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PANDANUS TECTORIUS AGAIN AND DELISSEA ANEW

Drs. Otto & Isa Degener*

After one of us lived in the Hawaiian Islands since 1922 and the other since 1953 and have concentrated on the flora full time for a total of 90 years in round numbers, we are still rather timid. We lack confidence in the result of studies of botanists, including ourselves, particularly concerning the scientific naming of plants in extremely complicated Hawaii Nei. Nor surprisingly as it may seem do we feel that newer publications concerning the naming of plants necessarily are always an improvement over the names that have been proposed in older publications. Moreover, repeating previous "sermons", we do not consider any scientific plant names of much importance unless the author (or authors) of each name is appended.

Regarding the hala of Hawaii Nei and its trivial variations, Dr. Benjamin C. "Skip" Stone (Notes from Waimea Arboretum and Botanical Garden 8(2):4-10. Dec. 1981.) makes much of the fact that:

> "The Degeners, however, have unfortunately made an error in writing the name as a new combination---; thus the whole name, with authors, according to the Degeners, should be written as follows: Pandanus tectorius (J.P. du Roi) Deg. & Deg. But this is incorrect, for the simple reason that the species was originally called, i.e. ascribed to, the genus Pandanus. No combination is needed, or for that matter, possible. The correct name for the species, therefore is: Pandanus tectorius J.P. du Roi as 'Z'."

As we Degeners understand it, no one ever put the name of the taxon in print except one of the Degeners' calabash cousins, namely the Brunswick Court physician - all worked with plants - Johann Philip du Roi (6/2/1741 - 12/8/1785). (Please note Stone misspelled the middle name, one or two "p"s often denoting whether the babe had been properly baptized.) As du Roi signed his article "Z" in the German periodical Der Naturforscher 4:240+. 1774, of which he was no editor, we Degeners replaced the ambiguous "Z" with "J.P. du Roi". Stone does not recognize this as a new combination, though we believe lexicographer Noah Webster (1758-1843) would do so. In short, we personally are still convinced we are correct in the use of P. tectorius (J.P. du Roi) Deg. & Deg., a favorable prejudice common to most individuals regarding their assertions.

We acknowledge that Drs. St. John and Stone, both known to us personally and by the publications available to us in our small, very own library on Oahu's North Shore, are the present World experts on the genus Pandanus. The former in his useful List and Summary of the Flowering Plants in the Hawaiian Islands, page 15, 1973 lists as native, if not endemic, to the Hawaiian Islands:

1. Pandanus chamissonis Gaud., 1841
2. P. douglasii Gaud., 1841
3. P. menziesii Gaud., 1841
4. P. odoratissimus L. f., s.s., 1781
5. P. odoratissimus var. levigatus Mart., 1930
6. P. odoratissimus var. oahuensis Mart., 1930
7. P. tectorius var. sandvicensis Warb., 1900

On the contrary to the above, acknowledged expert Dr. Stone, whose many Pandanus publications we lack, states on page 8 in the December 1981 "Notes" that:

> "Some authors (e.g., Dr. St. John) prefer to regard the species as of very restricted distribution; indeed, St. John does not regard the name as validly published---. Consequently he omitted the species from his recent publication on Tahitian pandans---."

Stone differs also with St. John in considering 1. P. chamissonis, 2. P. douglasii, and

3. P. menziesii as "illegitimate". Furthermore, though St. John recognizes 4. P. odoratissimus L.f., s.s., 5. P. odoratissimus var. levigatus and 6. P. odoratissimus var. oahuensis, Stone considers them merely varieties of P. tectorius.

Do the two World experts agree with each other? Read Pacific Science 33(4):397. 1979 and judge for yourselves. According to St. John:

> "Stone (1967:242), thinking that P. tectorius legally dated from 1900, states that another name must be found for the 'species (singular or plural) of Tahiti.' He states that the Hawaiian P. douglasii Gaud. (1841) occurs in Tahiti and is an available name. The writer is aware of Stone's lumping of taxa with different morphology, from remote areas into a single unit. Having had Stone as a graduate student and assistant for 3 years, and having followed his studies and publications since then, the author has a good idea of the value of Stone's taxonomy. He can observe differences and resemblances, but his judgement and his conclusions are of a different order. Half the time the writer cannot agree with Stone's results, and particularly in large and complicated problems, can seldom agree with him."

Furthermore, St. John remarks on pages 400 and 401:

> "Depending solely on his criteria of the fleshy shoulders and large white spines, Stone (1967:237), in his eagerness for lumping, has reduced to the synonymy of Pandanus odoratissimus the following sum of species described by the writer: from Malaya, 8; from Anamba Islands, 1; from Vietnam, 9; from Hong Kong, 1; and from the Maldive Islands, 4---His action seems based on prejudice, not on Scientific judgement."

With obvious squabbling about the standing

of taxa and their naming, we recognize that every scientific name published is correct not necessarily according to facts, but according to the opinion of the particular author or authors involved. Hence it is absolutely necessary to cite such authors. We personally then try to review the arguments and consider the standing or reputation of authors involved before we choose just whom to follow. Readers should choose for themselves whether they prefer for our common hala the binomial P. tectorius (J.P. du Roi) Deg. & Deg., or some other name proposed by some other squabbler. "But", as we have printed elsewhere before, "who knows what botanists 1,000 years hence will do?" With this in mind, the local Flora we have been publishing during the last half Century consists of illustrated, single sheets. As opinions may change hopefully for the better, even perhaps ours concerning the hala, they are bound loose leaf. Hence if the opinion regarding a taxon changes and funds are available, the sheet can be readily removed and replaced with the newer version. By this method, the Flora should improve as the Science of Botany does.

Doubting, as mentioned above, that all modern publications are superior to the old, our opinion upholding the genus Delissea according to the judgement of Gaudichaud who established it in 1826, still holds. He named it for the physician-apothecary A. M. Delisse, naturalist of the French 1800-1804 expedition to Australia. In the use of Delissea, among many others, we are in agreement with such writers as William Hillebrand who in late life studied under Asa Gray at Harvard and in 1888 posthumously had his Flora of the Hawaiian Islands published. He devoted pages 248-251 to the genus. Others that come to mind are: Baillon; Bentham & Hooker; A. deCandolle; Endlicher; Engler; A. Gray; Herbst; Léveillé; H. Mann, Jr., Neal, Presl; Skottsberg; Rock; Wawra; and Wimmer.

Sheepishly following the majority we, considered "splitters" because we emphasize the importance of differences in plants by "lumpers" who emphasize the importance of likenesses. Here

alter the scientific name of a member of the Lobeliaceae. It bears the legend: "Hawaiian Islands, Oahu Island, Kaaawa, Hidden Valley; moist river bed, under canopy of Aleurites and Pisonia, with Athyrium, 457 m (1,500 ft.) alt., Nov. 2, 1980, J. Obata & D. Palmer 433 (BISH)." According to our opinion, it better be:

Delissea occultans (St. John) Deg. & Deg., comb. nov.

Syn: Cyanea occultans St. John, Additions Cyanea (Lobeliaceae) of Oahu and Maui. Phytologia 45(2):143-145. 1981.

Of the two binomials may the reader take his pick. Both are correct, one according to the opinion of a "lumper" (excuse us, please) and the other according to that of two "splitters".

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*Authors and/or publishers of Flora Hawaiiensis or New Illustrated Flora of the Hawaiian Islands, Books 1-6,7 in print; Plants of Hawaii National Parks; Naturalist's South Pacific Expedition: Fiji; and articles like this one. For prices, write to Box 154, Volcano, Hawaii 96785.

KOLOA DUCK SURVIVAL?

In Vol.5 No.1 of the "Notes from Waimea Arboretum", it was stated that duckling leg bones were identified from the stomach contents of a Bullfrog, Rana catesbeiana Shaw;caught at Waimea. This was when we first suspected the bullfrog as being a problem on our ponds, after the disappearance of Koloa ducklings in their first few days of age.

It was stated in "The Koloa" (Swedberg, Div. of Fish & Game, 1967) that a bullfrog was found in the upper Kapaa Homestead (Kauai) with a tiny duckling lodged in it's throat. "How important this predation is, is unknown" Swedberg said.

On Jan. 13, 1982, 7 Koloa ducklings with Mother were spotted in our Pond #1. On Jan. 19,

3 ducklings were left. A large bullfrog was spotted in the pond and caught. This was dissected and not only her own eggs, but 2 completely undigested Koloa ducklings were found in the stomach. This was recorded with pictures.

The first bullfrogs were brought to Hawaii prior to 1867 and they inhabit all of the major Islands and can be found in most streams and reservoirs. They consume large numbers of insects and almost any animal they can catch and swallow.

The Koloa had gone extinct on all major Islands with the exception of Kauai which is free of the mongoose. We know that the loss of habitat, urbanization, feral cats, dogs, and the mongoose are the major causes of their decline; but could the bullfrog be considered as devastating to the Koloa?

Marleen Davis

KOLOA DUCKS IN THE AVIARY AT WAIMEA ARBORETUM

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Sincerely,

Bard Treiman

Bard Treiman
Associate Publisher

WP/sa

favored these figs, he told me to my horror, because the plants had no timber value and hence jungles consisting of them would never succumb to the lumberman's ax but catch water undisturbed for ever. Many of such plants were grown in the Station's nursery in Wahiawa, Island of Oahu, now a State Botanical Gardan.

One of the exotics in Wahiawa was Clidemia hirta, carefully grown in tins under the supervision of Forester George McEldowney and staff. Being interested solely in endemic plants and the animals that depend on them for food and shelter, I feebly protested in the late '40s the planting of the Clidemia seedlings in the Pupukea-Kahuku area of Oahu where I was spending so many days gleaning its endemic riches for permanent preservation in the museums of the World. My unheeded protest was countered by Lyon's remark that the species was particularly promising as, similar to lantana, its seeds would be widely disseminated by birds like the dove and mynah.

I had collected this tropical American shrub of the Melastome family while Botanist of the Anne Archbold Expedition to Fiji in 1940, my voucher specimen being preserved in Harvard's Arnold Arboretum. It had become such a pernicious weed in Fiji that it was known there as Koster's (not Coster's) Curse, in memory of the reckless wretch who had foolishly introduced it. It was not only a costly weed in pastures, plantations and gardens; but a scourge in the forest by crowding out and exterminating - and that means for ever - the endemic flora. It is briefly illustrated in Hosaka & Thistle's "Noxious Plants of Hawaiian Ranges" in 1954; listed by Degener & Degener in their leaflet of plants to be studied along the Poamaho Trail of Oahu, Aug. 27, 1961 by members of the Tenth Pa-Pacific Science Congress; and figured in color by Merlin in his "Hawaiian Forest Plants" in 1976.

Though influential in the spread of Clidemia hirta on Oahu, It is patently unjust to blame Dr. Lyon for the introduction of this noxious weed to the Islands. Had he done so, he certainly would have mentioned the fact in his meticulously kept file of introduced exotics long housed in the Station Library on Keeaumoku Street, Honolulu. Though search for this valuable file at the Lyon Arboretum was futile, I was delighted to learn that retired Forester L.W. Bryan of Kailua-Kona, Island of Hawaii, owns a partial copy that he had made of it a score years ago. His perusal for me of it shows no mention of any Clidemia. That it should have been mentioned in the lost portion is pure conjecture.

Even though insects have been introduced for biological control, such as a moth caterpillar that skeletonizes the leaves, the scourge, disseminated mainly by birds and feral pigs, is spreading to some of the other islands presumably by the vector man on hiking boots and camping gear.

For additional Clidemia information, including sixty references, consult L.L. Wester & H.B. Wood, Dept. Geography, Univ. Hawaii.

Though harmful to Hawaiian Biology with his continuous introduction of some of the most vigorous and harmful weeds from the far corners of the World to help rush our endemic biota to extinction, Dr. Lyon was an efficient, conscientious "sugar" executive, a position for which he was employed; and one of the great benefactors to local horticulture. He not only introduced many plants of great interest and beauty to our gardens and condominium lanai; but established andor materially helped Foster Botanical Garden, Wahiawa Botanical Garden, and the University of Hawaii's Lyon Arboretum, all on the Island of Oahu where tourists eager to see the real Hawaii presently congregate.

But why do we not learn from experience? Recently I read in the local newspaper that a would-be benefactor, apparently a restaurateur and not a botanist, is introducing a Hebe (incorrectly identified in the article) to the Islands because it is so aggressive that it will cover the junk piles, discarded cars and waste places about Honolulu with greenery. This "Down Under" exotic may be a two-edged sword as it may likewise smother with greenery our ornamentals, garden hedges, papaya trees, plantations and ultimately our hard-pressed endemics. Instead of opening up another Pandora's box of expensive problems, should not Beach's Blunder be extirpated before it reseeds itself and emulates Koster's Curse? Federal Law wisely discourages the introduction of exotics - was the Law innocently ignored?

The frightening result of more recently fallaceous thinking of a few individuals endangers the sanctity of our two National Parks, truly Cities of Refuge for endemics peculiar to large areas of the Islands of Hawaii and Maui. They maintain that exotic weeds now fill niches that always have been empty of natives. Even were this true, such weed patches would be foci for the continuous infection of unspoiled primeval surrounding regions. Exotics, for the most part free of the fungi and insects that plague and control their spread in their native home, compete for lebensraum at the expense of endemics having endemic fungi and insects feeding upon them.

Although the release from the State's Department of Land and Natural Resources mentioned above maintains that a forest products industry could "provide some 800 jobs in rural areas and a net cash flow to landowners in the State of $4 million annually," it ignores the costly effect on the lucrative tourist industry; the biological research programs supported by lucrative grants-in-aid; and, in a Biblical sense people can understand, the Sin of exterminating God's endemic Creations unique to the Hawaiian Islands.

Reading further, we learn that "A target of 200,000 acres, equivalent to 10 percent of Hawaii's forest lands, may ultimately be a part of our industrial forest resource base." This approaches the area of Molokai and Niihau combined! The present craze appears to be for "queensland maple, toona, and some eucalyptus." I have noted that pines are likewise favored particularly in the Kona Dis-

Pittsburgh

HELP

Save the Dwindling Endemic Flora of the Hawaiian Islands
at Least as Herbarium Specimens for Museums of the World

Otto Degener

Though this disturbing article was submitted to a local periodical for publication February 27, 1977, it was returned as unsuitable for printing July 26. Disappointed, I here submit it for the more international readers of Phytologia. As an addendum, I wish to mention a release received July 21 from the State of Hawaii's Department of Land and Natural Resources.

Our older executives and legislators, usually the product of schools concentrating on the Three Rs and ignoring the teaching of Biology, hardly realize that the intelligent World about us is horrified by our bull-in-the-china-shop attitude toward the outstanding biological treasures Nature has provided for us. These are an ever increasingly important magnet for attracting wealthy tourists and scientists to our shores. So I was not surprised when I received a request dated February 10, 1977 from E.H. Rapoport, Fundacion Bariloche, Rio de Negro, Argentina for information about the present status of our native flora and the name, date of introduction and extent of each of our exotic plants - especially our pernicious weeds. Though the task is impossible because of its enormity, I am mailing him with this, my present report, articles by Honolulu Star-Bulletin Conservation Editor Whitten appearing 8/22/68 and 2/21/77 concerning Clidemia hirta (L.) D. Don or Koster's Curse, a member of the Melastomataceae.

The late Dr. Harold Lyon, a botanist by training and an efficient Director of the Hawaiian Sugar Planters' Experiment Station in Honolulu, was a powerful man with a strong, persuasive personality. He was convinced that our uplands should become a thick tangle of plants to increase by fog drip and rainfall water for irrigating the lowland sugarcane fields. Employees of the Station, such as Fred Hadden, were instructed that wherever they might travel, to bring seeds and other propagules back to the Islands. He was particularly interested in banyans and strangler figs of all kinds, the late Dave Fullaway concentrating on their study and becoming an expert on the peculiar wasps effecting their pollination. Dr. Lyon

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Chemistry & Biology 21 (1) 1 (1983)

Chemistry and Taxonomy

Uncertainty of the biological species will produce most serious confusion in the study of "Chemistry and Biology". It would be needless to mention that the correct identification of plant species is essential and therefore plant taxonomy is very important when some critical chemical nature was found from some plant species among great number of plant taxa and when the development of an important scientific area is expected to follow.

Now I want to point out some aspects of our serious situation with biology in our country. This is that most of our nation, at present,are seldom concern with plant forms and classification. This situation has surely been due to the fact that Botanical Society of Japan decided shortly after the 2nd World War to abundon and close research organizations for plant taxonomy when they were disappointed by having lost the possibility of developing plant taxonomy in unknown area out-side of Japan, because all of the plant flora in Japan had been disclosed by the middle of this cnetury. This situation resulted in the fasion of modern biology and produced serious bias in the biological education and researches of our country. The effect has not restricted to the research and education in the Universities, but extended to and seriously injured general education in high schools, middle schools and primary schools of our country. It is quite obvious that the situation has been created and developed in the sequence of the following steps; University graduates from biology department, unfortunately ignored with plant forms and classification, became to decide the guide line of the content of text books of biology for general education, to write text books of biology as authors, to prepare questions of biology in entrance examinations for Universities, to teech biology in Education Universities where the graduates are to become teachers of biology in general education. Then our nation in general has lost interest and love to nature and living organisms, and it was followed by the distruction of natural environment and frequent occurence of pollution problems. In addition, abstruct biology has been, and still now is producing a great number of drop-out school boys and girls in the course of general education, and thus resulting in the desolation of general education in Japan.

When our country has been released from closed situation which had been maintained after the 2nd World War, we were really impressed by knowing that plant taxonomy has developed abroad brilliantly to plant systematics. The impression would not have been limitted to specialized botanists. Shall we appraise recent activities having been made by Kansai (Kyoto-Osaka) research group to develope plant systematics in Japan.

The defeat of plant taxonomy by modern biology in Japan after the World War was partly due to unfortunate prevailing of the opinion that taxonomy is a natural history and is not a natural science. But we, out-side scientists, really want to say that natural historical elements themselves are fundamental bases supporting healthy development of natural sciences. Elements of natural history absolutely indicate the depth of history and culture, and they are essential raw materials with which original sciences can be developed. Don't repeat the mistake of hon-yen-pin (ultra left violent young who destroyed countless past cultures in china, led by Mo-Zha-Ton some ten year ago).

Aout one year ago, I travelled very happily for about 10 days with an old botanist Dr. Otto Degener. Later I knew that he was the discoverer of an alive fossil plant: Degeneria (1 family, 1 genus, 1 species)and also the author of a voluminous book " Flora of Hawaii ". Degeneria is known to be an origin of all the engiospermae, togenther with Magnoliaceae and Winteraceae. How is the present condition of the herbaria in Japan which have been sent from Dr. Degener year by year to many research Institutes for future researchers.

Beside the herbaria in general various species of alive plants are cultivated and preserved in botanic gardens. Curious thing is that most public botanic gardens are of similar character and have no regional or taxonomic speciality in their collection. Therefore they are quite insufficient for the preservation of rare plant species and for affording research materials. For instance, when referring to Ilex and tree legumes which are plant materials for my present research, I could only find 6-7 Ilex species among 16, and 3-7 tree legume species among 11 (excluding Wisteria and Desmodium) species which are found in the Flora of Japan. Others are just before the extinction. Shall we proceed to restore orthodox biology with a courage of wild bore.

By Michihiko YATAZAWA

(Faculty of Agriculture,
Nagoya University)

"Hawaii's Crop Parade", by David Livingston Crawford. 305 pp. Review by Otto Degener, B.S.,M.S.; Collaborator in Hawaiian Botany, New York Botanical Garden; Author of "Plants Haw. Nat. Park" and "Flora Hawaiiensis".

When a book under authorship of a university president appears, it is bound to attract attention. Hundreds, perhaps thousands, of copies find their places upon the shrine-like shelves of public libraries and schools among standard works of reference. The statements made in such books are accepted as authoritative, in fact, as Gospel Truth by the great majority of readers. They have usually been checked and rechecked by the author to reduce errors as far as humanly possible, in fairness to the implicit trust placed in such books by the reading public.

President David Livingston Crawford's "H awaii's Crop Parade", an attractively bound and printed book of 305 unillustrated pages appears at first glance to belong to such a library shrine.* Curiously enough, from its content it is not quite clear whether this work is officially a Territorial Government publication or merely the exuberant product of a versatile mind whose free time on holidays and week-ends was employed in research. The author's recent contribution, after careful checking and rechecking to weed out errors, might deserve a place in the library beside Dr. Pope's useful "Manual of Wayside Plants of Hawaii" and Mrs. Frear's attractive and popular "Our Familiar Island Trees." Like these two books it deals chiefly with the introduced flora of the Islands, not with the native plants that bloom relatively unknown on our mountain-sides. Unlike these books which treat of weeds and of beautiful flowers respectively, the crop parade concentrates on "A review of useful products derived from the soil in the Hawaiian Islands, past and present."

After devoting 31 pages to "Agricultural Prospecting" and a very readable chapter to the "Historical Outline of Agriculture in Hawaii", the author parades various crops before us in alphabetical order. On the first page stand, for instance, Abaca, Acacia, Akala, Alcohol, while

on succeeding pages hop, skip or jump in quick array such subjects as Avocado, Bats, Coffee, Date, Elephant Grass, Frogs, Goats, Horses, Ironwood, Java Plum, Lettuce, Macadamia Nut, Ostrich, Pineapple, Sugar Cane, Taro, etc. This parade, after dealing with a good 300 distinct topics, ends on page 289 with Yard-long Bean and Yerba Mate. In general, the crop parade is a compilation, as the footnotes show, gathered from many rare and valuable sources. It seems, however, to the reviewer that the chaff was not carefully and critically sifted from the grain before the book went to press. The result is a work that confuses rather than instructs. Even the average intelligent reader cannot possibly glean its wealth golden grain from beneath the distorted straw left by the quickly moving reaper.

The reviewer, a former colleague who taught Botany at the University of Hawaii about ten years ago while the author taught Entomology there, suggests that an ERRATA be added to the volume. The owner of a copy might use the blank pages - 13 have been provided - just without the cover for this necessary evil. Corrections could begin with changes like the following:

ERRATA

AUTHOR'S NAME	CORRECTED NAME
(Akala) Rubus Macraei	R. hawaiiensis
(Arrow Root) Tacca Pinnatifida	T. hawaiiensis
(Avocado) Persea gratissima	P. americana
(Bean Sprouts) Glycine hispida	G. max
(Blackberry) Rubus spp.	R. penetrans of Florida
(Brazilian Plum) Eugenia brasiliensis	E. Dombeyi
(Breadfruit) Artocarpus incisa	A. communis
~~(Broom Corn) Sorghum vulgare technicus~~	~~Holcus technicus~~
(Brussels Sprouts) Brassica oleracea semnifera	B.o.gemmifera
(Butterbur) Petasites japonica	P. japonicus
(Cardamom) Elleteria cardamomum	Elettaria cardamomum
(Carissa) Carissa Carandas	C. grandiflora
(Cassava) Manihot utilissima	M. esculenta
(Chaulmoogra) Hydnocarpus anthelminticus	H. anthelmintica
(Chinese Cabbage) Brassica Ke-tsai	B. pekinensis or cernua
(Chinese Orange) Citrus japonica hazara	C. mitis
(Chinese Pea) Pisum sativum saccharatum	P. s. macrocarpon
(Chrysanthemum) Chrysanthemum hortorum	C. morifolium
(Cocaine) Erithroxylon coca	Erythroxylon coca
(Cotton) Gossypium barbadense maratima	G. brasiliense
(Dahlia) Dahlia variabilis	D. pinnata

AUTHOR'S NAME	CORRECTED NAME
(Dandelion) Taraxacum vulgare	T. officinale ?
(Grapefruit) Citrus grandis	C. paradisi
(Grasses) Tricholaena rosea	T. repens
(Hala) Pandanus odoratissimus	P. tectorius var.?
(Honohono) Commelina diffusa	C. undiflora
(Horseradish) Armoracia lapathifolia	A. rusticana
(Jack Fruit) Artocarpus integrifolia	A. integra
(Jesuit Nut) Trapa bicornis	T. natans
(Kamani) Terminalia catappa	T. catappa
(Kapok) Ceiba pentandra	Ceiba pentandra
(Kola) Sterculia acuminata	Cola acuminata
(Kumquat,tree with 1 inch fruit) Fortunella japonica	F.margarita
(Lima Bean) Phaseolus lunatus	P. limensis
(Lotus Root) Nelumbo nucifera	Nelumbium nelumbo
(Mandarin Orange) Citrus nobilis	C. n. deliciosa
Mandarin Orange is different from King Orange (Citrus nobilis) and not the same	
(Chinese Preserving Melon) Benincasa cerifera	B. hispida
(Millet) Chaetochloa italica	Setaria italica
(Mustard) Sinapsis chinensis	Brassica integrifolia
(Passion Fruit) Passiflora lingularis	P. ligularis
(Passion Fruit) Passiflora lingularis	P. laurifolia
(Peanut) Arachis hypogea	A. hypogaea
(Perilla) Perilla frutescens	P. f. crispa
(Pigeon Pea) Cajanus indicus	C. cajan
(Quince) Cydonia vulgaris	C. oblonga
(Rubber) Manihot glaziovia	M. Glaziovii
(Rubber) Hevea brasiliensis	H. brasiliensis
[illegible]	
(Rutabaga) Brassica campestris napo-Brassica	B. napobrassica
(Sandalwood) Santalum Freycinetianum only on Oahu and not elsewhere	
(Sapota) Achras sapota	A. zapota
(Soybean) Glycine hispida	G. max
(Swamp Cabbage) Ipomoea reptans	I. aquatica
(Tobacco) Nicotianum tabacum	Nicotiana tabacum
(Tree Fern) Cibotium chamisoi	C. Chamissoi
(Vanilla) Vanilla planifolia	V. fragrans
(Vegetable Ivory) Coelococcus carolinensis	C. amicarum
(Wampee) Clausena wampi	C. lansium
(Water Chestnut) Eleocharis tuberosus	E. dulcis ?
Trapa according to "Standardized Plant Names" is Water Chestnut	
(Watercress) Roripa nasturtium	Nasturtium officinale
(Water Dropwort) Oenanthe stolonifera	O. laciniata
(Wi) Spondias dulcis	S. Cytherea
(Willow) Salix vitellina	S. alba var.
(Yerba Mate) Ilex paraguayensis	I. paraguariensis

Scientific names, necessary for the precise identification of plants so often masquerading under different vernacular names in different regions, have no value unless correct. Careless terminology simply imparts a false impression of erudition to a publication. It may thus act as a snare to delude the unsuspecting reader into the belief that the work is highly authoritative when it is not strictly so. The "Acknowledgements" unfortunately increase this false impression by st[illegible]

several scholars, including ~~H.L.Lyon and E.L.Caum~~, "have reviewed parts or all of the manuscript and made valuable suggestions." Harold St. John and F.R.Fosberg "Have furnished information concerning botanical names and the distribution of some plants." It would obviously be unfair to hold these recognized botanical authorities responsible for the many errors in botanical terms throughout the book. With an average of about one botanical error for every five pages of the parade, one questions the accuracy of the descriptive text.

