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Vegetation of the Montane Region of Savai'i, Western Samoa[1]

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ABSTRACT: The natural vegetation of the volcanic region of Savai'i, Western Samoa, as surveyed on an expedition in 1975, is described. The natural vegetation of the highlands consists of cloud forest and smaller amounts of lava-flow scrub, scrub and herbaceous vegetation of cinder and ash deposits, and montane meadows. All but the latter were sampled for species composition and relative dominance of species. An annotated checklist of all flowering plant species collected or recorded on the expedition is included.

THE ISLAND OF SAVAI'I is the westernmost island in the Samoan Archipelago. With an area of 1800 km^2 (703 sq mi) and an elevation in excess of 1825 m (6000 ft), it ranks as one of the largest and highest islands in Polynesia. Despite centuries of occupation and the effects of a recent timber industry, much of the mountainous interior of the island is still clothed in its original vegetation.

Along with its size and elevation, what makes Savai'i unique is its large area of recent volcanic activity. In Polynesia, only Hawaii has more extensive recent lava flows. The most recent Savai'i eruptions were in the period 1902–1911, when three separate lava flows occurred (Figure 1). Two of these are small and are located in the highlands—the area in the interior over 1200 m in elevation. The other lava flow is much larger, extending from Matavanu crater at about 700 m down to the sea on the north coast of the island.

In addition to the lava flows and craters in the highlands, there are montane meadows, crater lakes, and large areas of cloud forest. Many species of animals and plants found in this area are endemic to Savai'i and occur only in these highlands. The whole area is of great aesthetic as well as scientific value.

In late May of 1975 a group of 20 people, most of them U.S. Peace Corps Volunteers, undertook a 9-day scientific expedition to the highlands. The purpose of the expedition was to study the vegetation, flora, fauna, and geology of the highland volcanic region. As the botanist on the expedition, the author collected the plant specimens and recorded the data that are the basis for this report.

PLANT COMMUNITIES

Several distinct plant communities occur in the highland volcanic region of Savai'i. The major factor correlated with these distinct communities is the type of volcanic material forming the substratum and the degree of weathering of the parent material. Most of these plant communities are seral, that is, stages in succession that will lead, if undisturbed, to the natural climax vegetation of the region—cloud forest.

The four basic types of plant communities are as follows:

1. Cloud forest—the dense forest covering the relatively well-weathered volcanic material over most of the highlands.
2. Montane meadow—the herbaceous wetland vegetation covering small areas of poorly drained valleys and swampy crater floors that may become small lakes during the rainy season: two distinct associations may be present.
3. Montane lava flow scrub—the scrubby vegetation that occurs on the little-weathered volcanic flows from 1902.

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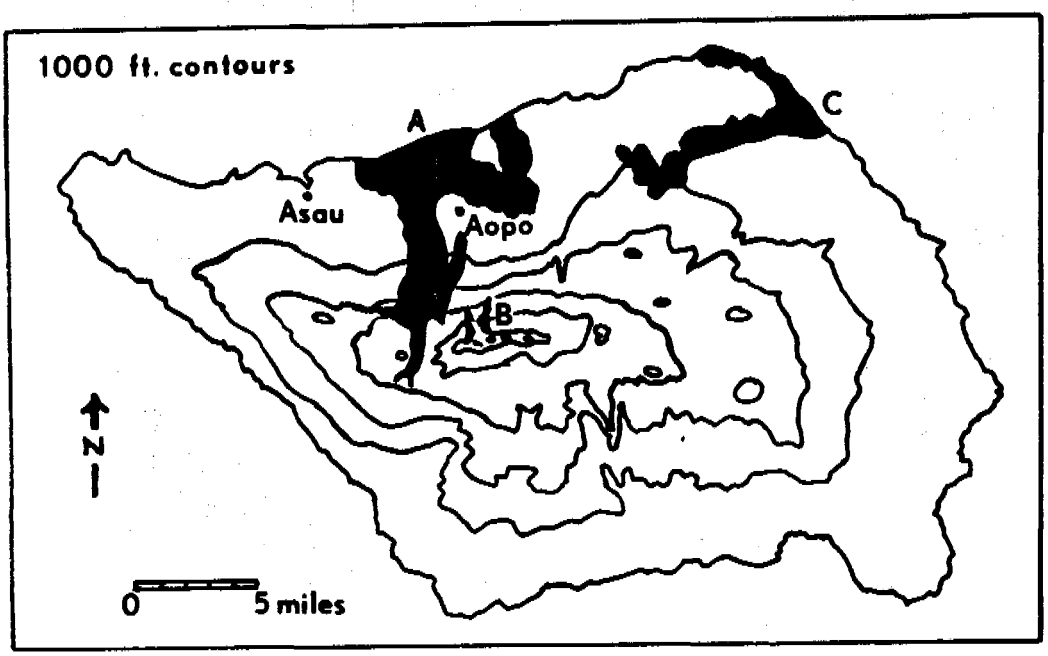

FIGURE 1. Map of the island of Savai'i, Western Samoa: *A*, Aopo lava flow (1760); *B*, Mauga Mu and Mata-o-le-Afi lava flows (1902); *C*, Matavanu lava flow (1905–11).

