called E. javanica.

Village, Sachet 2048 (US).
Common in weedy yard.

*Emilia sonchifolia (L.) DC. ex Wight var. javanica (N. Burm.) Mattf.

Slender, succulent-stemmed sparsely branched herb, thinly pilose, leaves thin, glaucous, basal leaves larger, lyrate lobed, terminal lobe larger, cauline leaves shallowly lyrate, involucre narrowly cylindric, of one series of linear bracts, flowers very slender, purple or lilac, subequal with involucre; achenes prismatic, 5-sided, angles grooved, pappus of many white fine capillary hairs.

Village, Sachet 2049 (US).
Rare in weedy yard.

*Emilia sp.

Diseased plants.

Village, Sachet 2050 (US).
Local in weedy yard with E. fosbergii.

*Synedrella nodiflora (L.) Gaertn.

Erect herb with opposite branching and opposite ovate serrate leaves, heads cylindric, sessile, axillary, involucre of few narrow oblong bracts, flowers few, several yellow rays, a few yellowish disk flowers, achenes of two sorts, ray achenes elliptic, strongly margined, margins toothed, two pappus spines rather erect.

Village, Sachet 2046 (US).
Common weed.

*Vernonia cinerea (L.) Less. var. parviflora (Bl.) DC.

Little Iron-weed.

Slender erect herb, sparsely branched, leaves alternate, elliptic to obovate, basal ones larger; heads discoid, small, about 5 mm long, in corymbiform clusters, involucre of several series of closely imbricate bracts, flower purple, pappus white, capillary.

Area just behind Sevice de la Pêche, Sachet 2027 (US). Whitney Exped. 1923 (BISH).
Common weed.

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Fig. 1. Channel (hoa) across reef, coconut grove in background, germinating coconuts in foreground.

Fig. 2. Coconut plantation with split nuts piled up to dry enough to loosen meat for copra. Vairua area, lagoon side.





Fig. 3. Shallow channel (hoa) through land-strip, Takai area. Tournefortia argentea tree on right.

Fig. 4. Almost dry, "non-functional" hoa, Tournefortia scrub forest at top of shore opposite.





Fig. 5. Timonius polygamus scrub, very tangled, with emergent Tournefortia tree, Takapoto Atoll.

Fig. 6. Prostrate Scaevola sericea var. tuamotuensis, Manihi Atoll, near airstrip. Nov. 1974.





Fig. 7. Tournefortia argentea, budding inflorescence, Manihi Atoll, near airstrip



Fig. 8. Tournefortia, flowering inflorescence, Manihi, both photos Feb. 1975.



Figs. 9-10. Fairy tern, Gygis alba, in Pisonia grandis tree,
Takapoto Atoll, Vairua.