It is the reviewer's conviction that "Hawaii's Crop Parade" in its present form exhibits symptoms of premature birth. May it receive an early burial lest it promote the teaching of errors to thousands of impressionable pupils in high schools, and tarnish the brilliance of thousands of degrees earned by University of Hawaii students. But such a book should not be allowed to die! From its ashes (like Phoenix, the namesake of the date palm) should arise under the more critical aegis of the Board of Regents a fresh, carefully corrected and revised crop parade, a book deserving a place on the hallowed reference shelf of libraries. As the correcting of some technical errors has already begun in this review, the author should be able to complete his task within a year if granted a well-earned sabbatical. The completed book should be equivalent at least to the thesis required for a doctorate degree at the University, really a good institution here.

Waialua, Oahu.

TO WHOM IT MAY CONCERN

Regarding Kahauale'a Geothermal Project

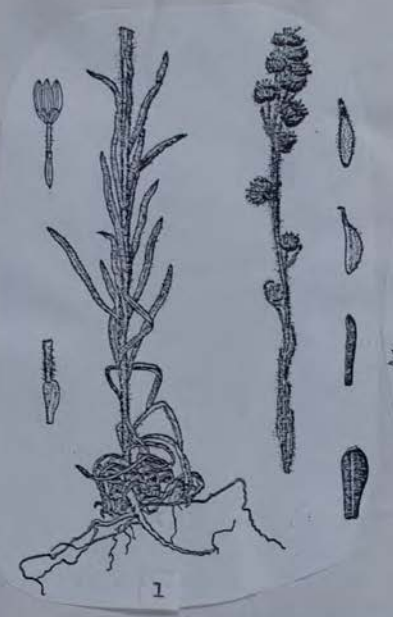
The Hawaiian Islands arose from the ocean in round numbers 100 million years ago from a "hot spot" belching magma or "lava" about where the Island of Hawaii is growing today. Some of the first land masses to appear were Kure Island, Pearl and Hermes Reefs and Midway Island. They reached their present position about half way to Japan by sliding with a huge crust of rock on top of peanut-butter soft magma at the rate of about two to five inches per year, perhaps e-van faster initially. About thirty to fifty islands erupted later at intervals at the same spot. There is no reason to believe such islands did not emulate in size and elevation the five major islands man now populates in ever-increasing numbers. We must not be confused by the barrenness and smallness of the more distant islands today. It is the result of no more increment of lava to make up for millions of years of erosion by rain, wind, and less effectively by earthquakes and tsunamis. All were bombarded with eggs and cysts of animals as well as spores and seeds of plants ever since their origin by their flying in the wind, floating on the water, and sticking to the soiled feathers and legs of birds or undigested in their intestines until voided with a useful contribution of manure. Almost all died, but a very few landed on ground satisfactory for living and forming a "dynasty" of their own. With millions of years available, this influx was enough to cover the barren lava wastes with plants which, in turn, supported "dynasties" of animals to the present. (See map.)

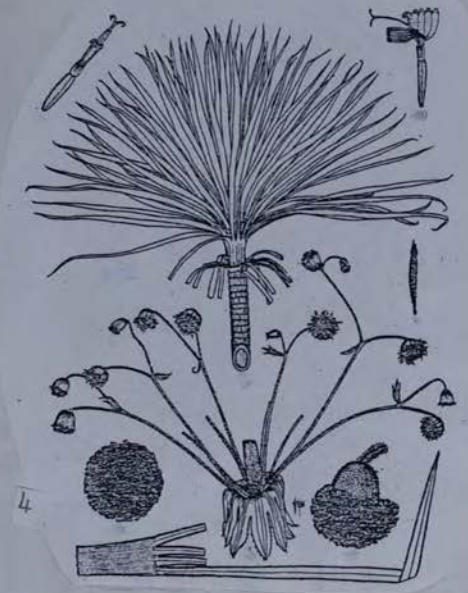
The earliest animals, perhaps landsnails in an overgrown knot hole of a driftwood log, and sticky "seeds" of the California tarweed ancestor or the seeds of some primitive southwestern hibiscus made the round trip from an early "hot spot" island with frequent stopovers on islands of our archipelago toward its northwestern end. Those that tarried petered out as the result of their island's continuous erosion. But some few emigrated in erratic stages all the way back again to the more modern islands arising from the "hot spot" many millions of years after the early ancestors had started the jaunt.

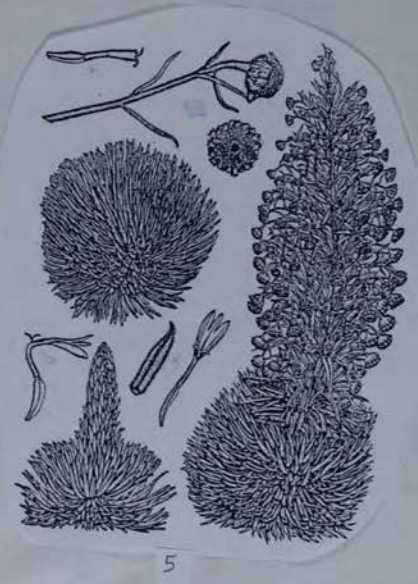
The earliest successful immigrants to the Hawaiian Islands on for example Kure, Pearl and Hermes or Midway had the greatest number of millions of years to evolve into something different from their ancestors, influenced by genetic isolation and the stimulation of growing at different times on different islands perhaps in salt bogs, deserts, dry forests, rainforests, cinder cones, in heat or cold, etc., etc. Most succumbed over the ages but about thirty to fifty kinds of Flowering Plants or Phanerogams, for instance, today are so different from their ancestors that they are recognized as distinct genera. In the case of Madia (fig. 1) or perhaps more precisely something like Adenothamnus or Hemizonia, it developed in the presently surviving genera Railliardia (fig. 2), Dubautia (fig. 3), Wilkesia (fig. 4) and the truly magnificent Argyroxiphium (fig. 5). Argyroxiphium, if you have not guessed it, is the famous silversword genus to which about a half dozen species exist on Maui and Hawaii. About an equal number of less silvery taxa, some not yet properly described for naming scientifically, are endemic to Maui. Somewhat subdued in appearance, they are known as "greenswords" in the vernacular.

The other example that fascinates us so intellectually is more involved: The Lobelia Family is characterized almost always with bearing curved flowers. The one endemic genus Brighamia has straight flowers; but the endemic genera Clermontia, Cyanea, Delissea, Galeatella, Neowimmeria, Rollandia and Trematolobelia all have curved ones.

Whether early emigrant birds had straight or more likely somewhat curved beaks, eons ago birds came and evolved into the endemic Family Drepanididae or Honeycreepers. This consisted of twentytwo endemic species with about fifty subordinate taxa until relatively recent times. For a bird with a straight beak to sip nectar from the inside bottom of a curved flower is far from ef-







Figs., 1, Madia, tarweed; 2, Railliardia, kupaoa; 3, Dubautia, naenae; 4, Wilkesia, iliau; 5, Argyroxiphium, ahinahina, the silversword.

ficient. Hence over millions of years, evolution perfected the curves of beak (fig. 6) and flower (fig. 7) to fit each other like a hand in a glove. Birds with the most efficient beak presumably gained more food to breed more successfully and to bequeath their beak type to their offspring. Moreover, the lobelia genera which catered best to such birds were most efficiently pollinated and hence tended to produce the most seeds to germinate into plants having the same good or even better flower shape. Inferior ones tended to die out.

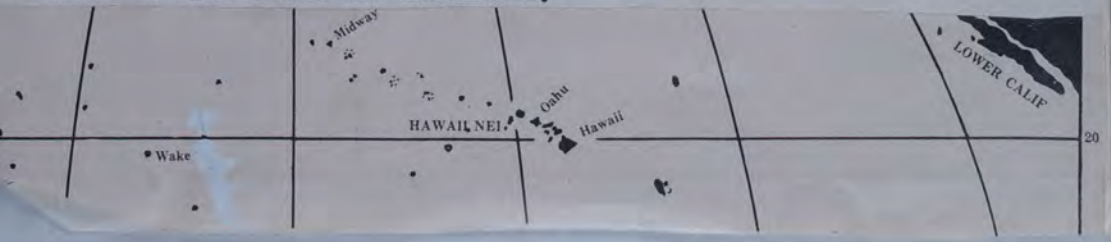
The end of this story is truly amazing. Surrounded by birds with curved beaks, a typically star-shaped hibiscus flower evidently was not very popular and hence failed to be often pollinated to produce seed. Thanks to the working of evolution over millions of years the lucky offspring of the original hibiscus immigrant perfected a flower with petals rolled lengthwise together into a curve to fit the beak of the nectar probers. Being so different, the five species known from Hawaii, Maui, Lanai and Kauai constitute the extremely rare genus Hibiscadelphus (fig. 8).

We two are convinced after concentrating full time ninety years on the flora of the Hawaiian Islands and publishing nine books and numerous articles about it - the kane writer was first Naturalist of Hawaii National Park in 1929 and we are now residing in Volcano - the Hawaiian Islands even for conspicuous organisms like the flowering Plants are crowded with still unrecognized endemic species, varieties and forms. Other (except for perhaps mollusks, ferns and mosses) less highly evolved organisms are practically unknown to this day. How many fungi capable of furnishing new antibiotics, and how many limu or algae secreting anticancer chemicals are we blindly destroying forever?

Puna and Kau Districts are no exception in harboring organisms known nowhere else. Due to the direct and indirect action of Man, the lowlands of Puna have been badly mauled so far as endemic animals and plants are concerned. The baneful influence, we feel, of action by the proposed Kahauale'a Geothermal Project, if properly confined to well below 1,000 feet elevation to where exotic weeds, sugarcane, papaya, pineapple and cattle have already wiped out most of the delicate endemics; would not be such a disaster. But the disaster would progress geometrically with increase in elevation. Near Hawaii Volcanoes National Park - Watt's the matter with apparently somnolent National Park Service executives in Washington? - the area would lose the wealth of its fascinating endemics. How many lucratively spending locals and foreign tourists would continue to swarm there except for occasional volcanic outbursts? We would sell our Volcano village property to the highest bidder.

To limit Man's geothermal activity to the lowlands, a compromise in favor of its advocates, has become outdated because of the increased human habitations in the vicinity. Hence to gain power thus, we are convinced, should be abandoned in favor of the less destructive and "cleaner" method briefly called "OTEC" (Ocean Thermal Energy Conversion). Look into the relatively harmless method of utilizing the differences in temperature of the Pacific at considerable depths and near the surface in relationship to ammonia, please. To us it is convincing.

We are disinclined to quarrel, feeling that there are many ways to reach the summit of a mountain. Thus whether present "Civilized Man" is a sincere polytheist, monotheist or, as we are, atheists, to exterminate endemic animal and plant kinds whether created supernaturally by Almighty God by fiat or over a period of many million to many thousand years by the interaction of Laws of Nature is SACRILIGIOUS and BLASPHEMOUS!



The sin of annihilating Sacred Creations is hardly valid for most of us because of our present ignorance of what is Right and Wrong. The majority in the Islands and elsewhere just never knew better. The present human race differs as much from the superior men and women following us eons hence as does the ancient tarweed from its present offspring, the glorious silversword! For Doubting Thomasses cencerning the above, avoid being self conscious for a moment. Note what normal human heads look like untouched by clippers, scissors and razors - how ornamental they would be stuffed and hanging on the dining room wall? - ; remember your bare looks in a mirror; admire the slightly mangey appearnace of furred sunbathers disporting along Hawaii's beaches; listen on the Radio and TV to adolescents howl and scream innate mating calls less interesting than those of coyotes on a moonlit prairie; read in the newspapers about wholesale atrocities committed by mature men imbued by the mob spirit on defenseless men, women and children; and the frequency of crime committed by individuals. Next saunter to a Zoo and observe the good natured chimpanzee, gorilla and orangutan, true blood brothers to us according to recent medical blood tests. Of these four groups, I consider myself and my kind of Primate truly the prime ape in viciousness. But why remain so? I am convinced the "silversword man" of the Future will approve "tarweed man's" attempt to conserve the biotic distinctness and wealth of Hawaii Nei. Why not join us in this endeavor?

DRS. OTTO & ISA DEGENER
P. O. Box 154
Volcano, Hawaii 96785, U.S.A.
Jan. 1983

Fig. 7, Clermontia, ohawai

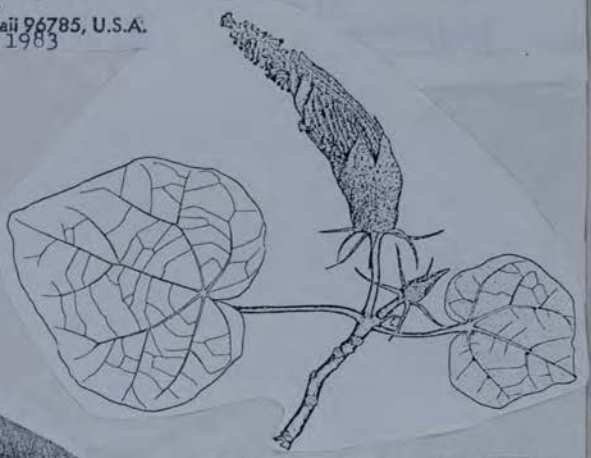


Fig. 8, Hibiscadelphus, haukuaiwi

Fig. 6, Honeycreeper mamo

FLOTSAM AND JETSAM OF CANTON ATOLL, SOUTH PACIFIC

Otto & Isa Degener

Canton, a Pacific Ocean atoll lying between latitude 2° 46' and 2° 52' S., and longitude 171° 37' and 171° 44' W., is the most northern of eight low coral islands comprising the Phoenix Group. Resembling a pork chop in shape, it is about eight miles long, and has its longer axis lying roughly from its narrower eastern end to its four miles wide western end (fig. 1). The atoll consists of a rim 150 to 1,800 feet wide enclosing a shallow lagoon of about 25 square miles. The greatest elevation of the island is twenty feet.

Evidently built around a volcanic core, the atoll consists mainly of the calcareous skeletons and shells of invertebrates, fragments of coralline algae, and a few vertebrate skeletons. All have been comminuted into sand and powder, andor cemented into vast stretches of calcite. These last rim the island and are worn smooth by the waves washing back and forth over them with scouring material. The dry atoll rim of calcite fragments, sand and powder is more or less glued together by felt-like or gelatinous films of numerous genera of blue-green algae (Degener & Degener 1959). Bird excrement, hardly guano, accumulates under the rookeries of booby and frigate birds nesting preferably on scaevola bushes (Murphy et al., 1954; fig. 2). Rare areas of humus may be found in patches of forest, the result not only of fallen twigs and leaves, but from accumulated excrement of the terrestrial hermitcrab Coenobita perlatus. Some of this earth, an estimated collection of 1,000 years, may be four inches deep.

The atoll was of little importance until Pan American World Airways began to use it as a refueling station in 1939 for aircraft on Honolulu-Auckland flights. As both Great Britain and the United States laid claim to this flat area, the controversy was amicably settled April 6, 1939 by agreement to administer the atoll jointly as a condominium for fifty years and "thereafter until such time as it may be modified or terminated by mutual consent." With outbreak of World War II, Canton became the hub of Pacific air movement by United States Military Forces. In 1942, with 1,143 Army personnel stationed there, it was used for antisubmarine search and photographic reconnaisance missions. A year later it was the main base for the conquest of the Gilbert Islands from the Japanese. By 1950 commercial activity was at its zenith, with four major airlines involved and a resident force of about 300 Americans and British.

With continuous improvement in airplanes, the importance of Canton as a refueling station waned. The last scheduled commercial stop was in 1959. That same year the National Aeronautics and Space Administration (NASA) selected Canton as Project Mercury Tracking

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Containing

THE LAST CRUISE OF THE "CHENG-HO"

PART I

by

OTTO DEGENER

Volume 44 SEPTEMBER 1943 Number 525

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Containing

THE LAST CRUISE OF THE "CHENG-HO"

PART II

by

OTTO DEGENER

Volume 44 OCTOBER 1943 Number 526

2/6/1982

A FAIRY TALE

Drs. Otto & Isa Degener

Having read the above article about the endemic Hawaiian flora will the reader, as do the writers, believe in the fairy tale about the silversword (Argyroxiphium) which is known for its strange beauty to residents and tourists alike? Comparing some of the sticky silverswords of Maui and Hawaii with all other kinds of plants in the entire World, we botanists are convinced their remote ancestors came from California or thereabouts many million years ago. The evidence for this belief is their resemblance to the sticky tarweeds (Madia) endemic to that general region. Tarweeds obviously are the poor relations of the regal silverswords.

The original tarweed with its sticky achene or fruit containing the seed almost certainly flew as a stowaway stuck to the outside of a bird exhausted after flying thousands of miles over the ocean. We doubt such a bird would have had the indurance to fly from the Mainland way out northwest where Kure and Midway now lie. It probably alighted, thoroughly exhausted, on the first island it saw erupting from the "hot spot". This is approximately where the Island of Hawaii is now erupting. Preening its feathers, tarweed seeds fell luckily on good ground and germinated. Guarded on this isolated island from the keen competition to which its kind had been exposed on the Mainland, this ancient plant bred and multiplied almost explosively. The variable progeny of this archaic tarweed not only drifted with its "birthplace" island about two inches per year northwestward. It also, almost entirely by birds because of stickiness and less by wind in spite of a tendency to have a fruit crowned with plumose hairs, scattered here and there and even to neighboring islands. Due to isolation, different types of environment and inbreeding the offspring of this first Madia immigrant evolved into four related major groups or genera: 1.) Kupaoa (Railliardia), shrubs not particularly surprising in appearance to the educated layperson, consisting of almost fifty known kinds or taxa of shrubs scattered here and there mostly in drier localities on all the present major islands. 2.) Na'ena'e (Dubautia), similarly scattered on all major islands. These are often somewhat succulent, coarse shrubs usually of moister localities, deserving a second look by a layperson. They have branched out to produce almost as many kinds or taxa as did Railliardia. 3.) Iliau (Wilkesia), a strangely branching shrub more closely related to Dubautia than to Railliardia. The genus consists of only two kinds, both limited to the Island of Kauai. In appearance Wilkesia certainly gives the impression of being the closest relative of the silversword (Argyroxiphium), known as 'ahinahina to the Hawaiians, and its somewhat drab congener, the greensword.

On West Maui, originally a separate island from East Maui dominated by Haleakala, two kinds of Argyroxiphium inhabit the foggy mountain tops, both creepingly branching in the boggy soil. Thus they are a bit reminiscent of the more primitive Wilkesia of distant Kauai, In and about Haleakala, mainly on sun-scorched cinder cones moistened by fog drifting in from Koolau Gap about ten o'clock mornings until evenings, grows the silversword viewed with awe by residents and tourists alike. It grows for six to a dozen or so years depending mainly on character of terrain and abundance of fog before the entire plant bursts into flower, matures seed, and dies completely. Yet, should the terminal shoot be lost perhaps to a hungry feral goat, it has the ability, common to its less specialized relatives, to develop a substitute and live successfully longer to procreate its kind. This magnificent creation has four or five less spectacular relatives growing among the low bushes in the neighborhood. Moreover, it has two or more close, also magnificent relatives endemic to the Island of Hawaii.

The fairy would never agree to the idea that these magnificent silverswords ever had the time to attain perfection from a Madia during the geologically short existence of Hawaii and East Maui. To attain their present glory they must have started evolving on high island now eroded down toward sealevel and northwest of Kauai. Was it perhaps on Kure or Midway before these drifted away from the "hot spot" at the rate of about two inches per year to their present position? Their forebears might have hopped, skipped and jumped from island to island southeastward to reach Maui and eventually Hawaii. What do you think?

1. Have hiatal hernia of no bother. 2. Take daily 1 each of anavit, prostagut, peretrate. 3. since Fiji 1930-41 tend to have swollen left foot (filariasis?) so sleep with 1 pillow under it. Some mornings left foot seems as normally thin as right. 4. Allergic to penicillin 5. Seemingly triggerhappy Dr. S., of Med. Group 4-5 years ago was ready to operate (prostate ?). Before appointed day, got antibiotics from dentist for root canal treatment. Entire urinary system acted normally so I cancelled operation. Last night (2/1/82) on diet for your tests, I drank less & woke only once during night to urinate. 6. After shopping many coconut leaves with axe, before going to Queens for Greenwall ingoinal hernia operation, had a few lumps clotted blood in urine. Never, before; never since. 7. Need salve for forehead precacerous (?) pimples and ~~~~ hair sore. 8. Both feet stiff, with soles feeling like cardboard. 9. At times feel slight pain in right chest. Aneurism? 10. Have 'flu (1/30/82 with rhynitis & sore throat Sat., & Sunday (after meeting Mrs. Guy Miller in your waiting room. Took overdoses of vit C; almost cured 2/1/82. 11. Need COMPLETE copy of tests to carry along during extended trips from home. O.D.

Draft submitted March 22, 1982
to HNEI for SYNFUELS ENERGY
TREE FARM WORKSHOP REPORT

THE EUCALYPTUS TREE FARM PROBLEM

Recently, Drs. Otto and Isa Degener have called attention to factors associated with Eucalyptus species and related genera which seriously challenge the desirability of permitting massive plantings of these trees in Hawaii. It appears that the concerns expressed by the Drs. Degener have not been given serious reception warranted by their professional qualifications among many of those to whom these concerns have been presented. Although those issues were beyond the writer's experience and therefore not addressed during the 1981 Synfuels Project Tree Farm Workshop, failure to rectify this omission would be unconscionable.

The Degener's position is as follows:

1. Eucalypts are fire resistant as evidenced by the spongy, corky, thick, layered structure of their bark and/or readily ablated loose outer bark, often white.

2. Eucalypts readily regenerate from deep cambial cells or sub-soil root structures.

3. Eucalypts are rich in flammable, toxic oils.

4. Serious, frequent, extensive fires are characteristic of Eucalyptus forests and brush land in Australis, New Zealand and Tasmania.

Following the Degeners' points, it should be noted that the monoterpenes of Eucalyptus, are in fact toxic and volatile. Their toxicity accounts for the limited predation and infection among Eucalyptus species. Eucalyptus oil may also contribute to the low rate of litter decomposition because of the antibacterial-antifungal, generally toxic properties. The accumulation of Eucalyptus litter and detritus on the forest floor with their volatiles, sets the stage for fire. And the low boiling character of the Eucalyptus terpenes should facilitate combustion and propagation of fire.

Mueller-Dombois, writing in the Conference Proceedings, Fire Regimes and Ecosystem Properties (East-West Center, December 11-15, 1979, issued July 1981 as U.S.D.A. Forest Service General Tech. Rpt. WO-26), points out that heath forests, tropical pine and oak, teakwood and eucalypt forests all involve fire as part of their periodic mechanisms of rejuvenation.

In fact, these plants are so commonly associated with large scale fire that they are termed "pyrrophytes".

Mueller-Dombois also notes: "North Australia may form a special case, where....fire-originated savannas....predate the use of fire by man. This is...related to....open canopy structure of....sclerophyll forests.... Fire adapted woody plant(s) are particularly common...." The reference here is to Eucalyptus species.

Of the family which includes Eucalyptus he also notes "....certain

woody plant families such as the Myrtaceae, contain real pyrrophytes". Such families have species with "lignotubers, trunk buds, serotinous capsules and heat requiring seeds.