TABLE 1

TREE SPECIES COMPOSITION OF THE SILISILI CLOUD FOREST

SPECIES	TOTAL BASAL AREA (cm^2)	NUMBER OF TREES	TREES OVER 15-cm dbh	RELATIVE DOMINANCE (%)
1. *Spiraeanthemum samoense*	37,220	38	21	44
2. *Reynoldsia pleiosperma*	16,345	2	2	19
3. *Homalanthus acuminatus*	7,698	2	2	9
4. *Dysoxylum huntii*	6,915	12	9	8
5. *Coprosma savaiiense*	6,122	19	10	7
6. *Streblus anthropophagorum*	4,544	7	7	5
7. *Geniostoma samoense*	1,451	8	3	2
8. *Psychotria xanthochlora*	537	6	1	1
9. *Scaevola nubigena*	498	2	2	1
10. *Glochidion christophersenii*	466	4	1	1
11. *Pittosporum samoense*	464	5	1	1
12. *Hedycarya denticulata*	451	3	1	1
13. *Hernandia moerenhoutiana*	430	1	1	1
14. *Cyathea* sp.	227	1	1	*
15. *Cyrtandra aurantiicarpa*	241	3	0	*
16. *Acronychia richii*	140	4	0	*
17. *Meryta macrophylla*	114	2	0	*
18. *Alectryon samoensis*	42	1	0	*
Totals	83,905	120	62	100

NOTE: Sample size, 120 trees over 5-cm DBH; mean distance between trees, 2.17 m; mean area/tree, 4.71 m^2; mean number of trees/100 m^2, 21.1; total basal area/100 m^2, 1.48 m^2

*Less than 1 percent relative dominance.

4. Ash and cinder cone scrub—the vegetation that varies from open scrubland to lichen-covered cinder, found on the cinder cones of Mauga Mu and Mata-o-le-Afi and on nearby ash deposits; several associations may be distinguished.

METHODOLOGY

During the expedition, a number of vegetation surveys were made to sample the different types of plant communities. All the communities were sampled quantitatively with the exception of the montane meadows.

The woody vegetation of the cloud forest was sampled by measuring the trunk diameters (dbh) of a number of trees in the area between Mata-o-le-Afi and Mt. Silisili. The method used was the point-centered quarter method along a freshly cut trail. At intervals of approximately 10 m, points were established, and around each, four quarters were marked. The distance to the nearest tree in each quarter, as well as the diameter of the tree, was measured and recorded. Thirty such points were established, giving a sample size of 120 trees. The results of the tree survey are given in Table 1.

The herbaceous vegetation was sampled using the Braun-Blanquet cover-abundance scale. A series of random plots were situated in uniform areas of vegetation (communities or associations). These plots were 10 × 10 m on the lava flow and cinder cone and 8 × 8 m on the ash plain. The cover of each species in the plot was then estimated using a scale with seven values. A 5 was recorded for species with 75 to 100 percent cover, a 4 for 50 to 75 percent cover, a 3 for 25 to 50 percent cover, a 2 for 5 to 25 percent cover, a 1 for numerous individuals with less than 5 percent cover, a + for few individuals with little cover, and an r for a solitary individual with little cover. The results for each community or association were tabulated and are recorded in Tables 2, 3, and 4. In the nonforest vegetation, three layers are often present—shrub layer, herb layer, and moss layer. In the tables for the lava flow and cinder cone plots (Tables 2 and 3), the latter two are combined and on the ash plain (Table 4), no shrub layer was present.

TABLE 2

GROUND COVER OF MONTANE LAVA FLOWS

SPECIES	COVER (%)	FREQUENCY
A. Shrub layer		
1. *Vaccinium whitmeei*	50	6/6
2. *Spiraeanthemum samoense*	22	6/6
3. *Coprosma strigulosa*	9	6/6
4. *Cyrtandra nitens*	4	5/6
5. *Reynoldsia pleiosperma*	1	2/6
6. *Cyathea* sp.	1	3/6
7. *Wikstroemia foetida*	*	2/6
8. *Weinmannia affinis*	*	1/6
9. *Metrosideros collina*	*	2/6
10. *Geniostoma samoense*	*	2/6
11. *Amyema artensis*	*	1/6
Total	87	
B. Herb and moss layers		
1. *Stereocaulon* sp.	33	6/6
2. *Polytrichum* sp.	9	6/6
3. *Lycopodium venustulum*	1	6/6
4. *Imperata cylindrica*	1	6/6
5. *Blechnum procerum*	*	5/6
6. *Dendrobium mohlianum*	*	6/6
7. *Nephrolepis cordifolia*	*	6/6
Total	44	

NOTE: Sampling techinque, Braun-Blanquet cover-abundance scale; sample size, 6 random 10 × 10 m plots.
* Less than 1 percent cover.

DISCUSSION

The following descriptions and discussions of the plant communities found in the highlands of Savai'i are based on observations and the data obtained, which are given in Tables 1–4.

Cloud Forest

The major part of the highlands of Savai'i is covered with a continuous cloud forest (Figure 2). The ground is continually wet, as the area receives over 600 cm of annual rainfall with no dry season. During the daytime, the top of Savai'i is usually cloaked in clouds. The warm, moist tradewinds ascend

TABLE 3

GROUND COVER OF MONTANE CINDER CONE

SPECIES	COVER (%)	FREQUENCY
A. Shrub layer		
1. *Vaccinium whitmeei*	12	14/16
2. *Coprosma strigulosa*	7	16/16
3. *Wikstroemia foetida*	5	16/16
4. *Weinmannia affinis*	2	11/16
5. *Geniostoma samoense*	1	8/16
6. *Reynoldsia pleiosperma*	*	6/16
7. *Cyrtandra nitens*	*	5/16
8. *Coriaria ruscifolia*	*	3/16
9. *Spiraeanthemum samoense*	*	2/16
10. *Scaevola nubigena*	*	1/16
11. *Eurya japonica*	*	1/16
12. *Metrosideros collina*	*	1/16
Total	27	
B. Herb and moss layers		
1. *Stereocaulon* sp.	43	16/16
2. *Polytrichum* sp.	28	16/16
3. *Imperata cylindrica*	11	16/16
4. *Nephrolepis cordifolia*	7	16/16
5. *Lycopodium venustulum*	1	7/16
6. *Asplenium cuneatum*	*	7/16
7. *Cladonia* sp.	*	3/16
8. *Crassocephalum crepidioides*	*	3/16
9. *Dendrobium mohlianum*	*	2/16
Total	90	

NOTE: Sampling technique, Braun-Blanquet cover-abundance scale; sample size, 16 random 10 × 10 m plots.
*Less than 1 percent cover.

TABLE 4

GROUND COVER OF MONTANE ASH PLAIN

SPECIES	COVER (%)	FREQUENCY
A. Herb layer		
1. *Imperata cylindrica*	28	6/6
2. *Dryopteris puhirachis*	6	6/6
3. *Euphorbia reineckei*	1	5/6
4. *Crassocephalum crepidioides*	*	6/6
5. *Asplenium cuneatum*	*	6/6
6. *Ophioglossum parvifolium*	*	5/6
7. *Blechnum procerum*	*	4/6
8. *Erechtites valerianaefolia*	*	1/6
9. *Spiranthes sinensis*	*	2/6
10. *Nasturtium sarmentosum*	*	1/6
11. *Cyathea medullaris*	*	1/6
12. *Vaccinium whitmeei* (seedling)	*	1/6
13. *Geniostoma samoense* (seedling)	*	1/6
14. *Nephrolepis cordifolia*	*	1/6
15. *Carex graeffeana*	*	†
16. *Nertera granadensis*	*	†
17. *Mikania micrantha*	*	†
18. *Solanum nigrum*	*	†
19. *Dicranopteris linearis*	*	†
20. *Liparis phyllocardium*	*	†
Total	35	
B. Moss layer		
1. *Polytrichum* sp.	25	6/6
2. *Cladonia* sp.	19	6/6
3. *Stereocaulon* sp.	9	6/6
4. Moss indet.	*	3/6
5. Moss indet.	*	1/6
6. *Lycopodium cernuum*	*	†
7. Moss indet.	*	†
Total	53	

NOTE: Sampling technique, Braun-Blanquet cover-abundance scale; sample size, 6 random 8 × 8 m plots.
*Less than 1 percent cover.
†Occurs in the area, but was not found in the plots.

the mountains and cool, causing the condensation of the water into clouds and rain. The epiphytes are abundant, particularly in more sunny areas of the forest. This epiphytic growth is sometimes so thick as to make the tree trunks appear twice their actual diameter.

The forest is low compared to the rain forest at lower elevations. The trees are mostly less than 18 m high. The canopy is continuous, but is not as dense as undisturbed rain forest. The site at which the tree survey was made is between 1550 and 1650 m in elevation. The dominant tree species in both number of individuals and basal area is *Spiraeanthemum samoense*. Two other species, *Dysoxylum huntii* and *Coprosma savaiiense*, are also numerous. Along with *Spiraeanthemum*, the largest trees were *Reynoldsia pleiosperma* and *Homalanthus acuminatus*, but they were few in number (two each). A *Reynoldsia* tree had the highest dbh at 118 cm. On the edges of the forest, *Reynoldsia* appears to be the dominant tree. This indicates that this species requires light for germination and/or early growth. It is not common in the mature cloud forest, where it is apparently replaced by *Spiraeanthemum*

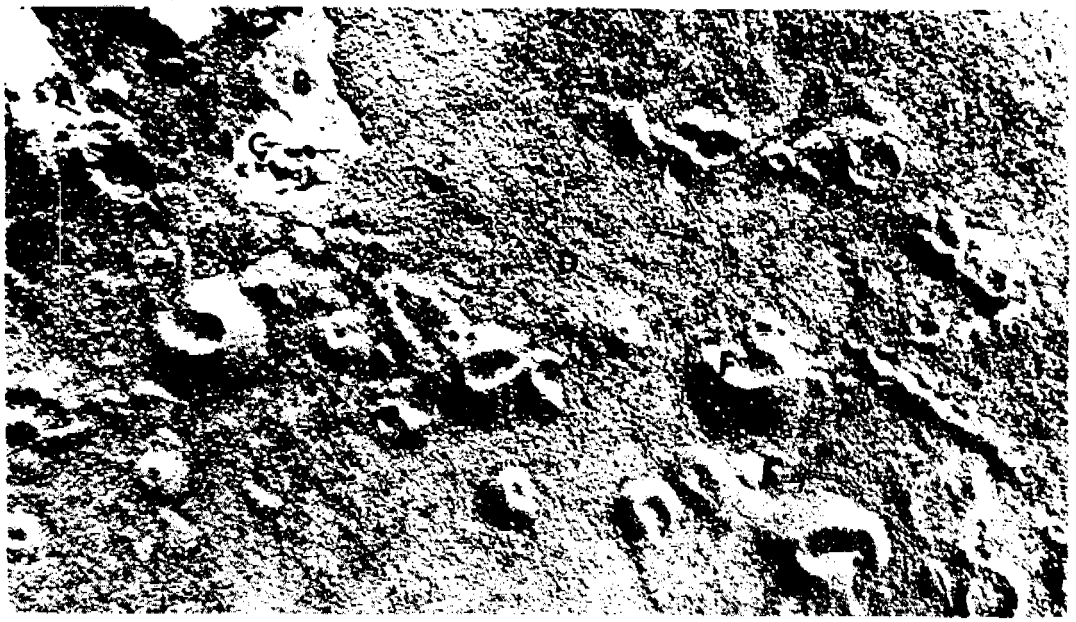

FIGURE 2. An aerial photograph of the summit of Savai'i: *A*, Mauga Mu lava flow; *B*, Mata-o-le-Afi lava flow; *C*, Mata-o-le-Afi craters; *D*, cloud forest where the tree survey was made; *E*, montane meadow at the base of Mt. Silisili; *F*, Mt. Silisili.

and other species. In all, 17 species of trees (plus one tree fern) were recorded in the 120-tree sample (see Table 1).