Consultation with colleagues, Mueller-Dombois and Lamoureux, has confirmed fully the serious implications for fire hazard and natural toxicant release of massive Eucalyptus plantings, especially in northern Hawaii county where water resources are limited or scarce.

Additional support for the Degeners' comments about oil of Eucalyptus' flammability has been obtained from eyewitnesses to the part played by conifer resins in the explosive conflageration of southern California.

It is recommended, based on our present information, that tree farm energy plantations be based on species without the hazards of Eucalyptus.

S. M. Siegel 24 March, 1932

S. M. Siegel

Honolulu Advertiser
Wednesday, February 17, 1982

Troops called in to fight fires

HOBART, Australia — Hundreds of firefighters battled a brush fire threatening Tasmania's capital and brought it under control yesterday, but officials called in army troops to help fight other blazes.

Police said more than 500,000 acres have burned in some 200 brush fires. Along Tasmania's west coast, cooling temperatures and rain brought relief for residents of small towns threatened by brush fires since Monday.

10/13/81 50

DRS. OTTO & ISA DEGENER
P.O. Box 154
Volcano, Hawaii
96785 U.S.A.
Oct. 13, 1981.

Dear Editors:

Beware of Fire!

Attending the XIII International Botanical Congress in Sydney and spending two months studying the native floras of Australia, New Zealand and Tasmania in comparison to that of Hawaii Nei, we hardly can be considered authorities. Yet from conducted tours with other Congress members under the leadership of Dr. W.D. Jackson, the monographer of the genus Eucalyptus and Professor at the University of Tasmania in Hobart, we did absorb some astonishing knowledge and probably correct impressions. Hence the appearance of an article entitled "Tree Farm Workshop" in the October 8, 1981 issue of the Hawaii Tribune-Herald prompts our present harangue.

The frightening article states in part: "Experts on all aspects of tree farms are meeting for a three day workshop this week to produce a comprehensive report on the technical and economic feasibility of eucalyptus tree farms on the Big Island. - - - The workshop is part of a large project, led by Pacific Resources, Inc., on the feasibility of using Hawaiian biomass to produce hydrocarbon fuels. Other members of the team are the Institute of Gas Technology of Chicago, Illinois, and the Hawaii Natural Energy Institute. Preliminary work has led to the conclusion that the most promising energy plantation would be eucalyptus on the Island of Hawaii."

Previous to our trip, we would have been opposed to the continued planting of eucalypts, except for an occasional tree for someones' personal interest, as they tend to kill interesting plants around them and the interesting associated animals from bugs to birds. The only benefit to such animals, as we see it, is a short flowering season producing some edible nectar. Its oil, known as eucalyptol, is so poisonous that it is only useful when properly recommended by a physician, after a pharmaceutical company has refined it, to kill pathogens attacking both man and beast. We need no forests for a supply of such oil. The eucalypt is a killer of things about it, and hence detracts the evermore discerning generations of tourists who visit the Hawaiian Islands to revel in things Hawaiian, not in groves of eucalypts that they can see better if they wish under natural conditions in Tasmania. Jet flying is no longer so expensive in money and time that they must see exotics under unnatural conditions. The cultivation of introduced eucalypts and their ilk, crowding out natives and marring the normal environment is a cancer slowly throttling our lucrative tourist industry. How many unsuspecting tourists are disappointed when they see the skyscraper hotels flanking the beach at Waikiki or the sky-reaching eucalypts hiding the native countryside? Without a gallery of undisturbed "bush" or of forest alongside rural highways, we typical "Down-Under" tourists don't anticipate repeating the monotony of passing through vast cattle and sheep ranches nor manicured forests of biomass valuable, Continental pine trees. It is as drowsy as driving through fields of sugarcane, pineapple or watermelon in Hawaii Nei.

After touring Tasmania, much of the above seems to us piffle considering the following: Forest fires must have been common during the eons the genus Eucalyptus was able in Tasmania to evolve well over a hundred species, varieties and forms. Abundantly armed with poison oil cells, the plants are relatively immune to depredation by members of the Animal Kingdom except incidentally for the cuddly koala "bear" with its "two-thumbed" hands for efficient climbing. This marsupial is remarkably specialized to eat eucalypt leaves and "nothing else". (A tame one, however, enjoyed munching some of our salted potato chips.) With such oil, if for no other reason, the forests were just about as dead to animal activity as are our valley bottoms crowded with the Polynesian introduced kukui, a relative of the castor oil plant.

The trunks of so many of the eucalypts are amazing regarding fire: Some outside bark hard, corky and thick; others are loose and flaky, similar to the asbestos-like, almost fire proof bark of the exotic Melaleuca or paperbark tree known to most of us; and still others have smooth, whitish bark. We had never realized that whitish bark would lessen heat exposure like the other two kinds to the cambium; yet we remember our mothers

Dupl. to Hobart, Aarhus, Adelaide, Ames, Amherst, Ann Arbor, Auckland, Austin, Basel, Berkeley, Wm. Berlin, Bloomington, Bochum, Brisbane, Brno, Brussels, Budapest, Calcutta, Cambridge, Canberra, Caracas, Carbondale, Chiba, Christchurch, College Station, Coimbra, Copenhagen, Dallas, Dublin, W. Bot. Society, Edinburgh, Florence, Frankfurt, Fukuoka, Gaines[illegible], Geneva, Göteborg, Göttingen, Graz, Halle, Hamburg, Helsinki, Hiroshima, Honolulu, Ithaca, Jena, Jerusalem, Senator John Carroll, Hunt, Kagoshima, Kanazawa, Karlsruhe, Kew, Kiew, Krakow, Kyoto, Kyushu, Lansing, [illegible], Leiden, [illegible], London, [illegible], Lucknow, Los Angeles, [illegible], Madison, Manchester, Melbourne, Miami, Mie, Milwaukee, Montpellier, Montreal, Moscow, Munich, Nagoya, Takaki, Nara, N.Y. Hunt, Oshkosh, Oslo, Ottawa, Oulu, Paris, Peking, [illegible], Pyatigorsk, Rio, Ryukyu, Sapporo, Seattle, San Francisco, Stanford, St. L., St. Paul, Stockholm, Stuttgart, [illegible], Koutnik, Faith T. Campbell (Nat. Defense Council), Hobart, D. Ikeda, Northern Tasmania

We told you & others so Oct. 13, 1981!
Drs. Otto & Ira Zegnier

Honolulu Advertiser

Tuesday, February 16, 1982 A-9

Brush fires rage on Tasmania

HOBART, Australia — Brush fires raged out of control over large areas on the Australian island of Tasmania for the second straight day yesterday.

One fire menaced the outskirts of the state capital, Hobart. But officials said it was unlikely that blaze would jump the Derwent River and spread to the city.

The largest fire was burning across a 30-mile front of mountain country west of Hobart, threatening villages.

Police said at least 12 homes were destroyed.

Honolulu Advertiser

Thursday, February 18, 1982

Tasmanian fires contained

HOBART, Tasmania — Scattered rain aided firefighters yesterday in their battle to control several blazes in brushland across the island of Tasmania.

With the help of 150 army troops, firefighters were able to contain all of the blazes, which numbered more than 200 on Monday. Officials expect the firefighters to extinguish the few remaining blazes by tomorrow.

Senator Inouye, Senator Matsunaga, Rep. Heftel, Rep. Akaka, Andrew Lewin, B. M. Matsumura, H. A. Sagawa, Y. Takamine, D. K. Carpenter, John Ushijima, Haw. Nat. Energy Institute (U. of H. Manoa), H. Horiuchi, C. Wakida, Roger Skolmen, Yuzuru Tamimi, Ronald Sirois, P. Canan, C. Ching, J. Holderness, H. Ikawa, K. MacDicken, J. Melrose, A. Seki, S. Siegel, P. Yuen, B. Vandenbeldt, Tom Spitel, Haw. Volc. Nat. Park, Hampton Carson, Senator John [illegible], M. T. Andrews, W. W. Monahan, A. T. Takitani, H. J. Honda, R. D. Dods, B. Marumoto, F. Roefing, T. T. Morioka, K. Kiyabu, B. Kobayashi, K. B. Kamakau, P. L. Lacy, D. M. Hagino, M. Hirono, A. de Heer, C. Fukunaga, B. T. Taniguchi, R. Blair, R. Stanley, B. W. Baker, M. M. Liu, D. M. Nakasato, T. Tavares, G. Albano, C. S. Chun, John Raleigh, [illegible], Nat. Res. Defense Council, Wildlife Management Institute, Roger Skolmen, T. T. Kunimura, G. K. Machida, M. Yamasaki, D. G. Anderson, R. J. Azuma, T. T. Kunimura, Y. Takamine, V. Isbell, Dante Carpenter, Mary George, R. M. Matsumura, Y. Takamine, V. Isbell, Gerald Hagino, W. D. Billings, Dan Taylor, F. M. Dedu, Noel Kefford, Gerald Hagino, W. D. Billings, David M. Fujii, R. E. Burgan, Doak Cox, Fujioka, [illegible], C. Y. Hashimoto, [illegible], T. K. Kihara, [illegible], A. T. Hagino, G. Nakamura, M. K. Ige, J. Wong, D. M. Hackling

DRS. OTTO & ISA DEGENER
P.O. Box 154
Volcano, Hawaii
96785 U.S.A.
April 6, 1982.

Hon. Spark Matsunaga
5121 Kirkson Bldg.
Washington, D.C.

Dear Senator Matsunaga:

Your March 29 letter was forwarded to [illegible] me to our alternate home at Volcano - I was Naturalist of the Park in 1929, and we are of course attracted to the area.

We wrote our warning to the editors of our newspapers regarding the imminent danger of the proposed eucalypt project. As they abbreviated our long article, it was hardly convincing. Frustrated, we had about 100 copies printed to mail to that many individuals & institutions concerned with biology world wide. To save time, we listed the institutions on the enclosed sample merely by city. This began Oct. 13, 1981.

By pure coincidence we read the short articles in the Honolulu Advertiser of Feb. 16, 17, & 18, 1982 about such eucalypt fires in Tasmania, so we had another baton of UPDATED xerosec printed to scatter by mail, this was four months after our first warning.

Being engrossed in our own projects of untangling our presumed knowledge of the Hawaiian flora - we are exterminating it even before knowing its value as my brief newspaper note of Sauvolfia, the reserpine plant, shows - we never heard of a Dr. S. [illegible] Siegel, evidently botanist at the Ilse mater in "Green Lands Valley" where the [illegible] writer got his master's in 1923 & taught botany in 1925-27. Out of a clear sky, Dr. Siegel mailed us the enclosed 3-page "The Eucalyptus Tree Farm Problem". He seems convinced. I & I are rather gratified that our study on the spot last summer - costing us $8,000 - was a wise capital investment if it saves our state from making a ghastly blunder. I guess it is a form of patriotism; while others risk their lives going to some scuffle in Viet Nam or the Falklands.

I have not wanted your time first asking Dr. Siegel's permission to mail you the copy, as I imagine you should consider it confidential before you perhaps write him personally. He should get a letter from his soon as we mailed his some recent Tasmania newspaper quotes of the eucalypt fires from Dr. Orchard of Hobart.

According to my scribble on the xerox, we mailed Dr. Yuan a copy of our xerox.

Confidentially, confidentially & hush hush confidentially lest we get murdered, our serious botanizing was just about ended in the Islands, not because of advancing age, but by having been shot at twice. We are flying to the Canaries to botanize there this winter & to compare the vegetation of that island group with our own. We should be safe collecting about in the wilds there unless the wild canaries peck us to death.

Many thanks for your letter. Isa joins me in aloha,

Mrs Campbell.
Have no copy
and need
this back
O.D.

THE NODDING CLUBMOSS

(Lycopodium cernuum)

Popular and Technical Accounts of an Interesting Plant of Hawaii

Otto Degener, B. S., M. S.
Botanist at University of Hawaii, 1925 - '27
Naturalist at Hawaii National Park, 1929.

PART I#

Popular Account of the Nodding Clubmoss (Lycopodium cernuum)

PART II

Technical Account of the Gametophyte of Lycopodium cernuum in Hawaii

(Adapted with permission from the Botanical Gazette, 80:26 - 47. 1925.)

PART I

POPULAR ACCOUNT OF THE NODDING CLUBMOSS (Lycopodium cernuum).

The Nodding Clubmoss represents a very ancient type of plant that is found in most tropical countries in various slightly different forms. It grows on all the larger islands of the Hawaiian group, being especially abundant in the open forest in the vicinity of Kilauea.

This plant is known by three distinct names in the Hawaiian Islands. The common English name, Nodding Clubmoss, is appropriately applied because the ends of the fruiting branches droop in a characteristic way. The botanical or scientific name, on the other hand, is Lycopodium cernuum. "Lycopodium" is a word coined by Carl Linne' in 1753 from the Greek for "wolf" and "foot" and applied to all clubmosses because of some fancied resemblance to the foot of a wolf. The word "cernuum", meaning "nodding" in Latin, was chosen by him to denote our particular kind of plant and to distinguish it from all the others. The Hawaiian name is "wawaeiole", which curiously enough, means "rat's foot".

The nodding clubmoss is a very strange plant that may be considered a little modified survivor of the Coal Period. It is not like the Ferns or Flowering Plants growing about us but belongs to a group called Lycopodiales. It is beset with innumerable awl-shaped leaves less than a quarter of an inch long. Its stem trails over the ground in a series of long arcs that root at their ends (Plate). From here other stems arise and grow upright to a height of one to three or more feet. These, in turn, bear numerous short, forking branches of which the ultimate tips frequently droop and bear compact fruiting cones called strobili. Each of these consists of a short stem bearing closely pressed aggregated leaves, every leaf containing in its axil a small purse-like receptacle called sporangium.

Upon ripening, the leaves of the strobilus spread apart and the sporangia open to liberate countless microscopic, yellow reproductive bodies called spores. Because of their small size, these can be scattered by the wind for hundreds of miles.

Probably only one spore ( ) out of many hundred thousand ever reaches a location favorable for its further development such as is furnished by a moist, moss-covered embankment or preferably a volcanically heated crevice. Then the waxy spore wall bursts open along three delicate grooves to allow the single naked cell within to swell and divide into two. This is the beginning of a new generation of clubmoss very unlike its parent, the plant being now termed a gametophyte or prothallus. The gametophyte continues to grow in size until it has become a delicate club-shaped structure still too small to be visible to the naked eye ( ). Beyond this stage further growth seems impossible unless a special kind of microscopic fungus, called mycorrhiza, is at hand, to bore into the cells of the gametophyte and in some strange way supply it with part of its nourishment. This mycorrhiza very superficially resembles the mold so frequently observed on spoilt preserves or stale bread. With this living fungus in its tissues, the gametophyte clubmoss is enabled to continue growth. At length it develops into a light green, flattened but thick, body about the size of the head of a pin or larger ( ). At that stage it produces microscopic sex organs called antheridia and archegonia. Within the antheridia numerous sperm ( ) are produced, each bearing two fine threads called cilia. Upon ripening, these sperm are liberated from the antheridium and by means of their cilia actually swim around in the dew or rainwater that surrounds the gametophyte. The sperm are attracted probably by the secretion of a chemical to some neighboring archegonium, of which each contains a single egg. Sperm and egg then unite and from this union arises the

next generation called the sporophyte, which is the leafy clubmoss so familiar to us all. Thus the large leafy generation with asexual reproductive bodies invariably gives rise to the small shapeless generation with sperm and eggs. Such an alternation of unlike genetions occurs in all ferns and flowering plants but is often so obscured that only the botanist can follow it.

The gametophyte or sexual generation of the clubmosses existing today is so rare and so difficult to find that is has been discovered for only a small percentage of kinds. The plants apparently rarely reproduce by the germination of spores or fertilized eggs but, instead, creep over the ground and branch extensively. These branches, rooting at various intervals, finally appear as distinct individuals because of the ultimate death of their attachment to the older part of the plant. It is therefore of some interest that the gametophyte of the Nodding Clubmoss, so rare that it is known only from two previous accounts, has been found in great numbers in volcanically heated crevices near Kilauea Crater. An attempt has been made in PART II of this paper to explain why this gametophyte grown best under conditions of volcanic heat instead of under normal conditions.

The surviving clubmosses have slight economic value. The branches are woven into wreaths for Christmas decorations that long retain their color. The ripening strobili are collected in great numbers, especially in Russia, and then allowed to dry and shed their waxy inflammable spores. These, under the name of lycopodium powder or vegetable sulphur, are then shipped throughout the world. They are used as a remedy in certain skin diseases and as a coating for sticky pills to prevent their adhering to one another and to the sides of their container. Before magnesium powder was generally employed, the spores were used in the manufacture of fireworks or thrown as a cloud into the air and ignited to produce the blinding yellow light necessary for flash-light photography.

The ancestors of the Nodding Clubmosses and the relatives of the ancestors are extremely important to us because they, not peat mosses as formerly supposed, are largely responsible for the formation of coal. These plants flourished during the Carboniferous or Coal Period, 250 million to 350 million years ago, long before the more efficient Flowering Plants had yet evolved. Some were herbaceous while others grew to be huge trees attaining a height of 100 feet or more. According to their kind, they of proportionate size which shed clouds of yellow spores into the air at certain seasons. Some plants, like the Nodding Clubmoss, produced spores of only one kind that developed into gametophytes bearing both male and female organs. Others, however, developed two kinds of spores. The larger, termed megaspores, grew into distinct female prothalli or gametophytes that bore eggs only, while the smaller, called microspores, developed into male gametophytes that bore sperm.

During the Coal Period, spores, leaves, twigs, trunks of trees, and countless other vegetable and animal debris blew or fell into ponds or into streams to be swept away to a final resting place at the bottom of some lagoon. These deposits of carbonaceous material, frequently accumulating in layters of considerable thickness, were often covered by other sediment. Finally they slowly became fossilized and changed into bituminous, or soft, coal. Now let us turn to a piece of such coal broken across the ancient bedding planes of deposition. Here we note shining strips, termed glance by the miners, a tenth of an inch or so in breadth. These represent branches, logs or other essentially woody material that has been crushed flat for millions of years by the tremendous pressure of the overlying strata. Between the layers of glance, however, occur dull bands called mat. These, obviously, are composed of something else. In viewing under the microscope a section of mat

that has been cut with a special razor, so thin that it is almost transparent, we can tell with absolute certainty of what it is composed. Three well-marked structures can be recognized, as the illustration plainly shows, ( ), by the relative amounts of light that pass from the microscope mirror through each of them. There are minute black granules scattered throughout the field. These are pieces of charcoal that must have formed during prehistoric forest fires that were more frequent at that time than now because of the great clouds of inflamable spores that the ancient plants shed into the air. There are many brown particles of considerable variation in size. These represent the smaller pieces of wood and bark in which all evidence of cellular structure has been lost by the complete collapse of the compressed tissues. This material, as we would expect, displays under the microscope the same characteristics as bands of glance. The third noticeable component consists of innumerable amber-colored loops, all lying with their longer sides parallel to the bands of mat of which they compose such an important part. The majority are small while a few are many times larger. These amber loops represent the thick, waxy walls of spores which have been crushed flat so that their contents are barely visible as a dark line. The small loops are usually the remains of microspores, or of spores that upon falling on favorable ground could have produced gametophytes bearing both sexes. The large loops, on the other hand, are the remains of megaspores. That the loops are actually crushed spores is irrefutably proved by the occasional presence among them of an amber ring. This, one can clearly see, is the remains of a spore that has for some reason been able to withstand the pressure of overlying rocks without collapsing.

Anthracite, or hard coal, is usually of like origin and of contemporary age with bituminous coal. The essential difference between the two is that hard coal has been exposed to violent geologic disturbances often accompanied by volcanic heat so that many of its volatile constituents

have been dispelled. It therefore burns with relatively little smoke. Graphite may be considered anthracite that has been still more modified, or metamorphosed, thereby becoming crystalline and soft. This is the material used in the manufacture of ordinary pencils and known to us as the lead within. Exposure of our clubmoss ancestors to still greater dynamic changes in the earth's crust ultimately resulted in the formation of diamonds.

The Nodding Clubmoss, though of little value in itself, will always deserve attention. It is one of the survivors of an extremely important group of plants that is furnishing us with coal, graphite, diamonds and possibly even petroleum. A clue as to why this entire group is on the verge of extinction is given more technically in the following pages.

Plants received from Peking in exchange for Wagner specimens collected in Haw. Mei. Most donated to N.Y.Bot. Garden.

79001 Lygodium microstachyum Desv.
79003 Melastoma dodecandrum Lour.
79004 Torenia glabra Osb.
79006 Woodsia dianthera (Such.-Ham.) Maxim.
79011 Lindernia crustacea (L.) F.-Muell.
79012 L. stricta Tsoong et Ku
79013 Rubus alceaefolius Poir.
79016 Vitex negundo L.
79022 Acacia confusa Merr.
79023 Castanea henryi (Skan) R. et W.
79026 Hypericum japonicum Thunb.
79027 Helicteres angustifolia L.
79029 Euphorbia hirta L.
79030 Crotalaria mucronata Desv.
79032 Eucalyptus camaldulensis Dehnhardt
79039 Radermachera sinica (Hce.) Hemsl.
79040 Rubus tephrodes Hance var. amphiflous (Levl. et Vant.) H.-M.
79044 Sapium sebiferum (L.) Roxb.
79045 Fraxinus kveilinensis S. Lee
79047 Clematis chinensis Osb.
79048 Lespedeza cuneata (Dum. Cours.) G. Don
79050 Ficus concina Miq.
79051 F. tinctoria Forst ssp. gibbosa (Bl.) Corner
79052 Achyranthes aspera L.
79054 Polygonum longisetum De Bruyn
79055 P. multiflorum Thunb.
79060 Adiantum caudatum L.
79061 Bauhinia championii Benth.
79062 Cayratia japonica (Thunb.) Gagnep.
79064 Albizzia chinensis (Osb.) Merr.
79066 Cornus hongkongensis Hemsl.
79067 Cyclobalanopsis glauca (Thunb.) Oerst
79069 Bischofia racemosa Cheng et Chu
79070 Ficurrula parasitica L.
79076 Ligustrum lucidum Ait.
79078 Cryptomeria fortunei Hooibreuk ex Otto et Dietr.

79079 Pyracantha atalantioides (Hce.) Stapf
79080 Ficus nirens Ait.
79081 Epimeredi indica (L.) Rothm.
79084 Sapium rotundifolium Hemsl.
79086 Jasminum sinense Hemsl.
79088 Camptotheca acuminata Decne.
79090 Cyclosorus acuminatus (Houer.) Ching
79091 Acanthopanax trifoliatus (L.) Merr.
79092 Aralia armata (Wall.) Seem.
79093 Polygonum longisetum De Bruyn
79095 Amaranthus spinosus L.
79096 Alternathera sessilis (L.) R. Br. ex Schult.
79098 Lindendergia ruderalis (Vahl) O.Ktze.
79099 Pharbitis nil (L.) Choisy
79102 Pterolobium punctatum Hemsl.
79103 Ficus uirens Ait.
79104 Cipadessa cinerascens (Pall.) H.-M.
79105 Verbena officinalis L.
79108 Crotalaria albida Heyne
79109 Desmodium heterocarpum (L.) DC.
79110 Celosia argentea L.
79111 Ocimum gratissimum L. var. suave (Willd.) HK. f.
79114 Melia azedarach L.
79115 Agrimonia pilosa Ledeb.
79122 Lespedeza cuneata (Dum. Cours.) G. Don
79127 L. formosa (Vog.) Koehne
79129 Syzygium rehderianum Merr. et Perry
79131 Pittosporum truncatum Pritz.
79133 Tirpitzia sinensis (Hemsl.) Hall.
79134 Ficus microcarpa L.
79135 Aerva sanguinolenta (L.) Bl.
79137 Chenopodium ambrosioides L.
79138 Jussiaea lirifolia Vahl
79139 Perilla frutescens (L.) Britt.
79141 Corchorus acutangulus Lam.
79143 Cinnamomum burmanii (Nees) Bl.
79146 Eucalyptus robusta Sm.