By summing all the distances between the trees and the points, the average distance was determined to be 2.17 m. This, by the nature of the point-centered quarter method, is equal to the average distance between trees. Based on this figure, 21.1 trees per 100 m^2 and 1.48 m^2 basal area per 100 m^2 can be calculated. The mean diameter of trees in the sample is 30 cm. The basal area is relatively high when compared with data from rain forests in American Samoa (U.S. Fish and Wildlife Service 1978). This is due to the trees in cloud forest being closer together and larger in diameter than those of the rain forest plots.

Montane Meadow

These meadows occur in the cloud forest in old volcanic craters and poorly drained valleys. Two such meadows were visited during the survey, but neither one was sampled quantitatively. The first is the shallow crater of a volcanic cone south of Mt. Silisili at an elevation of 1650 m. The vegetation of the crater floor consists of low herbaceous plants mostly less than 30 cm high. The dominant species are *Carex samoensis*, *Paspalum orbiculare*, and *Lycopodium cernuum*. It is likely that during heavy rains a shallow lake is formed within the crater.

The other, larger, meadow is a flat area south of and adjacent to the base of Mt. Silisili (Figure 3). It is dominated almost entirely by a dense cover of the sedge *Carex graeffeana* growing up to 1 m high. In the center of the meadow in a narrow trough there was some standing water.

Montane Lava Flow Scrub

There are two recent (1902) montane lava flows in the highland region, one below Mata-o-le-Afi crater and a nearby one below Mauga Mu (Figure 4). A vegetation survey

FIGURE 3. Mt. Silisili with montane meadow in the foreground. The meadow is dominated by the sedge *Carex graeffeana*.

FIGURE 4. Scrub vegetation on the Mauga Mu lava flow at 1500 m elevation.

was done on the latter at an elevation of 1500 m. The vegetation consists mostly of small, scattered trees and shrubs less than 4 m high, which grow from cracks in the little-weathered lava surface. The herbaceous vegetation that is able to survive on this inhospitable habitat consists mostly of lichens and epiphytes.

FIGURE 5. A small cinder cone and shallow crater (foreground) at Mata-o-le-Afi. Note the scrubby vegetation on the cone and its virtual absence in the shallow crater.

The dominant woody species on the lava flow are *Vaccinium whitmeei* (which produces a tasty, edible blueberry), with approximately 50 percent cover, and *Spiraeanthemum samoense*, with 22 percent cover. *Vaccinium* requires sunny conditions for growth and hence is nearly absent from the cloud forest. The overall cover of the woody plants was estimated to be 87 percent and the herbaceous cover 44 percent (see Table 2).

Montane Ash and Cinder Cone Scrub

There are two cinder areas in the highland region, Mauga Mu and Mata-o-le-Afi. The former is a single cone; the latter consists of a linear series of about seven cones running in an east-west direction. A vegetation survey was done on the south-facing slope of the largest of these cones at an elevation of approximately 1550 m.

The vegetation of the south face consists of scattered shrubs and small trees and is considerably more open than the vegetation of the lava flow. The cover of the shrub layer was estimated to be 27 percent versus 87 percent for that of the lava flow. The dominant species on the cinder cone is *Vaccinium*, as it is on the lava flow, but here its estimated cover is only 12 percent. Also common are *Coprosma strigulosa* and *Wikstroemia foetida*. The moss and herb layers (combined) had a higher cover on the cinder cone than on the lava field (90 percent versus 44 percent). (See Table 3.)

The cinder cone vegetation is not, however, uniform. The westernmost cone of the series of Mata-o-le-Afi is entirely devoid of shrubby vegetation (Figure 5). The only plant that thrives there is the white lichen *Stereocaulon*. The reasons for the difference in the vegetation of these cinder cones are not clear, but it is probably due to the physical structure or the porosity of the cinder that forms the surface.

On the south side of the craters is a large flat ash plain where another vegetation survey was done. The vegetation on this plain is tundralike (Figure 6). The only woody plants there are found in several small, scattered clumps. Many tree molds that look like postholes can be found on the plain. The dominant herb is the grass *Imperata cylindrica*,

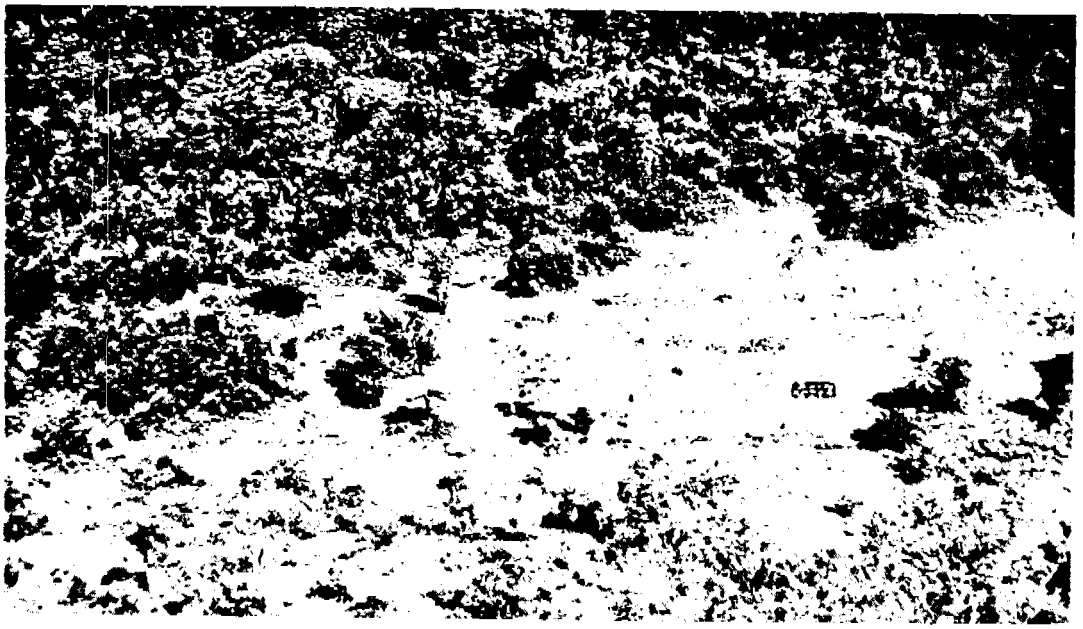

FIGURE 6. The ash plain at the south edge of Mata-o-le-Afi. Note the black tent at left center and the sign (for airplane supply drop) at right center.

with 28 percent cover (Table 4). The dominant lower plants are *Polytrichum* (25 percent cover), *Cladonia* (19 percent cover), and *Stereocaulon* (9 percent cover). The estimates may vary from place to place on the plain. The *Stereocaulon* seems to prefer rocks or large volcanic fragments. *Imperata* is not found in the forest and has not been reported from Savai'i other than from the montane volcanic areas.

CONCLUSIONS

During the expedition, a total of 86 species of flowering plants were collected, as well as a number of pteridophytes and lower plants. This is certainly not all the plants that occur in the area, but it probably does represent a majority of the species in and around the montane volcanic region of Savai'i. For a complete listing of the flowering plant species recorded during the expedition, see the checklist below.

Of the 86 species collected, a total of 47 species (55 percent) are endemic to Samoa, and 21 of these (24 percent) are restricted to the montane regions of Savai'i. This percentage of endemism is much higher than the overall endemism for Samoa (35–45 percent). In addition, there are many other endemic and often rare species that have been collected by earlier botanists, but were not seen during the expedition.

One of the remarkable characteristics of the highland region is the small number of weedy plants that occur there. The only ones that could be classed as weedy are the following species:

A. Composites:
   1. *Adenostemma viscosum*
   2. *Ageratum conyzoides*
   3. *Crassocephalum crepidioides*
   4. *Erechtites valerianaefolia*
   5. *Mikania micrantha*

B. Grasses:
   1. *Imperata cylindrica*
   2. *Paspalum orbiculare*
   3. *Oplismenus compositus*

C. Others:
   1. *Nasturtium sarmentosum*
   2. *Solanum nigrum*

The first two grasses, while sometimes weedy, are probably indigenous species and occur in undisturbed as well as disturbed areas. The only species of the ten that is common in the area is the *Imperata*.

What is particularly remarkable is that only a single individual of the "mile-a-minute weed," *Mikania micrantha*, was seen in the area. This fast-growing noxious vine is the worst weed in Samoa. At lower elevations, it rapidly spreads over cleared areas and retards forest regeneration in areas cut for timber. *Mikania* probably does not do well in the cool air of the highlands (the minimum temperature recorded during the expedition was about 7° C).

Commercially the area has little value. The Potlatch Company sawmill at Asau has found that cutting trees in areas over about 600 m in elevation is not profitable. The trees are not large enough and none of the 15 or so exploited trees are found at the higher elevations of Savai'i.

There has recently been an increased interest by the Western Samoa Government in conservation measures. Holloway (1975) listed Mt. Silisili as a number one priority for a proposed national park due to its conservation significance. The proposed park, with 22,000 acres, would encompass all the highland volcanic region and would extend down to an elevation of 170 m west of Aopo. There are a number of important reasons for establishing a national park in the Mt. Silisili area. With its high elevation, it is a unique natural area unlike any other in Polynesia. It has many endemic species of plants and animals, including the Samoan toothbilled pigeon and a flightless rail (the Samoan wood rail, *Pareudiastes pacificus*), which has not been collected in nearly 100 years.

In addition to its scientific value, the area has great natural beauty, with its forests, volcanic craters, and lava flows. A park in this area would help to protect and maintain the floral and faunal communities within their natural environment and preserve the area for the enjoyment of future generations.

CHECKLIST OF FLOWERING PLANTS COLLECTED ON THE SILISILI EXPEDITION

Dicotyledonae

Apocynaceae

Alyxia erythrosperma Gill. Lau maile

A woody high-climbing vine common in the montane and cloud forests. Indigenous to Savai'i and Upolu; also occurs in Fiji. The Samoan individuals belong to var. *samoensis* Chr. w 2563

Alyxia stellata (Forst. f.) R. & S. Gau

A scandent shrub or vine occasional in sunny forest areas at all elevations. Indigenous to all the high islands of Samoa and widespread in the South Pacific islands. w 2622, w 2636

Araliaceae

Meryta macrophylla Rich Fagufagu

A small tree occasional in the coastal to cloud forests. Indigenous to all the high islands of Samoa; also occurs in Tonga. w 2678

Reynoldsia pleiosperma A. Gray Vivao

A medium-sized to large tree common to abundant in the montane and cloud forests as well as in volcanic areas above 700 m. Endemic to Savai'i. w 2552, w 2637

Shefflera samoensis (A. Gray) Harms

A small tree with palmate leaves uncommon to occasional in the cloud forest above 700 m. Endemic to montane Savai'i and Upolu. w 2474

Asclepiadaceae

Hoya filiformis Rech. Suni, Fue sele lā

An herbaceous vine occasional in the montane and cloud forests and on montane lava flows. Endemic to Savai'i and Upolu. w 2643

Compositae

Adenostemma viscosum J. R. & G. Forst.