79147 Sanguisorba officinalis L. var. longifolia (Bert.) Yu et Li

79149 Phyllanthus niruri L.

79150 Flugge virosa (Willd.) Baill.

79157 Pinus massoniana Lamb.

79158 Cinnamomum camphora (L.) Nieb.

79159 Manihot esculenta Crantz

79161 Rosa cymosa Tratt.

79162 Pueraria lobata (Willd.) Ohwi

79163 Cuscuta japonica Choisy

79164 Veronicastrum caulopterum (Hce.) Yamazaki

79166 Phyllanthus reticulata Poir. var. glaber H.-M.

79168 Ficus tinctoria Forst ssp. gibbosa (Bl.) Corner

79169 Pistacia chinensis Bge.

79170 Rhynchosia volubilis Lour.

79171 Paulownia fortunei (Seem.) Hemsl.

79172 P. kawakamii Ito

79173 Limnophila sessiliflora (Vahl) Bl.

79174 Rosa laevigata Michx.

79175 Toona sinensis (A. Juss.) Roem.

79176 Dysophylla stellata (Lour.) Benth. var. intermedia C.Y. Wu & H.W.Li

79177 Ligustrum sinense Lour.

79178 Aleurites montana (Lour.) Wils.

79180 Lantana camara L.

79183 Acer buergerianum Miq.

79184 Ormosia henryi Prain

79186 Pimpinella diversifolia DC.

79187 Stenoloma chusanum (L.) Ching

The pineapple (Plate) is correctly known scientifically as Ananas comosus (L.) Merr. It is such a well known and important member of the Bromeliaceae that it has imparted to this this entire group the common name of Pineapple Family. The wild Hawaiian plant, unlike most of its relatives, is a large, terrestrial, rather variable herb having a short, massive stem. This bears stiff, linear leaves, sometimes a yard long, in dense spiral arrangement. These are grooved in the center, and armed along their margins with hooked prickles, in that respect resembling the leaves of the hala (Plate). In the axil of the clasping base of each of these leaves are dormant buds and so-called adventitious roots. The latter, shown after the removal of the lower leaves (Plate , at base) are of great value to the plant. Dust and dirt may be blown by the wind upon the leaves to be utterly useless to the plant, but when it rains such material washes down the central groove to be retained by the clasping base. Here the adventitious roots are enabled to absorb the water and the soluble constituents of the wind-blown particles, thereby adding raw food to the plant's supply that usually comes directly from the ground.

At flowering time the shortened stem elongates to become several feet high. The upper part enlarges and develops a variable number of purplish flowers, each borne in the axil o a single degenerate leaf, termed a bract. The remarkable fact about this flower cluster is the firm union of its main stem with the lower part of its axillating bracts and the lo part of its flowers. This is plainly shown in the longitudinal section of the maturing clu ter figured, the wilted part of the flowers showing above the free part of each bract. Su mounting all is the continuation of the stem bearing a crown of small leaves. The diurnal flowers do not bloom haphazardly. A single circle or two begins for a single day at the b succeeding circles blooming each day upward until the crown is reached.

With maturity not only the individual ovaries of the pineapple plant ripen into fruit, bearing hard seeds, but the bracts and the main stem likewise become fragrant and filled a sweet, acid juice. The stem is the "core" of the pineapple. The entire complex structur known commonly as the pineapple proper, is botanically termed a collective fruit. In the wild state it was an attractive food for various animals. It is particularly conspicuous when dead ripe as by that time the stem has bent down so thatthe yellow fruit lies horiz

tally. In eating it they must break off the terminal crown of stem and leaves. This crown, practically no matter where it falls, will strike root. Thus, if conditions are favorable, both sexual and asexual reproductive parts of the plant may be disseminated by the same agent at the same time. In the Hawaiian Islands this plant seldom matures seed (Plate ---, at left) probably because the humming bird or a suitable insect to effect pollination are not found here. Nevertheless, rudimentary seed (Plate ---, at right) may be always seen by slicing the fruit.

The pineapple is probably originally a native of Brazil, from where it has been widely distributed since prehistoric times by Amerindians in South and Central America. It is now grown commercially throughout the tropics and subtropics in the form of cultigens improved for man's use, as discussed in "The Pineapple of Commerce" (Page --). It was first brought to Europe about 1650, and grown under glass in France and England as early as the latter part of the eighteenth Century. As with sugarcane (p.), and coffee (p. --), it is not known when nor from where the plant was first introduced into these islands.

We malihini, or strangers originally from many foreign lands, know the pineapple is not native to the Islands. The Hawaiians from earliest times knew this too. In fact, their name for it is hala-kahiki. Though this names proves the plant's exotic origin, it is a somewhat ambiguous phrase. It means either the "Tahiti hala" or ~~much more likely~~ the "foreign hala." Kahiki (k and t in the Hawaiian language ~~being~~ often interchangeable) ~~to be sure, originally meant Tahiti, the island last visited by the Hawaiians around the twelfth century. But as time went on, knowledge of that country became more and more vague to the Hawaiians so that by the eighteenth century kahiki meant any foreign country whatever. Whether this foreign country happened to be Tahiti, some other Pacific island or even South or Central America is an intriguing question.~~

The discovery of the Hawaiian Islands by true Caucasians is a topic we here discuss because it bears on the introduction of the hala-kahiki.

Though the Hawaiians lacked writing - they did print designs on tapa with their oheha'alapala (Fig. --), and pecked "doodly" and also meaningful petroglyphs on rocks - they did have a rich, unwritten literature. Bards associated with the chiefs were highly trained in reciting epics and geneologies passed on from century to century. For example, "Mr. Ellis, at the time of his visit found the bards able to recount the successive reigns of

of about seventy kings; and with regard to the thirty-five reigns nearest to our own day the accordance between the bards was very exact." To ignore such tales, carefully recorded in print since the coming of Captain Cook by Hawaiian and Caucasian scholars, the latter often married to Hawaiian ladies of high rank, imparts a faulty slant to ancient, local history. The average ancient Hawaiian was no more a savage than the average illiterate Caucasian sailor of Cook's two vessels. The chiefs and priests were far superior, many being as civilized and cultured as Captain Cook and his officers but, of course, in a different way.

Fernando Magellan (1480-1521) sailed into the Pacific in 1520, discovering the Philippines and other islands. According to Ysendoorn an atlas published at Amsterdam in 1715 states

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Ysendoorn, H. Haw. Hist. Soc. 21:23-32. 1913.

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in French that "The galleon from Acapulco always leaves towards the end of March or in the beginning of April; about sixty days after departure she arrives off Guam, where she remains but two or three days to take in provisions and then continues her voyage for Manila, where she arrives usually in the month of June. Whilst this ship is under way, another loads merchandise from the East Indies, and gets ready to leave Manila for Mexico. Thus when the first arrives the second goes under sail, and goes as far north as 36° and even 40° north in order to get favorable wind for the American coast. Having arrived there she first coasts the shores of California, and never fails to catch wind whereby to reach Acapulco, where she usually arrives toward the end of December; always taking twice as much time to come back as it takes to go; which circumstance is attributed to the round about ways which have to be taken to get the wind and to avoid the currents - - - -. They have discovered in the last century many islands in this ocean; but they are so savage, and their inhabitants so poor, that nobody has cared to make much of an investigation about them."

Ysendoorn himself, referring to our Islands, remarks that "They appear for the first time on the famous chart of Mercator: Nova et Aucta Orbis Descriptio, 1569 (an outline of which may be seen in the Encyclopedia Britannica 1883, under the heading, Maps,) as a group of four small islets called Los Bolcanos, grouped in the form of a cross lying about the tropic of Cancer, and a bigger island called La Farfana, which is at 21° north latitude and and 176° west longitude from Greenwich." That the islands near the center of the North

Pacific were named "Los Bolcanos" as early as 1569 convinces us that the Spaniards not only new of the existence of the archipelago but were impressed seeing one of its volcanic eruptions!

According to *Ellis, the Hawaiians have three accounts of the arrival of foreigners prior to the coming of Captain Cook. For instance, In the reign of King Kahoukapu the priest Paao, a Caucasian, landed in Kohala, Hawaii, his descendants becoming priests of the area. He may have been a Roman Catholic named Paulo; and the reported gods he brought were a large and a small one. These may have been a figure of the Virgin Mary and the infant Jesus, or a figure and a crucifix. The temple Mokini, North Kohala, was erected in their honor.

*Ellis, W. Polynesian Researches, During a Residence of nearly Eight Years in the Society and Sandwich Islands. 4: 317-320. 1833.

During the lifetime of Paao's son, the priest Opili, white men known to the Hawaiians as na Kea or "the Whites," arrived somewhere in the southwest of the island. They settled on the mountain that was named, not for the winter's blanket of snow which it shares with Mauna Loa, but "Mauna Kea," for its inhabitants. The Hawaiians first feared them, not knowing whether they were gods or men. With the king's consent, Opili led a procession to them, carrying cooked food. The meeting was cordial, the strangers conversing with the Hawaiians through Opili as interpreter. From this fact we surmise Opili was either Caucasian or half-~~XXXXXXX~~Hawaiian through his mother. These strangers, whose leader was Manahini (probably simply a corruption of the word malihini or stranger), finally left in an attempt to return to their own country.

Another Hawaiian epic records that in the reign of Kaliiokaloa, who was born about 1500, a strange vessel was wrecked at Keei in the District of Kona, Hawaii. This may have been one of the two vessels that had disappeared from the three comprising Saavedra's squadron, which had left Mexico in 1527.

In 1964 the writers spent some time in the Museum of the Indies in Seville, Spain, where miles of bookshelves hold the original reports of all such voyages. Maps printed at least a century before Cook's time, were on display showing islands roughly in the position of the in our archipelago. *Alexander, who flourished while many Hawaiian native historians were

*Mary C. Alexander, daughter of the historian, in her entertaining "The Story of Hawaii,"

page 66, 1912, states "The idol was found on land in Kewalo near Honolulu." John F.G. Stokes, Haw. Hist. Soc. 20:98. 1939, reports that it "is said to have been found in Manoa valley." Though familiar with Stokes' arguments regarding the Spaniards, we are not convinced.

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still living, relates that "in 1555, Juan Gaetano, a Spanish pilot who had crossed the Pacific many times, saw five of these islands. Probably he went ashore. There exists, however, no definite Hawaiian tradition about it. The record of his discovery is in an ancient chart in the Spanish archives. Gaetano called Hawaii, La Mesa, the table; Maui, La Desgraciada, the unfortunate; the three smaller islands, Molokai, Lanai, and Kahoolawe, Los Mojes, The Monks. The Spanish kept their discovery secret. In 1743, when English mariners sailed the Pacific and contested for their rights there, they found a copy of this chart. It was in the cabin of a Spanish galleon which they captured near the Philippines. On this chart Hawaii was placed in the right latitude, but ten degrees of longitude too far east." In a map of the World attached to Anson's Voyages, published in 1748 and hence thirty years before Cook's arrival, the Hawaiian Islands are shown under their Spanish names correctly placed as to latitude. Their longitude, however, in this case is a bit too far east. *Ar-

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Arago, J. Narrative of a Voyage Round the World in the Uranie and Physicienne Corvettes, commanded by Captain Freycinet. Page 57. 1823.

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ago had explained this discrepancy in location as early as 1823. Though rather repetitious, we quote: "It is certain that the Spaniard Gaetano was the first European who, in 1542, discovered the Sandwich Islands. Cook himself discovered there certain indications of the residence of Europeans; and the terror which the natives manifested of fire-arms, proved clearly that they were not unacquainted with them. Motives for the silence and discretion of Gaetano may be easily discovered. All the west coast of America was infested with pirates - - -. Gaetano, after having made the discovery of this Archipelago, clearly saw, that if he gave it publicity, it would become the rendezvous of these outcasts of the sea - - -. This - - - induced him, in the chart which he published some time afterwards, to place the Sandwich islands at ten degrees distance, both of latitude and longitude, from their real situation; thus, with the consent of Charles Vth, he fixed them at the 9th and 11th degrees, instead of the 19th and 21th - - -."

It is definitely known from Spanish records that three Spanish vessels sailed from Mexico in 1527 for the Moluccas under the command of Pedro Alvarado de Saavedra and that two of these never reached their destination. Undoubtedly some such vessel is the basis for the

for the natives' accounts of the coming of strangers during the reign of King Keliiokaloa, who was born about 1500, when their vessel was wrecked at Kaei, Kona, Hawaii.

According to *Hopkins, "A more precise tradition relates that a boat arrived in Ke-

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*Hopkins, M. HAWAII: The Past, Present, and Future of its Island-Kingdom. Chapter VI. 1862. Mr. Hopkins was Hawaiian Consul-General; his brother and advisor, resident in the Islands for sixteen years, had been "Director of the Government Press at Honolulu."

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alakeakua Bay, on the west side of Hawaii, - the bay where Cook met his death, - that it had no masts or sails, but was painted, and had an awning over the stern. The persons who arrived in the boat were clad in white and yellow cloth, and one of them wore a hat with a plume, and had a pahi, i.e. a sword, at his side. These people remained, and formed alliances with the natives, rose to be chiefs and famous warriors, and for a considerable period governed Hawaii. The date of their coming, as far as it can be deduced from circumstances, may have been about the year 1600. Later than this, perhaps in 1620, a vessel was wrecked in the south side of the same bay. The Captain of her, and a white woman, were the only persons saved. On reaching the beach they prostrated themselves there for a long while. The strangers were hospitably received by the natives, formed connections with them, and from this mixed race it is said that many chiefs and common people have descended. Those who are supposed to represent this race at the present day, are distinguished by their lighter skin, and by brown or curly hair, called ehu." This spot, a little southward of Kealakekua, according to C.C. Bennett's Honolulu Directory of 1819 "was named by the Hawaiians Kulou - to bow down - which name it retains to the present day."

Such Spaniards, if shipwrecked, undoubtedly intermarried with the alii, or chiefly families. A few decades ago a Hawaiian teacher in Kona, Hawaii, alleged that one of his ancestors, of early Spanish origin. Moreover, a Hawaiian family in neighboring Kohala, bearing a name for generations that is the vernacular for Gaetano, claims to be descended from the famous pilot.

The writers in 1952 studied a heroic statue in the Museum für Völkerkunde, Berlin, Germany, whose Director kindly furnished them with the photographs here reproduced with his permission. The stone is typically Hawaiian, with gas cavities and olivines. The statue depicts a Spanish grandee, certainly not a Hawaiian, with a ruff (Plates). Should the Spaniards, either explorers or shipwrecked immigrants, have fraternized with

the Hawaiians, we can imagine they would have entertained them with some of their dances, and the Hawaiians certainly would have absorbed some of the Spanish features in some of their hulas. One of these may have been the hula pa-hua. According to Emerson,

Emerson, N.B. Unwritten Literature of Hawaii. Page 183. 1909.

this hula was a dance of classical times last performed on Oahu in 1846. The description of the dance does not concern us here beyond the fact that there were the usual two groups of participants; the olapa, who actively moved in the dance; and the hoopaa, who were in two divisions, marked the time of the movement by clicking together two pebbles which they held in each hand. The use of the pebbles after the manner of castanets, the division of the dancers into two sets, their advance and retreat toward and away from each other are all suggestive of the Spanish bolero or fanda[n]go. The resemblance went deeper than the surface. The prime motive of the song, the mele, also is the same, love in its different phases even to its most frenzied manifestations." In the hula ili-ili only the olapa took part. Their dance was similarly peculiar in the use of pebbles, or ili-ili, like castanets.

That the Chinese andor Japanese reached the Hawaiian Islands in prehistoric times is possible, but the evidence is still controversial.

But to us na mele or Hawaiian epics, the mysterious, olivine rich idol with ruff, maps printed long before Cook's time showing the approximate position of the Hawaiian Islands, and the knowledge and possession of presumably European iron artifacts by the natives before Cook's time is evidence enough that the discovery of our archipelago, so far as the white race is concerned, was by Spaniards.

One of the greatest problems of extensive voyages was the illness and often death of seamen from scurvy. An outstanding antiscorbutic growing ~~growing~~ in warmer regions of America is the pineapple. Could it be that Spanish navigators familiar with the pineapple cultivated in both Acapulco and Manila would neglect sailing without a good supply of this life saving fruit? We think not. When Spanish galleons reached the Islands, did not crowns or seeds of the pineapple reach land and grow to maturity perhaps with the help of the natives, expert horticulturists? Though we lack proof, we believe this probably for the hala kahiki.

Born October 27, 1728 at Marton in Yorkshire to English farm laborers originally from Scotland, James Cook was endowed with a sturdy body, ambition, common sense and a craving for knowledge. This enabled him to rise to eminence in a society where exalted birth was

generally held more important than ability. He was first apprenticed to a draper and grocer, a mean character; but by thirteen he went to sea as cabin boy aboard one of the colliers belonging to the Quaker brothers John and Henry Walker. While the colliers were being repaired, the boys lived with the Walkers, Jimmie studying navigation during his spare time. Thanks to a Squire Thomas Shottowe, who paid the tuition, he attended the Friends School. We believe this early Quaker influence made him more humane than the average Christian blessed with a soul, who considered heathens and animals soulless and open to indignities. He became so proficient in his chosen field that he was mate by 24. He joined the British Royal Navy in 1755 and, in the war against France, made an outstanding charo of the St. Lawrence River in the face of the enemy. This facilitated the conquest of Canada. Later Admiral Percy Brent, as disclosed by the Navy Records Society in 1928, gave Cook secret instructions to take possession for King George III of a rumored "southern continent," which had not yet been definitely located. Thus Australia became part of the British Empire. To discourage rival nations from gaining this additional territory, they were induced to believe that the expedition was sanctioned by the Admiralty and the Royal Society to observe the transit of Venus at Tahiti June 3, 1769 across the sun's disk. For this technical work he was to receive 100 guineas, in addition to his regular salary of five shillings per day. This ruse worked. The coring expedition was considered so noteworthy that France, at war with England at the time, instructed her forces to consider Captain Cook immune from capture as an enemy; while the statesman Benjamin Franklin wrote letters to American ships of war, urging them not to treat "the celebrated Captain Cook" as an enemy, an instruction countermanded by politicians in Congress. This expedition ended on return to England in June 1771.

Cook's second expedition left England for the Pacific July 1772, returning three years later. The third, which interests us because of his rediscovery of the Hawaiian Archipelago, left England July 1776. It consisted of the vessels "Resolution" and "Discovery." The returned to England, after the tragic death of Cook, in October 1780.

January 18, 1778 the expedition saw three of the Hawaiian Islands. Natives paddled to Cook's vessel, the "Resolution," from Kauai to barter. They were well understood as the Hawaiian dialect is close to the Tahitian, with which the English had become familiar. Cook

landed the following morning. Though the Islands lacked metallic iron the natives *"se-----
ed to understand that it was better adapted for cutting, or boring holes, than any article their own country produced; and they asked for it - - -." The expedition weighed anchor on the twenty third, drifted away against their will, and hence anchored off Niihau. There the natives "traded with the crew, who ascertained them to be addicted to cannibalism/ (Page 142)./- - - On the 30th, an officer, with a party, went ashore, where they were detained for nearly two days by the stormy weather. Next day, the captain landed, and left the goats and pigs, of the English breed, with some garden seeds - - -." To the whole "in compliment of his noble patron, the first Lord of the Admiralty, was given the name of Sandwich Islands, - - -."

*Anonymous (Published by John W. Parker). The Life, Voyages, and Discoveries, of Captain James Cook. Ed. 4, p. 140. 1849.

After visiting Kauai and Niihau only, Cook sailed February 7, 1778 in search of a northwest passage into the Atlantic Ocean. Unsuccessful, he returned to the Islands, anchoring in Kealakekua Bay, Hawaii January 17, 1779. Mistaken there for the God Lono, whom the natives had expected to return by coincidence at that very season of year the expedition appeared, Cook was deified. The expedition was lavishly entertained and honored, huge quantities of supplies were ~~lavished~~ brought as gifts, and much was bartered. An elderly seaman died of natural causes, convincing the Hawaiians that Cook's followers at least were mortal. The crew, in spite of Cook's attempt to prevent it, mingled with the women and thus introduced social diseases new to the Islands. Twelve wooden idols and the fence surrounding the temple or heiau, despite the protestations of the priests, were tactlessly used by the visitors for firewood; while some of the Hawaiians engaged in pilfering. Though Cook in our opinion tended to be humane for his time, contrary to the beliefs of Dibble, Stevens & Oleso, Mark Twain and Ysendoorn, the Hawaiians were relieved when their erstwhile, somewhat abusive guests, again feasted and overwhelmed with lavish presents, set sail February 4 with the intention never to return.

While already beyond the horizon it was discovered that the foremast of the "Resolution" had given way during the night before. To repair the damage, both vessels returned to Kealakekua three days later. As the mast of the Hawaiian sailing canoe is sacred, the breaking of that of the "Resolution" was considered a portend of evil and must certainly have eroded the esteem still further in which Cook had been held. Cook, probably unaware

that the ohia-lehua (p. --) tree is sacred, foolishly took such a log from the temple to replace the broken mast. The Hawaiians, though not hostile, were a bit unfriendly at having their demanding guests return. Pilfering increased, and even a six-oared cutter was stolen. In all this confusion, a high chief was accidentally shot to death by a stray bullet. February 14 Captain Cook planned to kidnap the very feeble, old King Kalaniopuu and detain him aboard as hostage until the return of the cutter. With Cook leading him "the old monarch proceeded submissively, and with apparent indifference; but, when he came near the water's edge, one of his wives entreated him to go no further - - -, telling him he would be put to death if he went into the stranger's ship." In the ensuing riot, Cook was stabbed between the shoulders and fell into the water dead. The common statement that Cook was murdered by savages February 14, 1779 is untrue. The Hawaiians immediately regretted this act of almost justifiable, voluntary manslaughter by one of them, and treated the corpse with the utmost respect. Though Captain Cook, a month before his death neglected making further entries in his journal, we are able to piece together the sequence of events from records written during the time by members of the expedition and later by historians and missionaries who questioned Hawaiian eye-witnesses. This historic region in Kona is now under jurisdiction of the National Park Service.

After this digression that aims to place blame where blame belongs, we wish to emphasize that Cook was first considered a health food crank by most of his crew. They never realized that he was a* pioneer in controlling scurvy, after a few weeks at sea the bane of marinners. He later was awarded the Copley Gold Medal, and was appointed Captain in Greenwich Hospital with an annual income for life. "The ships were amply stored and provided for a long and difficult voyage, particularly with articles to prevent the scurvy, and to preserve the health of the crews, as malt, sour crout, portable broth, saloop, and mustard (Anon., Parker, ed. p.57). and slabs of concentrated vegetable soup. He carried garden seeds along. For example, in New Zealand "A garden was also dug, and several seeds and vegetables, adapted to the climate, were sown in it (ibid. p.62)." In Tonga, he sowed "Indian corn, melons and pumpkins (p.106)." In fact, "The voyagers reached Annamooka (Habai Group north of Tonga) on the 4th of June; and Cook, on landing, found the inhabitants digging up yams to market. Since our navigator's last visit, the island had been better cultivated; some pine-apples which he had left were in a thriving state; - - - (p.107)." So far as we know presently, Cook does not record having seen the pineapple in

*Actually naval Dr. James Lind in 1754 found that lemon juice was a specific against scurvy, a discovery long ignored.

the Hawaiian Islands, but he certainly made us of it as an antiscorbutic.

Ellis, in his "Narrative of a Tour Through Hawaii," page 10, 1826, remarks that "O-ranges, limes, citrons, grapes, pine-apples - - - have been introduced, and, excepting the pine-apples, thrive well." Whether he thought it was Cook who introduced the hala-kahiki or some one else, we do not know. A lay opinion that the pineapple could not have survived but would have rotted during a long ocean voyage ignores the ability of the crown to survive for months and the seeds, not usually formed in the improved cultugen, for years.

According to Laura Fish Judd, "Among the rubbish in the cellar of the house of the premier, Kekauluohi, which we occupied two years, was found an old dilapidated journal, written in Spanish, which Mr. Wyllie translated. It appears that Don Francisco de Paula Marin came to the Sandwich Islands in 1791. The first entry in the journal is November 14, 1809. He speaks of making gardens and planting pine-apples, oranges, beans, cabbages, fig-trees, melons, tobacco, etc." Marin evidently was the first Caucasian to cultivate the hala-kahiki, though the Hawaiians may have been growing the plant in a semiwild state long before. As recently as April 7, 1948, however, Jared G. Smith maintained, without giving his source, that "Pineapples of the 'Queen' variety were brought by shipmasters about 1805, probably from Canton, eventually spreading until half-wild and hence regarded by some as a 'native'."

In 1824 Andrew Bloxam, naturalist on the Frigate "Blonde," reported that in Honolulu "- - - pineapples and some other fruits are to be had, but not in abundance." Elsewhere he mentions the pineapple as one of the introduced plants. These plants, of which a typical one is pictured on Plate --, produce rather small but very fragrant, sweet fruit. They may be found near sea level usually as escapes from early cultivation by the Hawaiians. They grow in numbers in rocky places on the Island of Hawaii in Puna, not far from the Park boundary, as well as in Kona, where they received considerable care from the Hawaiians; they are known from a wet but well-drained forest in Wailau Valley, Molokai; on Kauai; and probably elsewhere.

We writers believe that the hala-kahiki was introduced to the Islands ~~very likely~~ by the early Spaniards. Moreover, whether the Spaniards actually had done so or not, we believe with little doubt that Captain Cook reintroduced or introduced it during his third and last expedition. If readers do not agree with us, that is their problem.

The discovery of the New World, like that of the Hawaiian Islands, was likewise complicated. There are many unsung heroes on the Pacific side. What Asiatics, generation after generation, walked, rowed and sailed eastward along the Aleutians 100,000 or so years ago to first step on Mainland America to evolve into the polyglot Amerindians of many different human strains? What Polynesians from Easter Island and perhaps elsewhere first reached South America? According to Hawaiian tradition, we know Hawaiiloa reached America; but we do not know whether he or an earlier explorer brought the South American sweet potato (or even the hala-kahiki) back to Hawaii and into the Pacific Islands realm. If some ancient kinds of primitive "Blacks" of Australia could settle Tasmania, could not some have landed at Terra del Fuego or south of it to be absorbed in marriage by Amerindians? We know vikings discovered North America on the Atlantic side long before Lief Ericsson set foot on Greenland and North America around ~~1000~~ 1400 A.D. Such great voyages involving America do not dim the exploits of Christopher Columbus; nor do such early, great voyages by Polynesians, Spaniards and perhaps other races to the Hawaiian Islands dim the exploits of Captain Cook. He certainly publicised the existence of Hawaiian and other Pacific archipelagos to Europeans and Americans, a fete deserving the greatest honor.