A weedy herb occasional on trails and in clearings in the montane and cloud forests. It also occurs as a weed near sea level on Swains Island, an atoll. Perhaps it previously occurred at low elevations on the high islands of Samoa, but is unable to compete there with the more vigorous introduced weeds. An aboriginal introduction to Samoa; widespread in the Pacific. w 2529, w 2652

Ageratum conyzoides L.

A weedy herb occasional to common in disturbed areas; rare in montane Savai'i. Introduced to Samoa; a widespread weed of the tropics. w 2656

Crassocephalum crepidioides (Benth.) S. Moore Fualele

An erect weedy herb common in sunny disturbed places. It is common on the montane ash fields of Savai'i. Introduced to Samoa; a widespread weed of the tropics. w 2491, w 2586

Erechtites valerianaefolia (Wolf) DC. Fualele

An erect weed common in sunny disturbed places; occasional on the montane ash fields of Savai'i. Introduced to Samoa; a widespread weed of the tropics. w 2532, w 2590, w 2658

Mikania micrantha H. B. K. Fue saina

A weedy herbaceous vine abundant in disturbed areas. It is the commonest and most noxious weed in Samoa, but is rare in montane Savai'i. Introduced to Samoa; a widespread weed of South America and the tropical Pacific. w 2646

Coriariaceae

Coriaria ruscifolia L.

A widely branching shrub occasional in sunny montane areas above 1400 m. Indigenous to Savai'i; also occurs in Chile, New Zealand, Fiji, and the Society Islands. w 2488, w 2569

Cruciferae

Nasturtium sarmentosum (Forst. f.) Schultz A'atasi

A weedy herb occasional in disturbed and sunny areas; rare in protected spots on the ash plains in montane Savai'i. Indigenous or an aboriginal introduction to Samoa; widespread in Polynesia. w 2587, w 2655

Cunoniaceae

Spiraeanthemum samoense A. Gray

A medium-sized to large tree abundant in the montane and cloud forests, rarely below 300 m. Endemic to Samoa; occurs on Savai'i, Upolu, and Tutuila. w 2557, w 2659

Weinmannia affinis A. Gray

A small to medium-sized tree occasional to common in the montane and cloud forests above 400 m. Indigenous to all the high islands of Samoa; also occurs in Fiji. w 2486

Ericaceae

Vaccinium whitmeei F. v. M.

A shrub common to abundant in sunny montane volcanic areas, occasionally as an epiphyte in the cloud forest above 800 m. The Samoan blueberry is endemic to montane Savai'i. w 2489

Euphorbiaceae

Claoxylon cf. *echinospermum* M.-A.

A small tree uncommon to occasional in the cloud forest. Indigenous to Savai'i; also occurs in Fiji. w 2544

Euphorbia reineckei Pax

An erect herb occasional in clearings in the montane and cloud forests and in sunny volcanic areas above 300 m. Endemic to Samoa; occurs on Savai'i, Upolu, and Tutuila. w 2519, w 2585

Glochidion christophersenii Croizat

A shrub or small tree uncommon in the cloud forest above 1000 m. Endemic to montane Savai'i. w 2527, w 2628, w 2660

Homalanthus acuminatus M.-A.

A medium-sized tree occasional in the montane and cloud forests. Endemic to Samoa; occurs on Savai'i and Upolu. w 2679

Flacourtiaceae

Xylosma samoense (Chr.) Sleumer

A small to medium-sized tree uncommon in the cloud forest above 2000 m. Endemic to montane Savai'i. w 2616

Gesneriaceae

Cyrtandra aurantiicarpa Gill.

A shrub or small tree occasional in the montane and cloud forests above 600 m. Endemic to montane Savai'i. w 2512

Cyrtandra nitens C. B. Clarke Alili (?)

A small shrub occasional in the cloud forest and sunny volcanic areas above 1000 m. Endemic to montane Savai'i. w 2483

Goodeniaceae

Scaevola nubigena Laut. To'ito'i vao

A small tree occasional in the cloud forest and on montane volcanic areas above 800 m. Endemic to montane Savai'i. w 2540, w 2560

Hernandiaceae

Hernandia moerenhoutiana Guill. Pipi

A medium-sized tree occasional in the montane and cloud forests. Indigenous to Samoa; occurs on Savai'i, Upolu, Tutuila, and Ta'ū, and westward to Melanesia. (Seen, but not collected.)

Icacinaceae

Citronella samoensis (A. Gray) Howard

A small tree occasional in the forest at all elevations. Endemic to Samoa; occurs on nearly all the high islands. w 2632

Loganiaceae

Fagraea berteriana A. Gray Pualulu

A medium-sized to large tree occasional to common in the lowland to cloud forests, but uncommon at the highest elevations of Savai'i. Indigenous to all the high islands of Samoa; widespread from New Caledonia to eastern Polynesia. w 2609

Geniostoma samoense Rein. Lau fatifati

A small tree occasional in the forest at all elevations. Indigenous to all the high islands of Samoa; also occurs in Uvea. The variety found in the cloud forest of Savai'i is var. *parviflorum* Rein. w 2471, w 2487, w 2567, w 2618

Loranthaceae

Amyema artensis (Mont.) Dan. Tapuna

A woody parasitic shrub occasional on trees at all elevations. Indigenous to Savai'i and Upolu; widespread in the tropical Pacific. w 2505, w 2610

Malvaceae

Abutilon sp. nova

A tree rare (?) in the cloud forest above 1000 m. Endemic to montane Savai'i. No native species of *Abutilon* are known from the nearby islands. w 2476

Meliaceae

Dysoxylum huntii Merr. Maota mea

A medium-sized to large tree common to abundant in the montane and cloud forests, rarely below 300 m. Endemic to Samoa; occurs on all the high islands. w 2536, w 2631

Monimiaceae

Hedycarya denticulata (A. Gray) Perk. & Gilg.

A small tree common in the lowland to cloud forest, rarely below 100 m. Endemic to Samoa; occurs on all the high islands. w 2634

Moraceae

Ficus godeffroyi Warb. Mati

A small to medium-sized tree occasional in the montane and cloud forests. Endemic to Samoa; occurs on all the high islands. w 2680

Streblus anthropophagorum (Seem.) Corner

A small to medium-sized tree occasional in the montane and cloud forests. Indigenous to Savai'i and Upolu; also occurs in Fiji, Rarotonga, Niue, and Tonga. w 2669

Myrsinaceae

Embelia vaupelii Mez

A woody vine occasional in the forest at all elevations. Indigenous to most of the high islands of Samoa; also occurs in Tonga. w 2620

Myrtaceae

Metrosideros collina (J. R. & G. Forst.) A. Gray

A small to large tree uncommon on ridges, lava flows, and sunny forest areas at higher elevations. Indigenous to Savai'i, Upolu, and Tutuila; widespread on tropical Pacific islands. (Seen in a sterile state, but not collected.)

Syzygium patentinerve Chr.

A medium-sized tree uncommon to occasional in the cloud forest, rarely below 700 m. Endemic to Savai'i and Upolu. w 2481

Syzygium samarangense (Bl.) Merr. & Perry Nonu vao

A small to medium-sized tree occasional in the lowland to cloud forests. Indigenous to all the high islands of Samoa; widespread in the Pacific. w 2625

Oleaceae

Jasminum didymum Forst. f.

A woody vine occasional in the forest at all elevations. Indigenous to all the high islands of Samoa; widespread from tropical Asia to eastern Polynesia. w 2562

Piperaceae

Macropiper timothianum (A. C. Sm.) A. C. Smith 'Ava' avaaitu

A shrub occasional to common in the lowland to cloud forests, mostly above 250 m. Indigenous to Savai'i, Upolu, and Ta'ū; also occurs in Fiji. w 2510

Peperomia christophersenii Yuncker

A small epiphytic herb occasional in the montane and cloud forests above 500 m. Endemic to Savai'i and Upolu. w 2517

Peperomia rechingerae C. DC.

A small epiphytic herb occasional in the montane and cloud forests above 600 m. Endemic to Samoa; occurs on Savai'i, Upolu, and Ta'ū. w 2504

Pittosporaceae

Pittosporum samoense Chr.

A small to medium-sized tree occasional in the cloud forest above 1000 m. Endemic to montane Savai'i. w 2516, w 2668

Rubiaceae

Coprosma savaiiense Rech.

A shrub or small tree common in sunny areas in the cloud forest and on montane volcanic areas above 800 m. Endemic to montane Savai'i. w 2520, w 2537, w 2554, w 2623, w 2676

Coprosma strigulosa Laut.

A shrub or small tree occasional to common in the cloud forest and on montane volcanic areas above 1000 m. Endemic to montane Savai'i. w 2485, w 2568, w 2681

Nertera granadensis (Mutis ex L. f.) Druce

A prostrate herb rare in sunny areas and streambeds in the cloud forest above 1250 m. Indigenous to Savai'i; widespread elsewhere. w 2583

Psychotria xanthochlora K. Schum.

A small tree common in the montane and cloud forests above 500 m. Endemic to Savai'i and Upolu. w 2521, w 2657, w 2665, w 2665A

Rutaceae

Acronychia albiflora Rech.

A small tree occasional in the montane and cloud forests above 600 m. Endemic to Savai'i and Upolu. All Samoan species attributed to the genus *Acronychia* should actually be transferred to the genus *Melicope* (T. Hartley, personal communication). w 2633

Acronychia richii A. Gray

A shrub or small tree occasional in the cloud forest and montane scrub. Endemic to Savai'i and Tutuila. Like the preceding species, this should be transferred to the genus *Melicope*. w 2524, w 2671

Sapindaceae

Alectryon samoensis Chr. Taputo'i (?)

A medium-sized tree occasional in the montane and cloud forests, rarely below 700 m. Endemic to montane Savai'i. w 2683

Solanaceae

Solanum nigrum L. Magalo

A weedy herb occasional in disturbed places. Rare in sunny volcanic areas in montane Savai'i. Introduced to Samoa; a widespread weed. w 2589, w 2627

Theaceae

Eurya japonica Thun.

A shrub or small tree occasional to common in the montane scrub, montane volcanic areas, and sunny forests above 450 m. Indigenous to Savai'i and Tutuila; widespread in the Pacific. w 2547, w 2644

Thymelaeaceae

Wikstroemia foetida (L. f.) A. Gray

A shrub occasional in sunny forests and volcanic areas at all elevations. Indigenous to Savai'i, Upolu, and Tutuila; also occurs in Fiji and possibly Tahiti. w 2484

Urticaceae

Boehmeria virgata (Forst. f.) Guill.

A shrub or small tree uncommon in open places in the montane and cloud forests.

Indigenous to Savai'i and Tutuila; widespread eastward to Melanesia. w 2475, w 2480

Elatostema cf. *cupreo-viride* Rech.

A large ground herb occasional in the montane and cloud forests. Endemic to montane Savai'i. w 2515, w 2545

Elatostema aff. *nigrescens* Miq.

A tall ground herb uncommon in the cloud forest. Indigenous (or endemic?) to montane Savai'i. w 2473

Elatostema cf. *obliquefolium* Rein.

A small ground herb uncommon in the cloud forest. Endemic to montane Savai'i. w 2665

Elatostema samoense Rein.

A small ground herb occasional in streambeds and forest floors in the montane and cloud forests. Endemic to Samoa; occurs on Savai'i, Upolu, and Tutuila. w 2477

Elatostema cf. *strictum* Rein.