Delegates bombarded State of Hawaii Legislators with books & pamphlets in behalf of Conservation of our unique Natural Resources.

They evidently appreciated it as the Resolution March 22, 1979 proves.

More people throughout the outside World know about the remarkable plant & animal Creations in Hawaii Nei than the kamaainas living in the midst of them! Charming holos among us are harming our Tourist ~~industry~~ Trade which is our one sure permanent ~~industry~~ that is increasing while the others are declining. Tourists come to visit an authentic Hawaii, not a counterfeit one. More & more Haw., plants are being replaced by ~~[illegible]~~ ~~[illegible]~~ bougainvillea from Brazil, eucalyptus from Australia, ~~[illegible]~~ hibiscus from China, oleander from Greece, plumeria from Mexico and pine trees from America & Asia by Mainland landscape carpet-bagger "experts" who don't know Hawaii's unique plant treasures. Our lowlands are primitive typically monotonous tropics tourists can find nearer home. Why waste time & money coming here ~~[illegible]~~ if the rest of the Islands get that way

[thanks to the "woodchip" craze?]

Hi-Lart

Hunt

DRS. OTTO & ISA DEGENER
P.O. Box 154
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96785 U.S.A.
Oct. 13, 1981.

Dear Editors:

Beware of Fire!

Attending the XIII International Botanical Congress in Sydney and spending two months studying the native floras of Australia, New Zealand and Tasmania in comparison to that of Hawaii Nei, we hardly can be considered authorities. Yet from conducted tours with other Congress members under the leadership of Dr. W.D. Jackson, the monographer of the genus Eucalyptus and Professor at the University of Tasmania in Hobart, we did absorb some astonishing knowledge and probably correct impressions. Hence the appearance of an article entitled "Tree Farm Workshop" in the October 8, 1981 issue of the Hawaii Tribune-Herald prompts our present harangue.

The frightening article states in part: "Experts on all aspects of tree farms are meeting for a three day workshop this week to produce a comprehensive report on the technical and economic feasibility of eucalyptus tree farms on the Big Island. - - - The workshop is part of a large project, led by Pacific Resources, Inc., on the feasibility of using Hawaiian biomass to produce hydrocarbon fuels. Other members of the team are the Institute of Gas Technology of Chicago, Illinois, and the Hawaii Natural Energy Institute. Preliminary work has led to the conclusion that the most promising energy plantation would be eucalyptus on the Island of Hawaii."

Previous to our trip, we would have been opposed to the continued planting of eucalypts, except for an occasional tree for someones' personal interest, as they tend to kill interesting plants around them and the interesting associated animals from bugs to birds. The only benefit to such animals, as we see it, is a short flowering season producing some edible nectar. Its oil, known as eucalyptol, is so poisonous that it is only useful when properly recommended by a physician, after a pharmaceutical company has refined it, to kill pathogens attacking both man and beast. We need no forests for a supply of such oil. The eucalypt is a killer of things about it, and hence detracts the evermore discerning generations of tourists who visit the Hawaiian Islands to revel in things Hawaiian, not in groves of eucalypts that they can see better if they wish under natural conditions in Tasmania. Jet flying is no longer so expensive in money and time that they must see exotics under unnatural conditions. The cultivation of introduced eucalypts and their ilk, crowding out natives and marring the normal environment is a cancer slowly throttling our lucrative tourist industry. How many unsuspecting tourists are disappointed when they see the skyscraper hotels flanking the beach at Waikiki or the sky-reaching eucalypts hiding the native countryside? Without a gallery of undisturbed "bush" or of forest alongside rural highways, we typical "down-Under" tourists don't anticipate repeating the monotony of passing through vast cattle and sheep ranches nor manicured forests of biomass valuable, Continental pine trees. It is as drowsy as driving through fields of sugarcane, pineapple or watermelon in Hawaii Nei.

After touring Tasmania, much of the above seems to us piffle considering the following: Forest fires must have been common during the eons the genus Eucalyptus was able in Tasmania to evolve well over a hundred species, varieties and forms. Abundantly armed with poison oil cells, the plants are relatively immune to depredation by members of the Animal Kingdom except incidentally for the cuddly koala "bear" with its "two-thumbed" hands for efficient climbing. This marsupial is remarkably specialized to eat eucalypt leaves and "nothing else". (A tame one, however, enjoyed munching some of our salted potato chips.) With such oil, if for no other reason, the forests were just abou as dead to animal activity as are our valley bottoms crowded with the Polynesian introduced kukui, a relative of the castor oil plant.

The trunks of so many of the eucalypts are amazing regarding fire: Some outside are hard, corky and thick; others are loose and flaky, similar to the asbestos-like, almost fire proof bark of the exotic Melaleuca or paperbark tree known to most of us; and stil others have smooth, whitish bark. We had never realized that whitish bark would lessen heat exposure like the other two kinds to the cambium; yet we remember our mothers

Dupl. to Hobart, Aarhus, Adelaide, Ames, Amherst, Ann Arbor, Auckland, Austin, Basel, Barbados, Bell, Berlin, Bloomington, Bochum, Brisbane, Bronx, Brno, Brussels, Budapest, Calcutta, Cambridge, Canberra, Caracas, Carbondale, Chiba, Christchurch, College Station, Coimbra, Copenhagen, Dallas, Dublin, Edinburgh Bot. Society, Florence, Frankfurt, Fukuoka, Gainesville, Geneva, Gotland, Göttingen, Graz, Halle, Hamburg, Helsinki, Hiroshima, Honolulu, Ithaca, Jena, Jerusalem,

changing seasons (usually) from dark, warm, winter clothing to light, cool, summer clothing. There must be some truth to it.

Forest fires evidently have been rampant in ages past to elicit such tree trunk adaptations. Forests then were occasionally ignited by lightning; by spontaneous combustion; and, we would imagine, by dead, leafy branches being rubbed together to ignition by a strong, dry wind. Forest fires must have markedly increased with the prehistoric coming of early, fire making man, contemptuously considered by many of our Christian Caucasian forebears to be subhuman aborigenes and hence helped to extinction. This outrage, however, did not reduce the number of fires. They increased in frequency after many of us Caucasians first mouthed burning leaves to inhale their narcotic smoke before finally dropping them perchance amid tinder dry duff.

Fires in a eucalypt forest, such as proposed to be "the most promising energy plantation - - - on the Island of Hawaii", must be devastatingly impressive. After a spark or ember finally bursts into flame and reaches lower, leafy branches, the oil does not simply burn. The oil in the entire forest vaporizes into a burning gas, and (gases) the forest fir in the entire area can burn itself out within only about THREE MINUTES!

To be sure, many tree trunks will smolder for (2 minutes) hours, but that is of little consequence. Many trees, thanks to their peculiar bark, will be almost bare trunks after a fire, like ohias exposed to lava flows or ash explosions in Hawaii Volcanoes National Park. After rains, these will sprout abundant branches from adventitious shoots arising from the cambium of the trunk. Others, like koas in the Park, will grow anew from adventitious shoots arising from the roots. Thus a eucalypt forest largely renews itself, exposed to another fire perhaps a score of years later.

The eucalypt conflagration, we wish to emphasize again, might be likened to an explosion. The air at normal temperature for the day expands tremendously in volume the instant it is heated, the cloud of burning gas, if the wind is in that direction, even crosses the ocean to set offshore isleta aflame. Whole towns go up in smoke, the burned houses seldom showing upright pipes and metal door and window frames as with us. Because of the intense heat, the houses are usually burned flat to the ground, all meta having melted including knives, forks and spoons to run down the path or roadway in a little silvery stream. The unfortunate householder later rolls up the congealed alloy t at least salvage a little cash by its sale to a junk dealer. Is this to happen to homes in towns makai of abandoned sugarcane fields in Hawaii?

If advocates of eucalypt forests ignore the high intellectual and scientific values of terrain not overgrown with unusually flammable and poisonous trees; if they ignore the welfare of a shaky tourist industry having potential visitors by 'plane bypass progressively more unnatural Hawaii Nei; and if they risk playing with fire that may wipe out entire coastal villages, we urge the State to Legislate that we andor our heirs be reimbursed adequately for a holocaust very likely destroying our prized possessions and perhaps our very lives. This hastily written urgent appeal may be based on statements not 100% correct; but sufficiently true, and now in the public domain via our newspaper, to be worthy of consideration.

Aloha,

Drs. Otto & Isa Degener
Owners of wooden houses

PANDANUS TECTORIUS Again and DELISSEA Anew
Drs. Otto & Isa Degener

After one of us has lived in the Hawaiian Islands since 1922 and the other since 1953 and have concentrated on the flora full time for a total of 90 years in round numbers, we are rather timid. We lack confidence in the result of studies of botanists, including ourselves, particularly concerning the scientific naming of plants in extrenely complicated Hawaii Nei. Nor surprizingly as it may seem do we feel that newer publications concerning the naming of plants necessarily are always an improvement over the names that have been proposed in older publications. Moreover, repeating previous "sermons", we do not consider any scientific plant names of much importance unless the author (or authors) of each name is appended.

Regarding the hala of Hawaii Nei and its trivial variations, Dr. Benjamin C. "Skip" Stone (Notes from Waimea Arboretum & Bot. Gard. 8(2):4-10. Dec. 1981.) makes much of the fact that "The Degeners, however, have unfortunately made an error in writing the name as a new combination - - - ; thus the whole name, with authors, according to the Degeners, should be written as follows: Pandanus tectorius (J.P. du Roi) Deg. & Deg. But this is incorrect, for the simple reason that the species was originally called, i.e. ascribed to, the genus Pandanus. No combination is needed, or for that matter, possible. The correct name for the species, therefore is: Pandanus tectorius J.P. du Roi as 'Z'."

As we Degeners understand it, no one ever put the name of the taxon in print except one of the Degeners' calabash cousin, namely the Brunswick Court physician - all worked with plants - Johann Philip du Roi (6/2/1741-12/8/1785). Please note Stone mispppelled the middle name, one of two "p"s often denoting whether the babe had been properly baptized.) As du Roi signed his article "Z" in the German periodical Der Naturforscher 4: 240±. 1774, of which he was no editor, we Degeners replaced the ambiguous "Z" with "J.P. du Roi". Stone does not recognize this as a new combination, though we believe lexicographer Noah Webster (1758-1843) would do so. In short, we personally are still convinced we are correct in the use of P. tectorius (J.P. du Roi) Deg. & Deg., a favorable prejudice common to most individuals regarding their assertions.

We acknowledge that Drs. St. John and Stone, both known to us personally and by the publications available to us in our small, very own library on Oahu's North Shore, are the present World experts on the genus Pandanus. The former in his useful "List & Summary Fl. Pl Haw. Islands, page 15, 1973 lists as native, if not endemic, to the Hawaiian Islands:

1. Pandanus chamissonis Gaud., 1841.
2. P. douglasii Gaud., 1841.
3. P. menziesii Gaud., 1841.
4. P. odoratissimus L.f., s.s., 1781.
5. P. odoratissimus var. levigatus Mart., 1930.
6. P. odoratissimus var. oahuensis Mart., 1930.
7. P. tectorius var. sandvicensis Warb., 1900.

On the contrary to the above, acknowledged expert Dr. Stone, whose many Pandanus publications we lack, states on page 8 in the December 1981 Notes that "Some authors (e.g. Dr. St. John) prefer to regard the species as of very restricted distribution indeed, St. John does not regard the name as validly published - - - ." Stone differs also with St. John in considering 1. P. chamissonis, 2. P. douglasii and 3. P. menziesii as "illegitimate". Furthermore, though St. John recognizes 4. P. odoratissimus L.f., s.s., and 5. P. odoratissimus var. levigatus and 6. P. odoratissimus var. oahuensis, Stone considers them merely varieties of P. tectorius.

Do the two World experts agree to disagree with each other? Read Pac. Sci. 33(4): 397. 1979 and judge for yourselves: According to St. John "Stone (1967:242), thinking that P. tectorius legally dated from 1900, states that the Hawaiian P. Douglasii Gaud. (1841) occurs in Tahiti and is an available name. The writer is aware of Stone's lumping of taxa with different morphology, from remote areas into a single unit. Having had Stone as a graduate student and assistant for 3 years, and having followed his studies and publications since then, the author has a good idea of Stone's taxonomy. He can ob-

serve differences and resemblances but his judgment and his conclusions are of a different order. Half the time the writer cannot agree with Stone's results, and particularly in large and complicated problems, can seldom agree with him." Furthermore St. John remarks on page 400 and 401: "Depending solely on his criteria of the fleshy shoulders and large white spines, Stone (1967:237), in his eagerness for lumping, has reduced to the synonymy of Pandanus odoratissimus the following sum of species described by the writer: from Malaya, 8; from Anamba Islands, 1; from Vietnam, 9; from Hong Kong, 1; and from the Maldive Islands, 4 - - - His action seems based on prejudice, not on scientific judgment."

With obvious squabbling about the standing of taxa and their naming, we recognize that every scientific name published is correct not necessarily according to facts, but according to the opinion of the particular author or authors involved. Hence it is absolutely necessary to cite such authors. We personally then try to review the arguments and consider the standing or reputation of authors involved before we choose just whom to follow. Readers should choose for themselves whether they prefer for our common hala the binomial P. tectorius (J.P. du Roi) Deg. & Deg., or some other name proposed by some other squabbler. "But", as we have printed elsewhere before, "who knows what botanists 1,000 years hence will do?" With this in mind, the local Flora we have been publishing during the last half Century consists of illustrated, single sheets. As opinions may change hopefully for the better, even perhaps ours concerning the hala, they are bound loose leaf. Hence as the opinion regarding a taxon changes and funds are available, the sheet can be readily removed and replaced with the newer version. By this method, the Flora should improve as the Science of Botany does.

Doubting, as mentioned above, that all modern publications are superior to the old, our opinion upholding the genus Delissea according to the judgment of Gaudichaud who established it in 1826 stands. He named it for the physician-apothecary A.M. Delisse, a naturalist of the French 1800-1804 expedition to Australia. In the use of Delissea, among many others, we are in agreement with such writers as William Hillebrand who in late life studied under Asa Gray at Harvard and in 1888 posthumously had his Flora of the Hawaiian Islands published. He devoted pages 248-251 to the genus. Others that come to mind are Baillon; Bentham & Hooker; A. deCandolle; Endlicher; Engler; A. Gray; Herbst; Léveillé; H. Mann, Jr.,; Neal; Presl; Skottsberg; Rock; Wawra; and Wimmer.

Sheepishly following the majority we, considered "splitters" because we emphasize the importance of differences in plants by "lumpers" who emphasize the importance of likenesses, here alter the scientific name of a member of the Lobeliaceae. It bears the legend "Hawaiian Islands, Oahu Island, Kaaawa, Hidden Valley, moist river bed, under caopy of Aleurites and Pisonia, with Athyrium, 457 m (1,500 ft.) alt., Nov. 2, 1980, J. Obata a D. Palmer 433 (BISH)." According to our opinion, it better be:

DELISSEA OCCULTANS (St. John) Deg. & Deg., comb. nov.

Syn.: Cyanea occultans St. John. Additions to Cyanea (Lobeliaceae) of Oahu and Maui. Phytologia 45(2):143-145. 1981.

One of us having developed tachycardia in 1928, he no longer lets the precise status of pretty little flowers upset him. Of the two binomials may the reader take his pick. Both are correct, one according to the opinion of a "lumper" (excuse us, please), and the other according to that of two "splitters".

We believe Breynia disticha Forst. Char. t. 73. 1776, to approach the wild, New Caledonian species; while a horticultural taxon of original cultivation in the South Seas with leaves variegated with white deserves the new trivial name Breynia disticha var. nivosa (Bull) Deg. & Deg. (Syn. Phyllanthus nivosus Bull, Cat. 9. 1873, and W. G. Smith, Flor. Mag. N.S. t. 120.) The taxon with pink added to the already white variegated leaves and of mainly Caucasian horticultural origin we designate Breynia disticha var. nivosa forma roseopicta Deg. & Deg., while a taxon of similar origin but with purple in its leaves we designate B. disticha var. nivosa forma atropurpurea Deg. & Deg. (ab var. . . . . dist.)

ab var. . . . differt

A.

Vorkommen von Drosera anglica Huds in Hawaii und die die Samenverbreitung mancher DroseraArten in Hawaii und Europa

O & I Degener und Herm Ziegenspeck.

Der Hawaiisxhe Teil mit Unterstützung der National Science FoundationUSA

Vorläufige Mitteilung

Auf wenigen Mooren der Insel Kauai des HawaiiArchipels findet sich eine Drosera mit schmalen Blättern .Zuerst wurde sie von PICKERING & BRACKENRIDGE 1840 gefunden,aber erst 1845 von WILKES beschrieben. In den Torfproben aus der spätnacheiszeitlichen Wärmeperiode fand den kennzeichnenden Tetradenpollen SELLING 1947.Die Eingeborenen haben einen alten kennzeichnenden Namen mikanalo(Fliegenfalle,Nur auf den etwa 700 bis 1200m hohen Mooren allein dieser Insel war sie aufzufinden,ohne dass selbst auf sonst scheinbar geeigneten Stellen der ande Inseln dieses Archipeks anzutreffen sind.Ein besonders reicher Standort ist das Lehuamanaci(Metrosideros im Nebel)

Die ganze Gegend trieft von Regen 450-600 Zoll im Jahre.Gelegentlich kommt in dieser Hohe(1.180 m Frost vor.

Der Standort ist,wie der Name sagt, dicht mit Ohia Lehua(Metrosideros polymorpha var roten humila bestanden und prangt oft im Schmucke dieser grossen Blüten (Pompons) der Reisser.Häufig sind sie von einer Loranthacee(Korthasella cylindrina befallen.Von anderen Reissern erwähnen wir Vaccinien .

Dichte Bulte von Oreobolus furcatus geben dem Moore das Gepräge eines atlantischen Wollgrasmoores,welcher der hauptsächliche Torfbildner ist.Ebenfalls bultartig wächst die binsenartig aussehende Schizaea robusta,die lange Stiele und nur kleine wedelartige Sporangiophore aufgesetzt trägt.Alle diese Gewächse wie die beigemengten Carices,Gahnia und RynchosporaPanicumarten und Dechampsia zeigen "xeromorphen Bau",der SCHIMPER zur Aufstellung der Theorie der physiologischen Trockenheit verleitete.

Wir betonen den meist auf Kauai und seltener auf den HawaiiArchipel beschränkten Endemismus.Es fehlen auch nicht die auf Drepaniden angewiessenen krummschlundigen Lobeliaceae und Goodeniaceae,das Paradebeispiel von gegenseitiger Anpassung scharf endemischer Natur.Auch die sonstigen Phanerogamen sind streng endemisch.

Man musste daher auf den Gedanken kommen auch in der allein in dieser Vegetation gedeihenden Drosera nicht longifolia zu sehen, sondern irgendeine endemische Art. Jedoch alle Versuche tiefgreifendere Unterschiede aufzudecken misslangen. Die in dieser Gruppe so wertvollen Samenunterschiede wiesen völlig auf Drosera anglica Huds und zwar den grössersamigen Formen derselben.

Sphagnen finden sich an sich in Hawaii selten, auf diesem Standplatze fehlten sie völlig. Dafür jedoch sahen wir Leucophanaceae nach Art von Eriodictyon, das mit Schizaea Bivoi vergesellschaftet ist. Die Leucophanaceae haben den merkwürdigen Bau der europaeischen Leucobrya, der entfernt an Spagna erinnert, ohne jedoch auf dem eigentlichen Hochmoor zu wachsen.

Die grössere Menge sowohl aus Hawaii wie aus europäischen Mooren etc, die wir durch die Güte von MEBDMÜLLER, HEPP und BERTSCH erhielten und selber gesammelt hatten ermöglichten eine vergleichende Untersuchung der Benetzbarkeit.

Sowohl die Samen von Drosera rotundifolia wie auch die von Drosera anglica sind klein sägespanförmig und haben Flugmäntel. Infolge ihrer schweren Benetzbarkeit schwimmen sie zunächst auf der Oberfläche, dann nach natürlichen oder künstlichen Benetzen der Oberfläche der Samen oben unter der Wasser-Oberfläche. Sie gleichen hierin völlig den Samen der meisten Orchideen, vieler Ericaceae Pirolaceae und Monotropeae etc.

Die Drosera intermedia entbehrt der Flughülle, besitzt dafür bewachste Papillen, die ebenso wie die mit festanliegenden Schalen versehenen aber schwerbenetzbaren Samen von Orobanche. Diese schwimmen zunächst auf der Oberflächen, nach dem Benetzen sinken sie sofort unter wie die Sporen von Lycopodium, Psilotum. Schizaea Eusporangiaten Farnen, manchen Moosen, Bovista, Lycoperdon Geaster und Blaphomyces

Ein nach Benetzung in Wirkung tretender langsamer Kohäsionsmechanismus erweitert die Samenschale und sorgt für das Einsaugen von Flüssigkeit in den Flugmantel. Er eignet Drosera anglica genauso wie Ihren Analogen und bewirkt späteres Untersinken.

Die nach Einwirkung von Netzmitteln erfolgte Suspension aller beider Gruppen von sägespanförmigen Samen verliert damit nicht ihren lipoidophilen Charakter der Oberflächen und lässt sich mit Lipoidlösungsmitteln an der Grenzfläche flotieren

Das bewirken auch die flüssigen und halbflüssigen Fette und Vaselinen. Taucht man eine Feder in eine Lösung von Fett aus den Perzeldrüsen von Enten und lässt das Lösungsmittel abdunsten,so kann man durch Umrühren aus einer Suspension die Samen an die Feder heften.

Das ist offenbar auch in der Natur der Fall.Die auf den Lachen schwimmenden Samen und Sporen konnen so von Vögeln aufgenommen werden und zumal bei Zugvögeln auf nahe und weite Strecken verbreitet werden.Viek sicherer gelan gen sie so auf die geeigneten Standplätze ,als durch das Verwehen durch den Wind,w e meist angenommen wird.Da die Samenkapseln infolge von Arretier einrichtungen aus den engen Spalten ,die noch sich hygroskopisch erweitern und verengen ,allmählich die Samen abgeben,so ist auch ein Aufnehmen von die sen auf das Federkleid von Vögeln möglich

Im Falle von Kauai lässt sich nun nachweisen dass auf dem Lehuamanakoi ein Zugvögel herumstreicht der kolea (Pluvialis dominica fulva.Er brütet in der Arktik also Sibirien und Alaska und verlässt Ende Juli seine Brut plätze wo gerade die Drosera anglica fruchtet.Nach G C MUNRO geht seine Wanderung entlang der ostasiatischen Küste von Insel zu Insel auch auf die des Pacifik von Hawaii,wo sie August bis September eintreffen. Derkolea besucht Lagunen ,Küsten und zumal Hochmoore,um in den südlichsten Teil Neuseelands zu gelangen.

Auf dem Lehuamanakoi hat sie DEGENER seit 1922 beobachtet.Einer Elster ähn lich laufen sie schnell auf eine Spinne oder Insekt los .Da er von allen Zugvögeln auf Hawaii am häufigsten auf"Hochmoren"zu sehen istmkann man wohl mit grosser Wahrscheinlichkeit annehmen,dass der Kolea die Drosera anglica von ihrer nordischen Heimat nach Kauai importiert hat. Ohne Ein zelheiten zu lennen,hat bereits GUPPY 1906 den Verdacht der Verschleppung durch der Drosera durch Vögel ausgesprochen.Das kann noch nicht sehr lange her sein,sonst wäre hätte vermutlich eine Wandlung zu endemischen Formen auf Kauai stattgefunden.

Diese Verbreitungsart dürfte jedoch nicht auf die DroseraArten beschränkt sein sondern auch für andere Bewohner von Mooren,Heiden und Steppenheiden ebenso gelten wie für Gewächse im tiefen Walde an der Bodensch cht ,wo doch nur selten Winde hinkommen. Vermerk auf das Original.

Pteridium revolutum (Bl.) Nakai 76050

Pteris vittata L. 76096

Adiantum myriosorum Bak. 76074

Dryoathyrium henryi (Bak.) Ching 76106

Taxus chinensis (Pilger) Rehd. 76099

Carpinus fargesii Franch.76023

Quercus glandulifera Bl. var. brevipetiolata (A. DC.) Nakai 76013

Boehmeria gracilis C. H. Wright 76027

Elatostema stewardii Merr. 76102

Pilea notata C. H. Wright 76038

Poelygonum minor Huds. 76035

P. thunbergii S. et Z. 76030

Cucubalus baccifera L. 76094

Melandrium tatarinowii (Regel.) Tsui var. albiflora Franch. 76008

Euptelea pleiospermum HK. f. et Thoems. 76077

Anemone hupehensis Lemoine 76026

A. tomentosa (Max.) Pai 76019

Clematis argentilycida (Levl.) Wang 76056

Thalictrum thunbergii DC. 76015

Illicium henryi Diels 76069

Lindera fruticosa Hemsl. 76042

L. glauca (S. et Z.) Bl. 76078

Litsea ichangensis Gamble 76057

Macleaya microcarpa (Maxim.) Fedde 76053

Hydrangea strigosa Rehd. 76080

Philadelphus sericanthus Koehne 76045

Pittosporum illicioides Makaino 76055

Cotoneaster horizontalis Dcne. 76012

Kerria japonica (L.) DC. 76058

Malus hupehensis (Pamp.) Rehd. 76061

Neillia sinensis Oliv. 76048

Photinia beauverdiana Schneid. 76101

Pyracantha fortuneana (Maxim.) Li 76016

Rubus lambertianus Ser. var. glaber Hemsl. 76066

Spiraea japonica L. f. var. fortunei (Planch.) Rehd. 76015

Stranvaesia davidiana Dcne. 76037

Campylotropis ichangensis Schindl. 76070

Dalbergia hyeriana Prain ex Herms 76037

Desmodium podocarpum DC. subsp. oxyphyllum (DC.) Ohashi 76020

D. szechuenense (Craib) Schindl. 76098

Indigofera carlesii Craib 76071

Lespedeza cuneata (Dun. Cours.) G. Don 76018

L. formosa (Vog.) Koehne 76007

Pueraria lobata (Willd.) Ohwi 76009

Geranium sibiricum L. 76031

Zanthoxylum planispinum S. et Z. 76068

Ilex pernyi Franch. 76101

Celastrus angulatus Maxim. 76082

C. orbiculatus Thunb. 76089

Acer davidii Franch. 76076

Meliosma kirkii Hemsl. et Wils. 76024

M. veitchiorum Hemsl. 76033

Impatiens pterosepala Pritz. ex Diels 76039

Berchemia floribunda Brongn. 76011

Rhamnus crenata S. et Z. 76047

Vitis flexuosa Thunb. 76060

Hypericum attenuatum Choisy 76034

Alangium chinense (Lour.) Harms 76041

Epilobium cylindricum Don 76003

Nothopanax davidii (Franch.) Harms. 76044

Cornus walteri Wanger. 76088

Helwingia chinensis Batal. 76064

H. japonica (Thunb.) Dietr. var. hypoleuca Hemsl. 76067

Pterostyrax psiloshyllus Diels 76095

Ligustrum sinense Lour. 76062

Buddleja davidii Fr. 76006

Cynanchum auriculatum Royle ex Wight 76004

Cynoglossum zeylanicum (Vahl) Thunb. 76029

Callicarpa japonica Thunb. var. angustata Rehd. 76059

Clerodendron trichotomum Thunb. 76043

Rabdosia nervosa (Hemsl.) Wu et Li 76005

Melampyrum roseum Maxim. 76049

Lonicera gynochlamydea Hemsl. 76065

Sambucus chinensis Lindl. 76109

Viburnum betulifolium Batal. 76002

V. plicatum Thunb. f. tomentosum (Thunb.) Rehd. 76054

V. sympodiale Graebn. 76046

Weigela japonica Thunb. var. sinica (Rehd.) Bailey 76079

Patrinia villosa Juss. 76086

Dipsacus asper Wall. 76017

Gynostemma pentaphyllum (Thunb.) Makino 76107

Thladiantha nudiflora Hemsl. 76103

Anaphalis margaritacea (L.) Bth. var. japonica (Sch.-Bip.) Makino 76032

Anaphalis sinica Hance 76021

Artemisia deversa Diels 76091

Aster ageratoides Turcz. 76093

A. ageratoides Turcz. var. microanthus Ling 76108

Eupatorium chinense L. 76014

Leontopodium japonicum Miq. 76028

Ligularia veitchiana (Hemsl.) Grecnm. 76051

Oplismenus undulatifolius (Arduino) Roem. et Schult. 76072

Juncus setchuensis Buchen. var. effusoides Buchen. 76025

Tricyrtis pilosa Wall. 76075

Pyrrosia petiolosa (Christ) Ching 76100

Aconitum hemsleyanum Pritz. 76110

Clethra esquirolii Levl. 76036

Cacalia tangutica (Franch.) H.-M. 76022

Eupatorium heterophyllum DC. 76087

Symplocos paniculata (Thunb.) Miq. 31077

S. ernesti Dunn 31081

Ardisia japonica (Hornsted) Bl. 31035

2220 University Ave.,
Honolulu, T. H .
Nov. 5, 1935.

Editor, H onolulu Star-Bulletin:

The Female of the Species is More Deadly than the Male

The importation of potentially destructive or harmful birds is very wisely prohibited by Territorial Law. The birds of the Lewis collection belong to three categories as far as the interpretation of this law is concerned:

1. Species (parrots and relatives) that might become carriers of the disease psittacosis.
2. Species that might possibly escape from their cages at Kapiolani Park, breed and multiply, and enable their numerous progeny to eat for years to come the fruits and other crops that we prefer to eat ourselves.
3. Species that are, at present considered harmless by the Board of Agriculture and Forestry.

There is little question as to what should be done with members of Groups 1 and 3. But in the case of Group 2 we should guard against interpreting our wisely passed Territorial laws with unnecessary severity.

There seems little reason for barring the entry of gaudy male birds of Group 2 provided the ~~female~~ more sombre female of the species is banished from our shores - Kipling gave the reason. Even should the males escape from their cages, their inability to reproduce would limit the danger of their importation to the pecking of perhaps a few mangoes or papayas before they die of old age or become victims of ~~laid low by~~ the small boy's slingshot. With this point in mind may not the boss board amend its interpretation of the Law at its next meeting?

Dear Sirs:

Your Book-dealers' Weekly was forwarded to me to Honolulu from New York, hence the delay.

Under separate cover I am mailing you the two volumes to date constituting my Flora Hawaiensis or New Illustrated Flora of the Hawaiian Islands. These books must really be received jointly.

For the enclosed ~~sum~~ please advertise my 3 books in your Weekly in issue in which yours receive of my Flora to appear. I shall then observe what results I get and decide on whether I shall continue advertising ~~in~~ ~~the~~ ~~Islands~~ have advertised only in the Hawaiian Islands.

For balance of my Cheque

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Vorkommen von D r o s e r a a n g l i c a H u d s., in Hawaii und die Samenverbreitung mancher Drosera Arten in Hawaii und Europa (21.IV. 1956)

O. u. I. Degener und Hermann Ziegenspeck.

Ophioglossaceae

Protokoll zu

Ophioderma pendulum (L)End.

Material stammt vom Museum Buffon Paris Sandwichinseln 1844 Dalm Voyage M J Remi1851 /52

Zum Vergleiche des von Degener tgeschickten MaterialesDie Nebenzellen sind kleiner als die sonstige Epidermis Es sind in der Anlage 4 zum Rhombus gelagert Durch tangentale und radiale Teilung werden es bis 63tückDas Stoma ist von Copeland zunächst beschieben dann von Porsch in Phylogenie der Spaltöffnungen.Hydathoden und Wassergruben fehlen,aber an der Blattspitze findet man dünnwandige Zellgruppen,die vielleicht einen Transpirator in der Entfalt7ngszeit darstellen können. Eine Casparyscheide fehlt dem Bündel der Blatt lamina. Band XVI 30

Aus Protokollband XIV 148 Beiderseits finden sich einzelne sehr grosse Stomata Parallel den NervenDie Radiomicellierung und Anatagonistische Mic ist sehr gut zu sehen. Man erkennt deutlich ein Verjüngen der Verdickung an den Enden zum HantellumenAuffallend ist neben der Radionmicellierung der Verdickungen eine "Streifung " radialer Art,wie sie für Bowenia unter den Cycadaceae abgebildet und von uns gefunden ist.Der Bewegungsmechanismus ist eigenartig und die Gestalt ähnelt auch der von PsilotumDie Enden der Schliesszellen sind dünnwandig Deltaartig Die Verdickung auf dem Querschnitte ist oben stark innen dagegen schwach bis fast fehlend Nach innen ist der Spalt trichterartig ausgeweitet Das Kutinaussenhorn ist kräftig aber nich nach aussen gezogen.Helminthostachys hat ähnlichen Querschnitt.Die Grösse wechselt etwas und öfters ist der Umriss etwas deformiert(Mykotrop) 82-100.(108-116)µlang X 58-70-80µbreit

Protokoll Badnd XIX 151Die Nachuntersuchung nach Kieselkprpern und Verkieselung verlief negativ.Dafür jedoch entpuppt sich die Streifung bei genauer Forschung mit Phasenkontrast Gekreute Nikols am Besten mit Berek als eine Radiofilierung.Diese wurde photographiert.

Die Nachkontrolle von Verwandten ergab nicht bei allen Ophioglossumarten eine Radiofilierung so fehlze sie bei Ophioglossum crotalophoidesDagegen waren solche bei Botrychium Lunaria und Helminthostachys gekegentlich zu erkennen.Das galt auch für Ginkyo

Nach der Flora Havaiensis von Degener scheint diese Art mit der folgenden vielleicht identisch zum mindesten nahe verwandt

Ophioderma falcatum Degener

No Degener 20956

PanvewaForest Havai Epiphytisch ges von Amy Grennwell28Aug 1950Es ist nur ein schmales Bruchstück vom Grunde des Wedels.

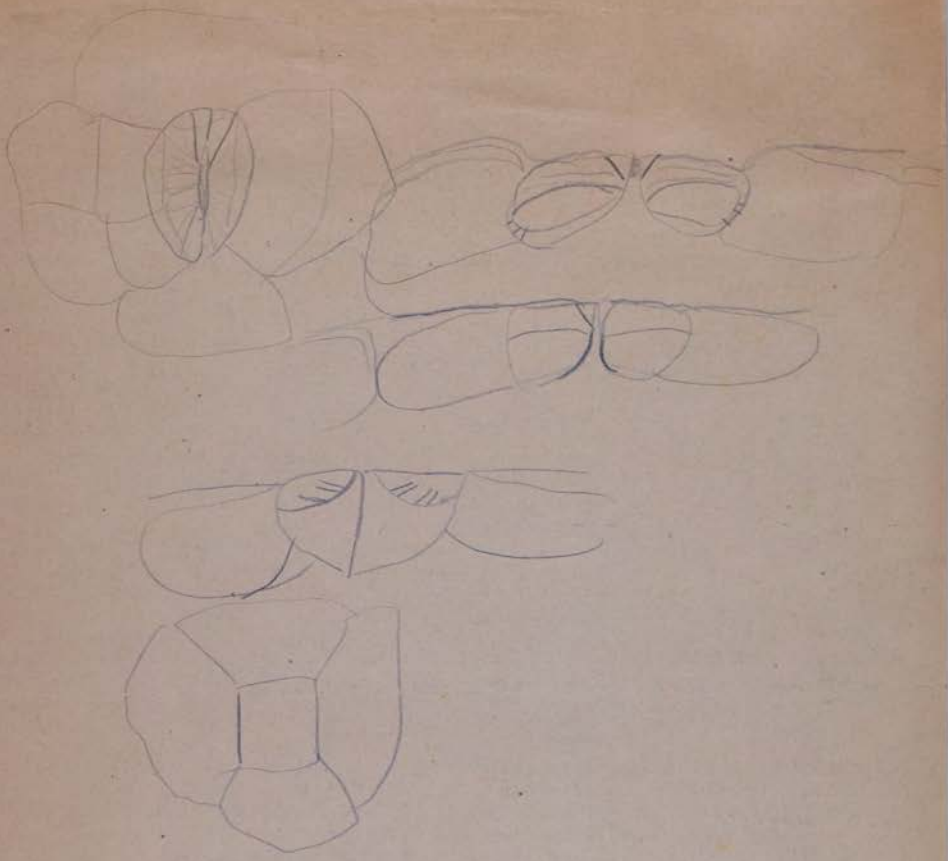
Phenolmilchsäure:In der Epidermis und im Blatte sind Einzelkristalle von Calcium Oxalat zu erkennen(in ogigerauch)Kieslkörper und Kieselmembranen fehlen.Mit dem gewöhnlichen Mikroskope kann man deutlich die Streifung erkennen Besser gelingt das mit den Phako und Polarosationsmikroskop-Die Blattteile wurden unmittelbar ohne jegliche Vorbehandlung (Eau de Javelle -) untersucht ,was von Wichtigkeit für die Radiofilierung ist.Die Aussenöffnug dew sTomas ist von einer grieseligen Masse (Wachs?) erfüllt-A f dem Blatte finden sich eigenartige Epiphyten fächerartiger Gestalt.

~~Die~~ Querschnitte in obigem Reagenze untersucht lassen die Fila auch in radialer Richtug liegend erkennen. An den dünnen Rückwanden finden sich Plasmodewmen gegen die Nebenzellen

Querschnitte in Chloralhydratglycerin nach Aufhellen.Wenn auch oben weniger,so fin den sich Spalten beiderseits in etwa gleicher Gestalt.Die Gestalt der Ep und der Stomata entspricht der der obigenAn manchen Stellen sind die Nebenzellen etwas nach oben gezogen und führen immer deutliche Aussengelenke Zumal gegen die Deltablase am Ende sind die Fila sehr deutlich zu erkennen.Die Verstopfung mit Wachs(?) ist deutlich zu sehen.Die Innenverdickung ist schwach Die

Flächenansicht:Die Stomata sind am Umfange gerne ezwas unter oder auch überwallt.Die Radiofilierung ist genau so zu sehen wie oben geschildertDie Nebenzellen sind ursprünglich in Rhombusstellung aber durch tangentiale und radiale Teilung auf (4)-5-6-(8)vermehrt Die antagonistische Micellierung ist sehr deutlich Gelegentlich findet sich ein Stomarudiment (96)-100-108-(120)µlang X72-80µbreit Die Einzelkristalle finden sich in der Epidermis Im koncentrischen Bündel besteht die Neigung zur Verlagerung des Hadroms nach unten.Das Bündel besitzt keine Parenchymscheide eine Casparyscheide fand ich nicht.

Nach dem mikroskopischem Bilde ist Ophioglossum pendulum mitOphioderma falcatum gleih



DIE FLORA DES CANTONATOLLS IM STILLEN OZEAN

Von O.Degener und W.Hatheway(Honolulu,Hawaii)

Mit Tafel III-V

Das Korallenatoll Canton, mitten im Stillen Ozean nahe dem Aequator (südl.Breite 2°49', westl.Länge 171° 43') gelegen, gehört geographisch zu den Phoenix- Inseln. Es hat die Form eines Schweineschinkens. Der Durchmesser beträgt etwa 8 Meilen, der Umkreis 22 Meilen. Das Land umrahmt die Lagune in einer Breite von 150 bis 1800 Fuss. Es ist stellenweise bis 20 Fuss hoch, wo die Sturzwellen Korallenblöcke, Bimsstein u. dgl.aufgeworfen haben. Die höchste gemessene Temperatur betrug 98°F (36.7°C), die niedrigste 71°F (21.7°C), die mittlere Jahrestemperatur ist 84°F (29°C). Nachts ist es angenehm kühl wegen des starken Ostwindes.

Der feste Boden des Atolls besteht aus Kalkstein und Sand, der von Meeresorganismen wie Korallen, Muscheln, Foraminiferen der Gattung BACULOGYPSINA und Algen gebildet ist. Auch etwas Guano und Humus findet sich sowie ab und zu Bimsstein, der von vulkanischen Gegenden durch das Meerwasser angeschwemmt wurde. Die ganze Insel ist von Meerwasser durchzogen, in der Oberschicht befindet sich etwas Frischwasser. Das Grundwasser senkt und hebt sich mit jeder Ebbe und Flut.

Die Verfasser haben im Jahre 1950 (Degener und sein Assistent Hatheway gemeinsam) und 1951 (Degener allein) Pflanzen auf Canton gesammelt. An Thallophyten kommen einige Algen und Pilze vor, die jedoch noch nicht studiert wurden. Flechten, Moose und Farns sind auf der Insel nie gefunden worden.

Folgende Angiospermen können als endemisch angesehen werden:

GRAMINEAE: DIGITARIA STENOTAPHRODES in unbeschriebenen Varietäten (Degener & Hatheway 21316-21318), ERAGROSTIS PAUPERA und WHITNEYI, die vielleicht identisch

early draft

~~FLOTSAM AND JETSAM OF CANTON ATOLL, SOUTH PACIFIC~~

by

Otte & Isa Degener, John V. Dennis & Charles R. Gunn

Pittsb

Canton is the most northern of eight low coral islands comprising the Phoenix Group. It is a Pacific Ocean atoll lying between latitude 2° 46' and 2° 52' S., and longitude 171° 37' and 171° 44' W. It fancifully resembles a pork chop in shape, is about eight miles long, and has its longer axis lying roughly from its narrower eastern end to its four miles wide western end. It consists of a rim 150 to 1,800 feet wide enclosing a shallow lagoon of about 25 square miles. The greatest elevation of the island is twenty feet.

The atoll was of little importance until Pan American World Airways began to use it as a refueling station in 1939 for aircraft on Honolulu-Auckland flights. As both Great Britain and the United States laid claim to this flat area, the controversy was amicably settled ~~in~~ April 6, 1939 by agreement to administer the atoll jointly as a condominium for fifty years and "thereafter until such time as it may be modified or terminated by mutual consent." With outbreak of World War II, Canton became the hub of Pacific air movement by the Military. In 1942 it was used for anti-submarine search and photographic reconnaissance missions, 1,143 Army personnel being stationed there; in 1943 it was the major base for the conquest of the Gilbert Islands from the Japanese. By 1950 commercial activity was at its zenith, with four major airlines involved and a resident force of about 300 American and British.

With continuous improvement in air transport enabling 'planes to fly ever longer distances non-stop, the importance of Canton as a stepping stone for refueling waned. The last schedules commercial stop was in 1959. That same year the National Aeronautics and Space Administration (NASA) selected Canton as Project Mercury Tracking Station Number 11, and a few years later until 1966 to support the astronauts in Projects Gemini. During 1968 the Government of American Samoa was permitted to salvage whatever it wanted from the deactivated installation. In 1970 the atoll became a Space and Missile Test Center, serviced by U.S., personel of which many were native of Samoa. In spite of

considerable United States activity, the "Pacific Islands Year Book" of January 1972 states that "Britain has not withdrawn from joint possession of Canton - - -." As it is unlikely for any ~~of the writers~~ civilians ever to visit Canton again for additional researches, it is time to publish this study in spite of some imperfections.

As Botanical Consultant for Canton Atoll for the Civil Aeronautics Administration (CAA), forerunner until 1958 of the Federal Aviation Administration (FAA), Otto Degener explored and worked on the atoll for a week in July 1950 and for six weeks in April-May 1951. He and Isa Degener then continued study of the atoll for about three weeks in February-March 1958. For additional information about the Unnatural History, the reader is advised to consult the Denver Museum of Natural History Museum Pictorial No. 10. It is Murphy, Niedrach & Bailey's "Canton Island," 1-78. 1954. Though this bulletin concentrates upon the avifauna, it gives a bibliography compiled by E. H. Bryan, Jr., of about seventy items published between 1862 and 1954. The present paper ends with a suppliment of ~~twelve~~ thirteen pertinent items.

Canton has been under scrutiny of many scientists practicing diverse disciplines. According to the entomologist van Zwaluwenburg (1942) on Canton: "Between December 1940 and February 1941 there were some weeks of strong westerly winds which attained a velocity of 55 knots. The effect of these prolonged gales on the normal ocean currents, though temporary, must have been considerable. Drift-borne seeds were absent or at least inconspicuous on the Canton beaches the year before, but by August they were a striking feature of the shore line everywhere. It is assumed that their presence is a result of the gales of the previous winter." He forthwith mentions Myristica sp., Entada scandens, Inocarpus edulis, Mucuna spp. (4), Caesalpinia crista, Canarium sp., Barringtonia speciosa, Terminalia catappa, Cerbera odollam, unidentified spp. (3), Aleurites moluccana, Pandanus sp., and viable Cocos. "Seeds of many of the species listed had sprouted after stranding. Between 35 and 50 coconut sprouts were estimated to be still present in September along the entire 27-mile perimeter of the island, but these were only a small fraction of the total number of coconuts cast up.

Some of the hazards attending the survival of seedling plants from drift seeds are obvious: hermit crabs (Coenobita olivieri Owen) [C. perlatus ✓] shred the husk of coconuts and eat out the contents of the sprouted nuts; flood tides drench many seedlings with sea water; in at least one case high water buried a sprouted palm deep in sand. So the complete failure of any of the above named plant species to become established on Canton in the past - - - is not surprising when, to the hazards already mentioned, are added the inevitable recurrent shortages of rain."

When the Degeners visited the island in the winter of 1957-58, they found on its beaches similarly great accumulations of floated debris, mostly wood, fruits and seeds reminiscent of the situation mentioned by van Zwaluwenburg as occurring seventeen years before. Such objects, often even with superficial scrutiny, can be identified to the genus; and, particularly ~~###~~ fruit and seeds, to the precise species. Characters are as definitive as are the finger prints of individual persons. To find out, however, from what species a puzzling, viable seed belongs, the Degeners planted a few in their Mokuleia Beach garden on Oahu, Hawaii. Germinating and growing lustily, such seeds give sufficient vegetative and even floral clues for their placement in the proper genus and even species (see Erythrina). Lack of sufficient space in the garden and sufficient time awaiting results is the ~~ing~~ are? frustrating bottleneck.

The Degeners collected chiefly along the north shore as many representative examples, mostly propagules, as the expense of shipping them home onto the museum permitted. Numbered voucher specimens have been deposited at the New York Botanical Garden (with unicates) and smaller collections to about a score of other institutions such as the University of Massachusetts, Berlin, Kew, Bishop Museum, Arnold Arboretum, Cornell, Geneva, Munich, Smithsonian, St. Louis, USDA and Vienna. Such specimens have been by this time in most cases so efficiently filed away taxonomically that it is impracticable to reassemble them to ascertain their herbarium numbers. The Degeners succeeded in identifying many of the disseminules themselves. Dr. R. Melville of Kew independently identified many of the numbers the Degeners had identified and, in addition, many unknown to them. They here acknowledge his very kind help. They

of Canton many years ago; Island Manager Edwin Gillaspy and Mrs. Gillaspy; and Mr. & Mrs. Albert Lincoln, well-informed residents and malacologists, for advice andor material aid.

Intrigued by Charles R. Gunn's article "Stranded Seeds and Fruits from the Southeastern Shore of Florida" appearing in the New York Botanical Garden Journal for March-April 1968, the Degeners dusted off their old notes, photographs and specimens. They then invited the author, and the Atlatic Ocean drift seed expert John V. Dennis, to join them in the present study. With a little poetic license the title of this article was chosen as it concerns flotsam, or material floating helterskelter on the surface of the ocean; and jetsam, the same material after it has been cast upon Canton's shore.

Because logs had housed shipworms of various genera (Banksia sp.; Martensia spp.: Teredo bensoni, clava, gregoryi, samoaensis) and some goose barnacles (Lepas anatifera), they collected nearly a hundred wood samples with a few deft strokes of a hatchet. These were shipped to the late Dr. Charles H. Edmondson for his studies of wood-fouling organisms, begun years ago under Navy auspices. Even logs of balsa, Ochroma pyramidale (Cav.) Urb., an American species, were found. These were conspicuous for dicotyledonous wood by being practically free of shipworms and entirely free of goose barnacles. We ascribe this freedom of organisms on floating balsa more to the remarkable lightness of the wood rather than to any other factor. Balsa wood practically floats on the ocean surface and, with the slightest breeze, the wet surface is lifted out of the water and exposed to the drying air. Hence this wood, as a whole, is simply too dry to sustain marine organisms.

In chopping drift logs for the pallets and shells, so necessary for the identification of shipworms, they came across several colonies of termites, such as Coptotermes formosana hitherto unrecorded from Canton. These insects appeared to have drifted to the atoll. It seems reasonable that wood borin insects can survive ocean transportation within a tree trunk as time is not always sufficient for it to get waterlogged through and through. Though not in the position to prove it ever happened, it is quite possible for a knothole in a tree to seal over and in the closed cavity within to house

gules of animals and plants: eggs, the aestivating or hibernating animals themselves, spores, seeds, fungus hyphae, etc. Eventually the tree decays, liberating the prisoners on virgin territory.

A drifted log, cast upon a sun-scorched beach and there decaying, will liberate any living propagules it may contain into such an unfavorable environment that very likely most of them will succumb. But another factor promoting survival and colonization not only for "knothole migrants" but for drift fruits and seeds enters the picture.

Living at the beach on northern Oahu, Hawaiian Islands, and having home and garden devastated by the tsunami or "tidal waves" of April 1, 1946 and March 9, 1957, the Degeners were overwhelmed by one truth. Tsunami are frequent and of enormous effect, pushing drift of all kinds a few feet to hundreds of feet inland from the inhospitable beach to often fertile humus soil and loam. Such action of tsunami is on a wholesale scale, entire coast lines being affected, usually totaling thousands of miles.