A small ground herb occasional in the cloud forest. Endemic to montane Savai'i and Upolu. w 2477A

Pipturus viridis Chr.

A shrub or small tree uncommon in the cloud forest and on montane lava flows above 1000 m. Endemic to montane Savai'i. w 2511, w 2629

Verbenaceae

Faradaya powellii Seem. Māmālupe

A high-climbing vine in disturbed and undisturbed forests at all elevations. Endemic to Samoa; occurs on all the high islands. w 2534, w 2630

Violaceae

Melicytus samoensis (Chr.) A. C. Smith

A small to medium-sized tree uncommon in the cloud forest. Endemic to Samoa, occurring on Savai'i, Upolu, and Ta'ū. w 2523, w 2621

Monocotyledonae

Cyperaceae

Carex graeffeana Boeck.

A coarse sedge common to dominant in swampy areas in the cloud forest above 1200 m. Indigenous to Samoa; also reported from Rarotonga. w 2547, w 2582, w 2664

Carex samoensis Boeck.

A coarse sedge common to dominant in swampy areas and meadows in the cloud forest above 700 m. Endemic to montane Savai'i and Upolu. w 2648, w 2649

Gramineae

Imperata cylindrica (L.) Beauv.

An erect grass common on sunny ash and cinder deposits in montane areas and occasional on sunny disturbed hillsides at lower elevations. Indigenous to Samoa; widespread in the tropics. w 2493, w 2588

Oplismenus compositus (L.) Beauv.

A weedy grass occasional to common in disturbed forest areas. Introduced to Samoa; a widespread tropical weed. w 2573, w 2651

Paspalum orbiculare Forst. f.

A grass occasional to common in wet, sunny places at all elevations. Indigenous to Samoa; widespread from Southeast Asia to Polynesia. w 2650

Liliaceae

Cordyline fruticosa (L.) Chev. Ti, Ti vao

A woody monocot shrub common in the forest at all elevations. Probably an aboriginal introduction to Samoa, formerly cultivated for its edible root, and now naturalized. Widespread from tropical Asia to Polynesia. (Seen, but not collected.)

Collospermum samoense Skotts.

A coarse epiphytic herb occasional in the montane and cloud forests above 600 m. Endemic to montane Savai'i and Upolu. w 2492, w 2518

Orchidaceae

Calanthe triplicata (Wille. f.) Ames

A large white-flowered ground orchid occasional to common in the forests at all elevations. Indigenous to all the high islands of Samoa; widespread elsewhere in the Pacific. w 2509

Calanthe ventrilabrum Rchb. f.

A large, yellow-flowered ground orchid uncommon in the montane and cloud forests of Savai'i. It is endemic to Samoa. w 2558

Coelogyne lycastoides F. v. M. & Krzl.

A large-leafed epiphytic orchid occasional in the montane and cloud forests. Endemic to Samoa; occurs on most of the high islands. w 2612

Dendrobium mohlianum Rchb. f.

A red-flowered epiphytic or ground orchid occasional in the montane volcanic areas and cloud forest above 1000 m. Indigenous to Samoa, where it occurs only on Savai'i; also found in Fiji and elsewhere. w 2490, w 2543, w 2667

Dendrobium reineckei Schltr.

An epiphytic orchid uncommon in the montane and cloud forests. It is endemic to Samoa; occurs on Savai'i and Upolu. w 2607

Dendrobium vagans Schltr.

An epiphytic orchid rare in the cloud forest above 1200 m. Endemic to montane Savai'i. w 2553

Diplocaulobium fililobum (F. v. M.) Krzl.

An epiphytic orchid occasional in the montane and cloud forests. Endemic to Samoa; occurs on most of the high islands. w 2608

Epiblastus sciadanthus Schltr.

A pink-flowered epiphytic orchid uncommon in the montane and cloud forests. Endemic to Samoa; occurs on Savai'i, Upolu, and Ta'ū. w 2555

Eria rostriflora Rchb. f.

An epiphytic orchid occasional in the montane forests above 500 m. It is indigenous to Samoa; occurs on Savai'i and Upolu; also found from Fiji to the Society Islands. w 2535

Eria aeridostachya Rchb. f. ex Lindl.

A thick-leafed ground or epiphytic orchid with white flowers. Indigenous to Samoa; widespread westward to Malaysia and the Philippines. w 2490A

Habenaria vaupelii Schltr.

A tall ground orchid uncommon in the montane and cloud forests. It is endemic to Samoa; occurs on Savai'i, Upolu, and Ta'ū. w 2482, w 2626

Liparis phyllocardium Schltr.

A small ground orchid uncommon in the cloud forest above 1000 m. Endemic to montane Savai'i. w 2506, w 2522

Liparis stricta Schltr.

A ground orchid occasional in the montane and cloud forests. Endemic to Samoa; occurs on Savai'i and in Manu'a. w 2561, w 2635, w 2640

Oberonia equitans (Forst. f.) Drake

A small epiphytic orchid occasional in the montane and cloud forests. Indigenous to most of the high islands of Samoa; widespread in the Pacific islands. w 2638

Phaius flavus (Bl.) Lindl.

A large, yellow-flowered ground orchid occasional in the cloud forest above 1000 m. Indigenous to Samoa. This is a new record for Samoa and a range extention for this species, which occurs from India to New Guinea. w 2507, w 2508, w 2559

Spiranthes sinensis (Pers.) Ames

A tiny ground orchid uncommon on ash and cinder areas of montane Savai'i. Indigenous to Samoa; widespread from India eastward to Polynesia. w 2584

Palmae

Clinostigma savaiiense Chr. Niu vao

A tall palm tree occasional in the montane and cloud forests above 600 m. Endemic to montane Savai'i. w 2564

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