For some years after tsunami, 200 to 300 feet inland from the stands along the beach of the wild, endemic naupaka kai (Scaevola sericea var. fauriei (Levl.) Deg. & Deg.) and the exotic seagrape (Coccoloba uvifera (L.) L.), the Degeners eradicated seedlings of these two plants that continued to sprout from flower beds. Similarly, on the south shore of Oahu, some years after the tsunami of 1946, Mr. Walter Bayer showed the Degeners healthy plants of the locally rare endemic taxon of Colubrina asiatica (L.) Brongn/., that had sprouted from the elevated windrow of debris cast up in his garden.

If there is to be a choice between land bridges or knotholes for the otherwise unexplained distribution of land organisms on isolated islands, the Degeners choose knotholes. They realize that one such successful immigration of a species may not happen in 1,000 to 5,000 years. But what is that in duration of time for an island many hundred thousand or even several million years old?

Any one who has seen the hard-shelled eggs of geckos firmly glued in holes and crevices of coconut and other logs along the beach will have an explanation - perhaps the true one - for the wide distribution of such reptiles.

Islands surrounded by great deeps, of which the water is usually icy cold even in the tropics, are beyond reach of most nonswimming, aquatic organisms unless they have a pelagic stage of some duration in their life. If these do not reach the completely isolated island via floating logs or larger propaules, a rare but just as effective means of transportation may be available. In studying the beaches of Canton the Degeners have come across quantities of gray to almost black blocks of pumice, and occasionally the shells of the pearly nautilus and the cuttlebone of the octopus. A random glance at dark pumice and more careful inspection of pale nautilus and cuttlebone occasionally discloses the white of coral and the calcareous housing of marine worms. Such types, and many others, may well have reached Canton waters mature enough to reproduce their kind before being washed upon the beach to die.

Before dealing with fruits and seeds in detail, we wish to emphasize that electric light bulbs, garbage and other waste matter of Caucasian and Oriental Civilizations, so common to many beaches, are conspicuous by their absence about Canton. Outstanding artifacts were several outrigger canoes and a paddle of primitive manufacture. Residents claim that one canoe, definitely hollowed out with a stone adz, is of African origin. Study of a wood fragment, never collected, would have decided such claim.

Fruits and seeds along the north shore were deposited in a line usually a foot or less wide. This width represented the area to which the stronger waves at high tide have been able to land water borne fruits and seeds of various sizes, shapes, textures and weights. Such qualities induced a certain rough assorting. A coarsely textured seed, other factors being equal, anchors in the sand before a smooth one.

They are just bugs, but to us pathetic ones all the same. Just beyond where the strongest waves lap the beach, among foam, sand and coral blocks of various sizes, clumsily and weakly hop exhausted marine waterstriders (Halobates micans). They are black above, perhaps for desired warmth; pale bluish below to be camouflaged against attack by hungry fish fry looking upward from below. They are only a few millimeters long. Agile skaters on the surface film of ocean water, like the relatives on fresh water of American

brooks and ponds, they are helpless when thoroughly wetted during a storm or blown unsuspecting by the trade winds and swept by the breakers onto shore. They are out of their element and here they die. Though living on the vast expanse of the ocean, they are no more water creatures than are the frigate birds flying overhead. This insect, to survive as a race, must find a chance piece of driftwood, seed, pumice or even floating feather upon which to lay its eggs; the bird and sea turtle must find an atoll like Canton. These water striders, exposed to gale force winds like fruits and seeds, had been swept along the surface of the ocean to pile up on the beach.

Some biologists, finding for example the same species of land snail on a continent as well as on an oceanic island, postulate the former existence of a connecting land bridge. The snail's ancestors, they maintain, generation after generation peu á peu thus reached the future island. This may be true in certain cases, as with the tortoises of the Galapagoes. But if we are to explain the countless instances of disjunct distribution of animals by former land bridges, the ocean would show subaquatic mountain ranges like a network of rail and air transportation lines in a populous country. Submarine mapping does not show this to be true. For most cases, therefore, we must find another explanation for dispersal.

Due to a spell of rainy weather germination of more or less salt freed seeds was so successful that the beach showed a narrow, faint line of green extending for many miles, a condition unknown to any resident of the time. In this line of drift not a single Canton species was noticed, except Triumfetta procumbens and Cordia subcordata. As these fruits were wave worn, we believe them not of local origin.

The sea heart (Entada phaseoloides), with large expanded cotyledons, a few leaves and a slender stem stretching out vainly for a support to climb, were already beginning to suffer in February from the strong drying salt breeze. Not one became established. Thousands upon thousands of seedlings of the beach morning-glory (Ipomoea pes-caprae var. emarginata) with stiff, thick, green, deeply notched cotyledons horizontally akimbo, were being

daily eaten by "Bernard," the hermitcrab (Coenobita perlatus). Not one became established. Various Mucuna species were germinating, merely to fall prey to hungry hermitcrabs. Of the myriad viable seeds that braved the o - an for unkown weeks and months without succumbing before landing on Canton shores, we failed to see a single successful introduction. This atoll simply does not offer conditions fit for survival excepting for the moonflower (Calonyction tuba), lovevine (Cassytha filiformis) and the few other natives described in Bulletins 41 and 64. Probably Canton would not even furnish conditions for survival farther inland to which a tsunami might push such living drift.

Although there are a number of tropical strand and estuary plants whose disseminules have the ability to stay afloat for long periods, so Dennis and Gunn have found, the buoyancy factor is usually not constant within a spedies. The ability to float and the duration of flotation depend on physical properties of the disseminule, viz., the nature of the outer coat and the relative size of the buoyancy principle (usually a cavity of spongy - sue). Guppy (L917) conducted several flotation experiments. The results of one of these tests have been selected to illustrate buoyancy variation within a species. About 20% of the seeds of an Entada sank in sea water and 30% sank in fresh water. The seeds which sank possessed intercotyledonary cavities which were insufficient to buoy them. Those seeds which did float had a cavity-weight ratio which permitted them to float for years provided the seed coat remained intact.

Generally, fruits which have fully matured and dried prior to falling int sea water have a better buoyancy than have unripe fruits. In some cases the buoyancy is increased as fruit parts are eroded. The buoyancy of Hippomane mancinella is enhanced as the exocarp is lost. This may happen in or out of water.

Buoyancy classification, based on data accumulated by Dennis and Gunn, is as follows:

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Group I.-Buoyancy due to empty spaces within seed or fruit.

1. Seed.

   a. Embryo not filling seed coat, cotyledons usually concoluted or c crumpled (Many Convolvulaceae, Hibiscus, Pariti).

   b. Embryo filling seed coat with an intercotyledonary cavity between the flattenad cotyledons (Entada, Mucuna, many other Leguminosae).

2. Fruit.

   a. Cavity within a one-seeded fruit (Cocos, other Palmae (Arecaceae), Manicaria).

   b. Seeds do not float but fruits do because seeds do not fill fruits
   Is there no Pacific substitute for Hymenaea courbaril?

   c. Empty carpel(s) because of aborted seed(s) (Littoral Scaevola spp.).

   d. Empty cysts present (any Pacific substitute for Sacoglottis amazonica?)

Group II. Buoyancy due to "spongy" tissue within seeds (Canavalia, Dioclea, Erythrina, Sophora, Ximenia).

Group III. Buoyancy due to fibrous tissues in fruit or seed coat (Barringtonia, Cocos).

Group IV. Buoyancy due to superficial perforations that hold air but are too small for water to enter (Fruit [illegible] in [illegible] [illegible]!)

GRoup V. Buoyancy due to oily (   ) or starchy endosperm or embryo rather than "stony" one (   ). ?????????????

Intergradations between the different groups are frequent.

Aarhus, Adelaide, Ames, Amherst, Ann Arbor, Arcata, Athens, Auckland, Austin, Barcelona, B[illegible], Belem, Basel, Bergen, Berkeley, Berlin G., Berlin F., Bern, Bloomington, Bochum, Bordeaux, Bremen, Brisbane, Brno Museum, Brno Univ., Budapest, Cairns, Calcutta, Cambridge, Canberra, Caracas, Carbondale, Chiba, Christch., Colgate, Coimbra, College Station, Columbus, Dallas, Dublin, Durham, Edinburgh, Florence Mus., Fl. Erb. Trop., Frankfurt, Gainesville, Geneva, [illegible], Göttingen, Goteborg, Graz,

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PAGES FROM A NEW ILLUSTRATED FLORA OF THE HAWAIIAN ISLANDS

By

Otto Degener

In reading various floras, we note cases where different writers have ascribed different names to the very same plant. There are two reasons: (1) outright errors and (2) differences of opinion. Hillebrand called the common prickly-pear *Opuntia tuna* instead of *O. megacantha*; and our native poppy, the Mexican poppy. These are mistakes in identification. I described and named a new *Schiedea*, carelessly neglecting to add a Latin diagnosis. As this is contrary to new rules of nomenclature the proposed name, instead of standing for all time, is relegated to obscurity. This was an error in technique. Evaluating differences of opinion is more complex.

A floristic work in general, and especially for an imperfectly known region like Hawaii, is unfortunately not a precise account of the diverse species, varieties, and forms growing within a given geographical area. It is rather a treatise expressing the author's opinion as to the categories into which the plants of his region belong. As all taxonomists (writer and reader excepted) are, according to botanical jargon, either "lumpers" or "splitters", a regional flora by a "lumper" contains fewer species than one written by a "splitter". Their opinions simply differ regarding the interpretation of what species, varieties and forms should be. (Hence to quibble about whether a little-known Hawaiian plant should be considered a species or a variety is a pedantic waste of time, particularly when so many others on the verge of extinction can yet be collected before it is too late.) No contemporary worker is qualified to decide this question—his criticism would simply express one more opinion that might or might not come nearer the truth. When we keep in mind the steady advance of taxonomy since 1753, the almost ephemeral duration of opinions regarding the placing of plants into various categories is striking. How many of the species studied by Linnaeus remain in the genera to which he assigned them—the majority have fled as the (L.)'s, standing for the father of Systematic Botany, found in parentheses after plant names prove! Systematic Botany simply has not yet reached its ultimate goal of being an exact science like Mathematics.

The Flora Hawaiiensis, being in loose-leaf form, allows for the correction of errors by replacement of obsolete pages. It concentrates on illustrated descriptions, on the present writer's opinion regarding the plant's status and, in the form of synonymy, on the opinions of disagreeing other workers. The advanced, critical student can thus choose from the long list of synonymy the name he considers correct. Others had better follow the writer, who trusts that time will substantiate his findings.

LIGHT FROM EROS

Asteroid Expected to Give New Data to Science

LAST Thursday the asteroid Eros made its closest approach to the earth, at a distance of only a little more than 16,000,000 miles. Appearing as a star of the seventh magnitude, it is just too faint to be visible to the naked eye.

Astronomers have been watching this tiny fragment of matter, no larger than fifteen miles in diameter, for many months; for it forms one of the best means of calibrating the yardstick of the solar system. The distance from the earth to the sun is known to be approximately 92,870,000 miles, with an uncertainty of about 10,000 miles, according to the latest figures. It is that uncertainty that worries the astronomers, and in an effort to reduce it they are studying Eros.

From the motions of the planets and asteroids it is possible, with the aid of Newton's law of gravitation, to draw a map of the solar system in which all relative dimensions are exact. To convert this into a real model one must know the length, in miles, of at least one distance, and it is Eros that is supplying the measurement, for it comes closer to the earth than any other body in the planetary system except the moon.

Because of its small distance from us, the deviations of Eros from its path around the sun afford a means of weighing the earth and the sun relative to each other, which, in turn, furnishes an accurate means of measuring the sun's distance from the earth.

Another question that may find its solution in the present study of Eros is that of its variability in light. It has long been known that during a period of five hours, sixteen minutes, the asteroid becomes bright twice and dim twice, but sometimes the ratio of brightening is as three to one, while at other times only half that.

Direct determination of the diameter of Eros may become possible.

FAMILIE HENNEBERG

Friedrich Christian Ludwig Henneberg, geb. Braunschweig 1748-1812 seit 1808 Praefekt vom. Dep. der Oker, 1781 Legationssekretär, 1790 Privat-sekretär des Herzogs Karl Wilhelm Ferdinand von Braunschweig, Heiratoto 1781 Dorothea Elizabeth Thiess 1744-1820, Tochter des Kauffmanns Johann Christoph Thiess und seiner Gemahlin To der Horst. Deren Tochter Henriette Dorothea geb. 1783 heiratete 6/2/1806 den Bankier Heinrich Ludwig Löbbecke geboren zu Iserlohn 14/8/1778 gestorben zu Braunschweig 9/7/1852. Die ältere Tochter der beiden, Marie, geboren 26/2/1807 in Braunschweig gestorben 9/2/1891 heiratete Theodor Emmerich Karl Denike. Eine zweite Tochter, Etta, geboren 28/5. 1810 in Braunschweig gestorben 22/5/1889 heiratete 9/4/1833 Wilhelm Friedrich Eduard Degener 13/7/1804-7/12/1874. These Denikes were Mrs. William Degener's grandparents. These Degeners were Mr. William Degener's parents.

The first known ancestor was Bürgermeister Gerhard Löbbecke in Iserlohn. Westphalen in 1313 (Urkunde von 1310 im Kirchenspielarchiv daselbst)

FAMILIE KAEMPF

Am 18 Aug.1818 hat ein Joseph Kaempf (29 Jahre alt) Munionar der K.K. Garnisonsartillerie zu Innsbruck in Tirol, die Antonia Magdalene Zippel (23 Jahre Alt) in Wien, Tochter des Artillerieoberleutnant und Josepha Lindlau geheiratet. Diese hatten dann zwei Töchter und drei Söhne. (Barbara, verheiratete Knapp, hatte 2 Töchter, Antoienette, verhairatete Kuchinke (1 Tochter, Marie Hirsch von Kronenwerk) und zwei Söhne, Ludwig und Karl Kuchinka, beide als Feldmarshall-leutnant in Pension gegangen.

Die drei Söhne von Joseph Kaempf und Antonia Zippel waren Karl, als Hauptmann in Pension gegangen, Johann und Joseph. Joseph Johann Kaempf, am 20 Feb. 1833 in Budweis geboren (im Jahr 1890 in Pension gegangen als Oberst, vom Kaiser Franz Joseph mit dem Prädikat von Baldenstein geadelt) heiratete am 12 Aug. 1860 Luise Denike, Tochter des Gutsbesitzers Karl

Theodor Emerich Denike zu Kranichsfeld (damals Steiermark, jetzt Yugoslavien) und Marie Lübbecke. Kinder von Joseph Kaempf von Baldenstein und Louise Denike waren Etta Poeck von Heldenwald, Marie Degener, Lola Ahlemann, Ilona von Boeckmsnn, Karl, Robert, und Irene Smecchia. Die Kaempfs stammten aus der Schweiz und wanderten aus nach Osterreich.

FAMILIE DEGENER

Aus Braunschweig in Niedersachsen (Verlag für Sippenforschung und Wappenkunde. C. U. Starke, Görlitz). "Der Sippenname Degener geht zweifellos auf den Vornamen Degenhard zurück. Er kommt in der Stadt Braunschweig schon gegen Ende des Mittelalters vor. Jedoch ist das hier behandelte Geschlecht Degener erst seit Anfang des 17 Jahrhunderts ebd. nachweisbar. Vermutlich ist es aus einem Dorfe der Umgegend (etwa Wipshausen bei Peine, wo besonders viele Träger des Namens Degener gesessen haben zugezogen. Die ältesten ganz sicher festgestellten Sippen-Mitglieder zu Braunschweig erscheinen, ihrer ländlichen Herkumft entsprechend, als Kuhhirten verschiedner Weichbilder der Stadt. Heirich Degener (?gestorben 1708) Kuhhirt in der Altenwik, liess seinen Sohn 1688 Andreas Degener bei der sehr angesehenen Gilde der Wandschneider und Lakenmacher in der Neustadt als Lehrling einschreiben. Mit ihm setzte ein sehr rascher Aufstieg des Geschlechts ein. Schon in den Nächsten Geschlechterfolgen gelangte es vornehmlich durch Tuch und Wollhandel zu bedautendem Wohlstande. Die Enkel des Andreas Degener, nähmlich Johann Heinrich Degener, Carl Heinrich Degener und Johann Friedrich Degener beherschten den Wollhandel zu Braunschweig, ihre Firmen hatten Ruf in ganz Deutschland."

WIKSTROEMIA PERDITA DEG. & DEG., AN EXTINCT (?) ENDEMIC OF A PARADISE LOST BY EXOTIC PRIMATES

Otto & Isa Degener

The genus Wikstroemia of the Thymelaeaceae, as occurring in the Hawaiian Archipelago, was studied by Dr. Carl Johan Fredrik Skottsberg (12/1/80-6/14/63) of Göteborg, Sweden, in the field in 1922, 1926, 1938 and 1948. His early studies were continued in great detail with the loan from about thirty institutions of over 600 historical numbers of which many have been exterminated in this Bulldozer Age of Biotic Destruction. He recognized 38 named taxa before his death; the major part of his study had ended less than a year before, as his letter indicates.

Skottsberg's handwritten manuscript was completed and posthumously published by Bo Peterson of the "Botaniska Museet, Göteborgs Universitet" who, according to his letter dated March 17, 1973, plans "to be able to publish some additions - - - and to make up a key for the species." We corrected the almost perfect English text, paying particular attention to the confused spelling of Hawaiian names before publication of the monograph as "The Genus Wikstroemia Engl. in the Hawaiian Islands." Acta Regiae Societatis Scientiarum et Litterarum Gothoburgensis. Bot. 1:1-166. 1972.

Driving in our jeep last January along the coastal road, Hawaii Volcanoes National Park, toward Wahaula heiau (temple) in search of ephemeral, halophytic Panicum species, we were amazed to see mauka (mountainward) fresh gashes in an endemic jungle never penetrated by botanists before. Reaching there late in the afternoon, we discovered the gashes represented a cleanly bulldozed grid evidently for paved roads in preparation for the sale of house lots. With all workmen gone for the day, we searched for possible botanical prizes. Among the bruised tangle of rare and even unknown taxa, such as a form of maile, Alyxia oliviformis, newly described under an archaic specific name in Phytologia 32:377-385. 1975, we unearthed a single graceful akia lying uprooted on the ground. Even though the butting of the bulldozer had knocked off most of its nocturnal flowers, we saved many of the twigs for museums of the world. We can only wonder what intricate chemicals this plant could synthesize - a plant of a genus cherished for its unique qualities in heathen days for stupefying and catching fish, and for eliminating hated enemies. Even though we failed to find a pistillate specimen, we here name and describe this single akia tree thus far known to us as:

WIKSTROEMIA PERDITA Deg. & Deg., sp. nov. Planta mascula solum cognita: Arbor usque 5 m. alta, glabrata; ramulis gracilibus; inter-

Saro, Sweden, July 30, 1962

My dear Degener,

Thanks very much for the clipping and for the new Flora leaves. The hunting program is a scandal and I cannot understand that it didn't meet with crushing resistance from the conservation people in U.S.A. Mind you, Hawaii is a state now and nothing like this brutality would pass in any other state.

Among the additions to the Flora were two new Canavalias. I see that you have distributed material to a number of herbaria, all perhaps not very important and I am sorry that you came not to think of Stockholm, where I have tried to build up a representative Hawaiian collection! Lots of paramount things are still missing.

Yesterday I finished the analysis of the last Wikstroemias you sent me. As I told you I cannot handle any more now, as I have to get the MS ready.

Best wishes
As ever
Skottsberg

nodis usque 5 cm. longis. Petiolus 5-10 mm. longus; lamina lanceolata, 40-100 mm. longa, 15-25 mm. lata; basi obtusata; apice acuminata. Rhachis 3-5 mm. longa. Flores strigosi; tubus 44 mm. longus; lobi externi 1.5 mm, interni 1 mm. Pistillodium 1 mm. longum; ovario ½ base nudo, ½ apice densiusculo-setoso.

Staminate plant (pistillate presently unknown) a slender glabrate strict openly twiggy tree 5 meters tall, with 4 cm. thick trunk and smooth reddish brown bark. Leaves distant, in bud antrorsely yellow-puberulent but soon glabrous or nearly so; petiole thin, 5-10 mm. long; blade chartaceous, lanceolate, 4-10 cm. long, 13-25 mm. wide, entire, green and with narrow impressed midrib above, pale green with somewhat salient midrib and prominent veins beneath, acute to acuminate at apex, broadly obtuse at base. Inflorescence long marcescent; peduncle barely 1 mm. thick, antrorsely yellowish puberulent as is rachis, straight but in age retrorsely curved, 2-4 to very rarely 10 mm. long; rachis 1.5 mm. thick, 3-5 to rarely 7 mm. long, unbranched, straight or nearly so, with 25-75 thick minute pedicels from which all nocturnal flowers have been shed except a terminal cluster of 2-5 open ones and up to 20 in various stages of immaturity. Flowers greenish yellow, densely puberulent with antrorse yellowish hair without but glabrous within; tube 4 mm. long; lobes spreading, suborbicular, irregularly crenulate, the outer two 1.5 mm. long and almost as wide but the inner two 1 mm. long and as wide. Stamens with outer pair of oblong anthers extending to apex of tube, inner pair separated by half an anther length below. Aborted pistil 1 mm. long, clavate, lower half glabrous, upper half densely beset with stiff antrorse hair. Hypogynous scales 2, one third length of pistil, ligulate, at apex somewhat acute and entire or somewhat truncate and emarginate.

Type Locality: Known only from "Deg. & Deg. 33,680. (Single staminate 5 meter tree.) *Kalama mauka just beyond Nat. Park Boundary NE of Wahaula, Puna, Hawaii. Bulldored Metrosideros forest at 1,300 feet. Jan. 23, 1976." Holotype at New York; isotypes widely distributed.

Before the Polynesians discovered the Hawaiian Archipelago several thousand years ago (Phytologia 29:242-246. 1974.), we estimated the endemic Angiosperm flora to have numbered about 50,000 well-recognizable taxa; by the time Capt. Cook rediscovered them in 1778 the endemics had declined to about half that number. With the advent of the bulldozer and the unwitting introduction of exotics, animals as well as plants, the extermination of our endemic plants and the endemic animals dependent upon them for food and shelter is progressing at frightful speed.

*The orthography was corrected to "Pulana" on all labels before distribution.

Not copyrighted. The more copies you xerox & distribute among the interested, the better we hope will be our joint attempt to save World Treasures in Hawaii from extinction. ~~from extinction.~~

O. v. 9. 3.

TO WHOM IT MAY CONCERN

O. v 9. 2. Rayward

Regarding Kahauale'a Geothermal Project

Hunt

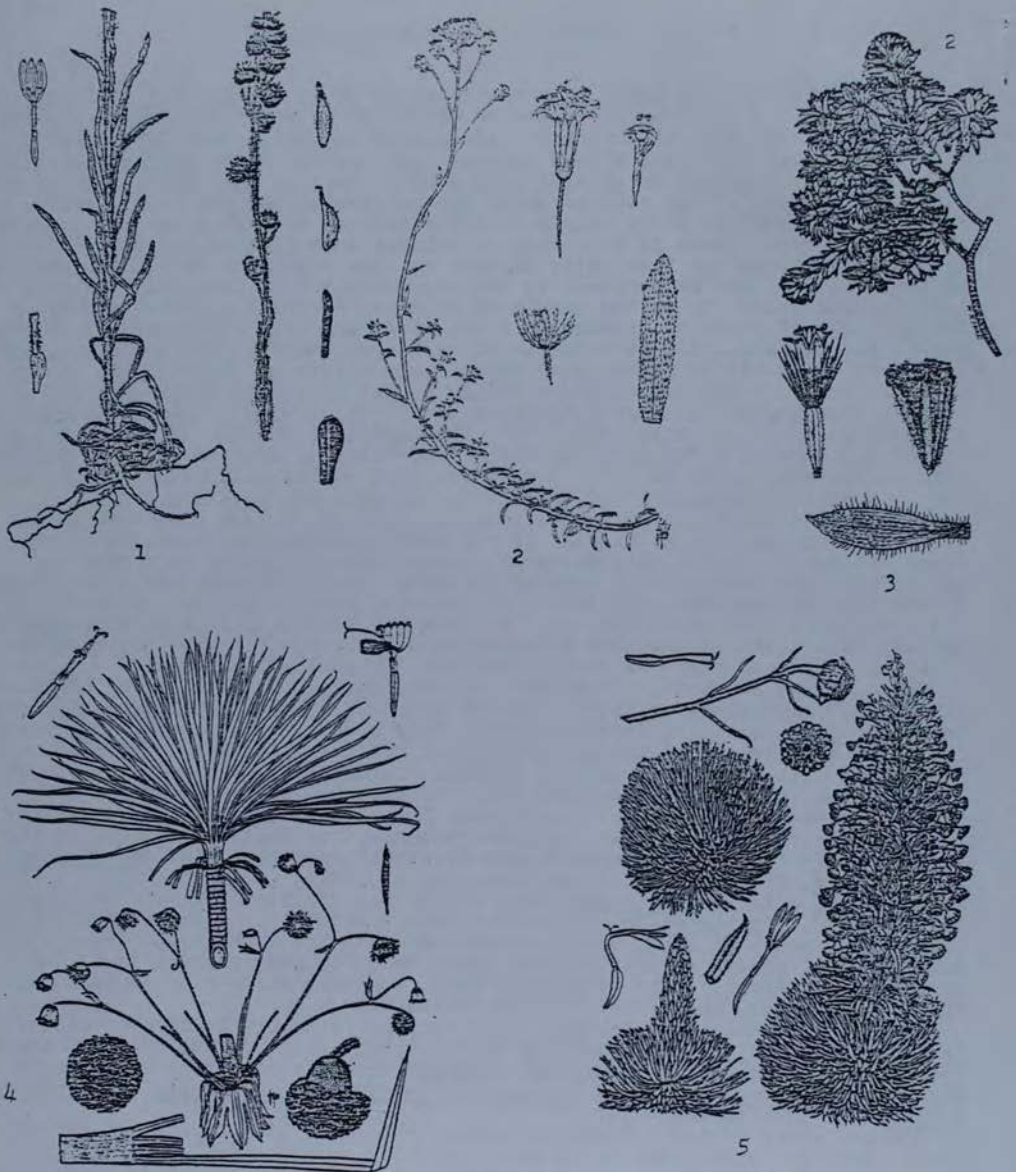
The Hawaiian Islands arose from the ocean in round numbers 100 million years ago from a "hot spot" belching magma or "lava" about where the Island of Hawaii is growing today. Some of the first land masses to appear were Kure Island, Pearl and Hermes Reefs and Midway Island. They reached their present position about half way to Japan by sliding with a huge crust of rock on top of peanut-butter soft magma at the rate of about two to five inches per year, perhaps evan faster initially. About thirty to fifty islands erupted later at intervals at the same spot. There is no reason to believe such islands did not emulate in size and elevation the five major islands man now populates in ever-increasing numbers. We must not be confused by the barrenness and smallness of the more distant islands today. It is the result of no more increment of lava to make up for millions of years of erosion by rain, wind, and less effectively by earthquakes and tsunamis. All were bombarded with eggs and cysts of animals as well as spores and seeds of plants ever since their origin by their flying in the wind, floating on the water, and sticking to the soiled feathers and legs of birds or undigested in their intestines until voided with a useful contribution of manure. Almost all died, but a very few landed on ground satisfactory for living and forming a "dynasty" of their own. With millions of years available, this influx was enough to cover the barren lava wastes with plants which, in turn, supported "dynasties" of animals to the present. (See map.)

The earliest animals, perhaps landsnails in an overgrown knot hole of a driftwood log, and sticky "seeds" of the California tarweed ancestor or the seeds of some primitive southwestern hibiscus made the round trip from an early "hot spot" island with frequent stopovers on islands of our archipelago toward its northwestern end. Those that tarried petered out as the result of their island's continuous erosion. But some few emigrated in erratic stages all the way back again to the more modern islands arising from the "hot spot" many millions of years after the early ancestors had started the jaunt.

The earliest successful immigrants to the Hawaiian Islands on for example Kure, Pearl and Hermes or Midway had the greatest number of millions of years to evolve into something different from their ancestors, influenced by genetic isolation and the stimulation of growing at different times on different islands perhaps in salt bogs, deserts, dry forests, rainforests, cinder cones, in heat or cold, etc., etc. Most succumbed over the ages but about thirty to fifty kinds of Flowering Plants or Phanerogams, for instance, today are so different from their ancestors that they are recognized as distinct genera. In the case of Madia (fig. 1) or perhaps more precisely something like Adenothamnus or Hemizonia, it developed in the presently surviving genera Railliardia (fig. 2), Dubautia (fig. 3), Wilkesia (fig. 4) and the truly magnificent Argyroxiphium (fig. 5). Argyroxiphium, if you have not guessed it, is the famous silversword genus to which about a half dozen species exist on Maui and Hawaii. About an equal number of less silvery taxa, some not yet properly described for naming scientifically, are endemic to Maui. Somewhat subdued in appearance, they are known as "greenswords" in the vernacular.

The other example that fascinates us so intellectually is more involved: The Lobelia Family is characterized almost always with bearing curved flowers. The one endemic genus Brighamia has straight flowers; but the endemic genera Clermontia, Cyanea, Delissea, Galeatella, Neowimmeria, Rollandia and Trematolobelia all have curved ones.

Whether early emigrant birds had straight or more likely somewhat curved beaks, eons ago birds came and evolved into the endemic Family Drepanididae or Honeycreepers. This consisted of twentytwo endemic species with about fifty subordinate taxa until relatively recent times. For a bird with a straight beak to sip nectar from the inside bottom of a curved flower is far from ef-



Figs., 1, Madia, tarweed; 2, Railliardia, kupaoa; 3, Dubautia, naenae; 4, Wilkesia, iliau; 5, Argyroxiphium, ahinahina, the silversword.

ficient. Hence over millions of years, evolution perfected the curves of beak (fig. 6) and flower (fig. 7) to fit each other like a hand in a glove. Birds with the most efficient beak presumably gained more food to breed more successfully and to bequeath their beak type to their offspring. Moreover, the lobelia genera which catered best to such birds were most efficiently pollinated and hence tended to produce the most seeds to germinate into plants having the same good or even better flower shape. Inferior ones tended to die out.

The end of this story is truly amazing. Surrounded by birds with curved beaks, a typically star-shaped hibiscus flower evidently was not very popular and hence failed to be often pollinated to produce seed. Thanks to the working of evolution over millions of years the lucky offspring of the original hibiscus immigrant perfected a flower with petals rolled lengthwise together into a curve to fit the beak of the nectar probers. Being so different, the five species known from Hawaii, Maui, Lanai and Kauai constitute the extremely rare genus Hibiscadelphus (fig. 8).

We two are convinced after concentrating full time ninety years on the flora of the Hawaiian Islands and publishing nine books and numerous articles about it - the kane writer was first Naturalist of Hawaii National Park in 1929 and we are now residing in Volcano - the Hawaiian Islands even for conspicuous organisms like the flowering Plants are crowded with still unrecognized endemic species, varieties and forms. Other (except for perhaps mollusks, ferns and mosses) less highly evolved organisms are practically unknown to this day. How many fungi capable of furnishing new antibiotics, and how many limu or algae secreting anticancer chemicals are we blindly destroying forever?

Puna and Kau Districts are no exception in harboring organisms known nowhere else. Due to the direct and indirect action of Man, the lowlands of Puna have been badly mauled so far as endemic animals and plants are concerned. The baneful influence, we feel, of action by the proposed Kahauale'a Geothermal Project, if properly confined to well below 1,000 feet elevation to where exotic weeds, sugarcane, papaya, pineapple and cattle have already wiped out most of the delicate endemics; would not be such a disaster. But the disaster would progress geometrically with increase in elevation. Near Hawaii Volcanoes National Park - Watt's the matter with apparently somnolent National Park Service executives in Washington? - the area would lose the wealth of its fascinating endemics. How many lucratively spending locals and foreign tourists would continue to swarm there except for occasional volcanic outbursts? We would sell our Volcano village property to the highest bidder.

To limit Man's geothermal activity to the lowlands, a compromise in favor of its advocates, has become outdated because of the increased human habitations in the vicinity. Hence to gain power thus, we are convinced, should be abandoned in favor of the less destructive and "cleaner" method briefly called "OTEC" (Ocean Thermal Energy Conversion). Look into the relatively harmless method of utilizing the differences in temperature of the Pacific at considerable depths and near the surface in relationship to ammonia, please. To us it is convincing.

We are disinclined to quarrel, feeling that there are many ways to reach the summit of a mountain. Thus whether present "Civilized Man" is a sincere polytheist, monotheist or, as we are, atheists, to exterminate endemic animal and plant kinds whether created supernaturally by Almighty God by fiat or over a period of many million to many thousand years by the interaction of Laws of Nature is SACRILIGIOUS and BLASPHEMOUS!

The sin of annihilating Sacred Creations is hardly valid for most of us because of our present ignorance of what is Right and wrong. The majority in the Islands and elsewhere just never knew better. The present human race differs as much from the superior men and women following us eons hence as does the ancient tarweed from its present offspring, the glorious silversword! For Doubting Thomasses concerning the above, avoid being self conscious for a moment. Note what normal human heads look like untouched by clippers, scissors and razors - how ornamental they would be stuffed and hanging on the dining room wall? - ; remember your bare looks in a mirror; admire the slightly mangey appearnace of furred sunbathers disporting along Hawaii's beaches; listen on the Radio and TV to adolescents howl and scream innate mating calls less interesting than those of coyotes on a moonlit prairie; read in the newspapers about wholesale atrocities committed by mature men imbued by the mob spirit on defenseless men, women and children; and the frequency of crime committed by individuals. Next saunter to a Zoo and observe the good natured chimpanzee, gorilla and orangutan, true blood brothers to us according to recent medical blood tests. Of these four groups, I consider myself and my kind of Primate truly the prime ape in viciousness. But why remain so? I am convinced the "silversword man" of the Future will approve "tarweed man's" attempt to conserve the biotic distinctness and wealth of Hawaii Nei. Why not join us in this endeavor?

DRS. OTTO & ISA DEGENER
P. O. Box 154
Volcano, Hawaii 96785, U.S.A.
Jan. 1983

Fig. 7, Clermontia, ohawai

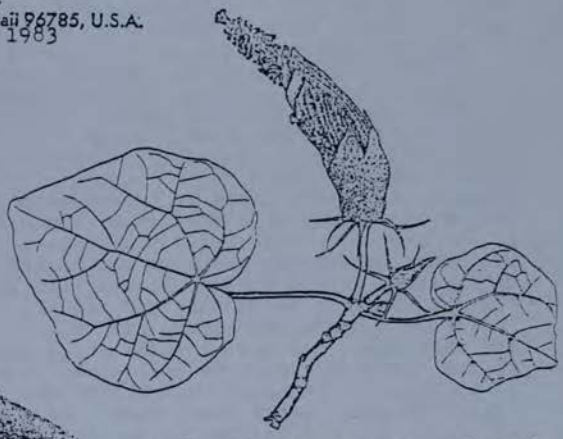


Fig. 8, Hibiscadelphus, haukuaiwi

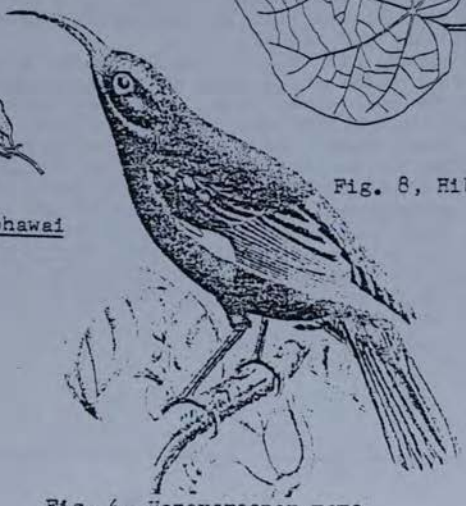


Fig. 6, Honeycreeper mamo

PANDANUS TECTORIUS Again and DELISSEA Anew

Drs. Otto & Isa Degener

After one of us has lived in the Hawaiian Islands since 1922 and the other since 1953 and have concentrated on the flora full time for a total of 90 years in round numbers, we are rather timid. We lack confidence in the result of studies of botanists, including ourselves, particularly concerning the scientific naming of plants in extremely complicated Hawaii Nei. Nor surprizingly as it may seem do we feel that newer publications concerning the naming of plants necessarily are always an improvement over the names that have been proposed in older publications. Moreover, repeating previous "sermons", we do not consider any scientific plant names of much importance unless the author (or authors) of each name is appended.

Regarding the hala of Hawaii Nei and its trivial variations, Dr. Benjamin C. "Skip" Stone (Notes from Waimea Arboretum & Bot. Gard. 8(2):4-10. Dec. 1981.) makes much of the fact that "The Degeners, however, have unfortunately made an error in writing the name as a new combination - - - ; thus the whole name, with authors, according to the Degeners, should be written as follows: Pandanus tectorius (J.P. du Roi) Deg. & Deg. But this is incorrect, for the simple reason that the species was originally called, i.e. ascribed to, the genus Pandanus. No combination is needed, or for that matter, possible. The correct name for the species, therefore is: Pandanus tectorius J.P. du Roi as 'Z'."

As we Degeners understand it, no one ever put the name of the taxon in print except one of the Degeners' calabash cousin, namely the Brunswick Court physician - all worked with plants - Johann Philip du Roi (6/2/1741-12/8/1785). Please note Stone mispppelled the middle name, one of two "p"s often denoting whether the babe had been properly baptized.) As du Roi signed his article "Z" in the German periodical Der Naturforscher 4: 240f. 1774, of which he was no editor, we Degeners replaced the ambiguous "Z" with "J.P. du Roi". Stone does not recognize this as a new combination, though we believe lexicographer Noah Webster (1758-1843) would do so. In short, we personally are still convinced we are correct in the use of P. tectorius (J.P. du Roi) Deg. & Deg., a favorable prejudice common to most individuals regarding their assertions.

We acknowledge that Drs. St. John and Stone, both known to us personally and by the publications available to us in our small, very own library on Oahu's North Shore, are the present World experts on the genus Pandanus. The former in his useful "List & Summary Fl. Pl Haw. Islands, page 15, 1973 lists as native, if not endemic, to the Hawaiian Islands:

1. Pandanus chamissonis Gaud., 1841.
2. P. douglasii Gaud., 1841.
3. P. menziesii Gaud., 1841.
4. P. odoratissimus L.f., s.s., 1781.
5. P. odoratissimus var. levigatus Mart., 1930.
6. P. odoratissimus var. oahuensis Mart., 1930.
7. P. tectorius var. sandvicensis Warb., 1900.

On the contrary to the above, acknowledged expert Dr. Stone, whose many Pandanus publications we lack, states on page 8 in the December 1981 Notes that "Some authors (e.g. Dr. St. John) prefer to regard the species as of very restricted distribution indeed, St. John does not regard the name as validly published - - - ." Stone differs also with St. John in considering 1. P. chamissonis, 2. P. douglasii and 3. P. menziesii as "illegitimate". Furthermore, though St. John recognizes 4. P. odoratissimus L.f., s.s., and 5. P. odoratissimus var. levigatus and 6. P. odoratissimus var. oahuensis, Stone considers them merely varieties of P. tectorius.

Do the two World experts agree to disagree with each other? Read Pac. Sci. 33(4): 397. 1979 and judge for yourselves: According to St. John "Stone (1967:242), thinking that P. tectorius legally dated from 1900, states that the Hawaiian P. Douglasii Gaud. (1841) occurs in Tahiti and is an available name. The writer is aware of Stone's lumping of taxa with different morphology, from remote areas into a single unit. Having had Stone as a graduate student and assistant for 3 years, and having followed his studies and publications since then, the author has a good idea of Stone's taxonomy. He can oo-

serve differences and resemblances but his judgment and his conclusions are of a different order. Half the time the writer cannot agree with Stone's results, and particularly in large and complicated problems, can seldom agree with him." Furthermore St. John remarks on page 400 and 401: "Depending solely on his criteria of the fleshy shoulders and large white spines, Stone (1967:237), in his eagerness for lumping, has reduced to the synonymy of Pandanus odoratissimus the following sum of species described by the writer: from Malaya, 8; from Anamba Islands, 1; from Vietnam, 9; from Hong Kong, 1; and from the Maldive Islands, 4 - - - His action seems based on prejudice, not on scientific judgment."

With obvious squabbling about the standing of taxa and their naming, we recognize that every scientific name published is correct not necessarily according to facts, but according to the opinion of the particular author or authors involved. Hence it is absolutely necessary to cite such authors. We personally then try to review the arguments and consider the standing or reputation of authors involved before we choose just whom to follow. Readers should choose for themselves whether they prefer for our common hala the binomial P. tectorius (J.P. du Roi) Deg. & Deg., or some other name proposed by some other squabbler. "But", as we have printed elsewhere before, "who knows what botanists 1,000 years hence will do?" With this in mind, the local Flora we have been publishing during the last half Century consists of illustrated, single sheets. As opinions may change hopefully for the better, even perhaps ours concerning the hala, they are bound loose leaf. Hence as the opinion regarding a taxon changes and funds are available, the sheet can be readily removed and replaced with the newer version. By this method, the Flora should improve as the Science of Botany does.

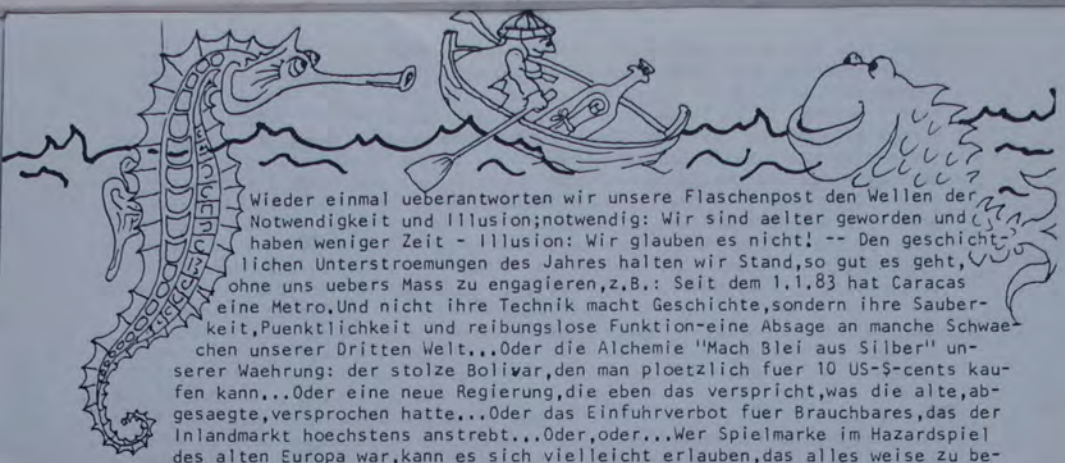
Doubting, as mentioned above, that all modern publications are superior to the old, our opinion upholding the genus Delissea according to the judgment of Gaudichaud who established it in 1826 stands. He named it for the physician-apothecary A.M. Delisse, a naturalist of the French 1800-1804 expedition to Australia. In the use of Delissea, among many others, we are in agreement with such writers as William Hillebrand who in late life studied under Asa Gray at Harvard and in 1888 posthumously had his Flora of the Hawaiian Islands published. He devoted pages 248-251 to the genus. Others that come to mind are Baillon; Bentham & Hooker; A. deCandolle; Endlicher; Engler; A. Gray; Herbst; Léveillé; H. Mann, Jr.,; Neal; Presl; Skottsberg; Rock; Wawra; and Wimmer.

Sheepishly following the majority we, considered "splitters" because we emphasize the importance of differences in plants by "lumpers" who emphasize the importance of likenesses, here alter the scientific name of a member of the Lobeliaceae. It bears the legend "Hawaiian Islands, Oahu Island, Kaaawa, Hidden Valley, moist river bed, under caopy of Aleurites and Pisonia, with Athyrium, 457 m (1,500 ft.) alt., Nov. 2, 1980, J. Obata a D. Palmer 433 (BISH)." According to our opinion, it better be:

DELISSEA OCCULTANS (St. John) Deg. & Deg., comb. nov.

Syn.: Cyanea occultans St. John. Additions to Cyanea (Lobeliaceae) of Oahu and Maui. Phytologia 45(2):143-145. 1981.

One of us having developed tachycardia in 1928, he no longer lets the precise status of pretty little flowers upset him. Of the two binomials may the reader take his pick. Both are correct, one according to the opinion of a "lumper" (excuse us, please), and the other according to that of two "splitters".



Wieder einmal ueberantworten wir unsere Flaschenpost den Wellen der Notwendigkeit und Illusion;notwendig: Wir sind aelter geworden und haben weniger Zeit - Illusion: Wir glauben es nicht! -- Den geschichtlichen Unterstroemungen des Jahres halten wir Stand,so gut es geht, ohne uns uebers Mass zu engagieren,z.B.: Seit dem 1.1.83 hat Caracas eine Metro.Und nicht ihre Technik macht Geschichte,sondern ihre Sauberkeit,Puenktlichkeit und reibungslose Funktion-eine Absage an manche Schwaechen unserer Dritten Welt...Oder die Alchemie "Mach Blei aus Silber" unserer Waehrung: der stolze Bolivar,den man ploetzlich fuer 10 US-$-cents kaufen kann...Oder eine neue Regierung,die eben das verspricht,was die alte,abgesaegte,versprochen hatte...Oder das Einfuhrverbot fuer Brauchbares,das der Inlandmarkt hoechstens anstrebt...Oder,oder...Wer Spielmarke im Hazardspiel des alten Europa war,kann es sich vielleicht erlauben,das alles weise zu betrachten;fuer Christine (Sprachreisen ins Ausland) und Juergen (Import engl. und deutscher Buecher u.Zeitschriften) aber bedeutet es den Kampf um die wirtschaftliche Existenz.- Nun ja - schalten wir das Zentrifugale ab - schon schwingt der Schwerpunkt des "Wir" und "Ich" im Wind der Zeit in alle Himmelsrichtungen.Sylvester wird hier mit ungeheurem Aufwand an Krach gefeiert, an dem selbst die uns benachbarte Feuerwehr teilhat:sie laesst alle ihr nur moeglichen Signale los - sonst haetten wir sicher verschlafen!-Am 12.1. ueberreichte mir der oesterreichische Botschafter das bereits im Vorjahr verliehene (schriftlich) "Ehrenkreuz fuer Kunst und Wissenschaft",erster Klasse! Mich freute besonders das Woertchen "und" - haben mir doch oft die Botaniker den Schriftsteller,die Verleger und Lektoren den Botaniker uebelgenommen! Ende Jaenner bekamen wir 4 neue Hausgenossen-Papageien,darunter einen afrikanischen Jako,der uns seither die schoensten Melodien vorpfeift.Ein weiterer Gluecksfall,der nur einem kaufmaennischen Idioten gelingen kann:Gerade drei Tage vor der Waehrungskatastrophe machte ich - allerdings gestupft von Christine - die Anzahlung auf mein neues Auto - das 4 Tage spaeter das Doppelte kostete!!! Zur Arbeit: in der Flaschenpost 1962 bekannte ich meine botanische Kehrtwendung von den Moosen zu den Flechten,und machte heuer wirklich ernst mit diesen aesthetischen Zwittern,schrieb mir meine eigeneFlechtenflora Venezuelas - nicht zum Veroeffentlichen,sondern nur als Arbeitshilfe.Wer die eremitenhafte Wohl-lust der einsamen Begegnung mit einer solchen Insel der Erscheinungen kennt,wird verstehen,wie gluecklich man dabei sein kann.Trotzdem kamen mir immer wieder mahnende Zeichen aus der Welt der Schreibverfallenen: Vor allem durch Lottes literaturverflochtenes Leben,an dem ich um so sehnsuechtiger teilnehme,je unerbittlicher mich die Ratioder botanischen Bemuehung ihrem Trockenklima ueberliefert.Hinzu kam die unvergessliche Freilandauffuehrung der Orestie des deutschen Regisseurs Stein:Von 7 Uhr abends bis nach 3 Uhr frueh haben wir - trotz Regen - (aber auch an die 3000 Venezolaner,die kein deutsch konnten!!)ausgehalten.Solche Erlebnisse versetzen den Naturforscher in eine Daemmerung,in der man - wie Ernst Juenger sagt - "Figuren sieht".Und noch etwas gehoert hierher: unsere Europareise,die schon im Mai moeglich wurde,weil Lotte gerade dann ihre Emeritierung ="jubilación" bekam - auf der wir vor dem landschaftlichen Hintergrund Menschen wie Henning und Silva (Dortmund),Lutti und Sanna (Utting),Nino und Edith (Bozen),Karl, Margot und Kinder (Undenheim),Roemerleins(Heilbrunn) nahe,vordergruendig,unvergesslich begegneten.Hauptziel war aber diesmal,noch mehr als sonst,Saarbruecken - Omi (Lottes Mutter Elisabeth Zettler) und ich feierten Geburtstag: Sie ihren 88.,ich meinen 77..!Dass die ganze liebe uebrige Saarbruecker Verwandtschaft da frisch-froehlich mitmachte,dass Ausfluege und weitere Reisen das Europaerlebnis herrlich abrundeten,,kann ich hier nur kurz,aber dankbar anfuehren.Dass ich ueberall - ausser den uns von Erich und Lutti vermittelten Juwelen des Kirchenbaus- auch eifrigst Flechten sammelte,war bei meiner zugleich 50 Jahre alten und 2Jahre neuen Leidenschaft selbstverstaendlich...

Gegen Ende der Reise hatten wir trotz allem Heimweh nach drueben,nach hier. Reisen bedeutet doch immer auch Ablenkung von jenem eigentlichen all-taeglichen Selbst,das unser Leben zur Aufgabe macht.Und dann - nach der Rueckkehr - geschah es!Im Trockenofen verbrannte durch einen Schaltfehler die in Europa gesammelten Flechten!!Das war die erste Ueberraschung,die zweite kam aus mir selber : keine Spur von Trauer oder Verzweiflung - strahlende Anerkennung eines Schicksalswinkes: Jetzt hast du Zeit und Kraft frei,endlich dein Z-Buch wieder in Angriff zu nehmen!Und wirklich - von Juli bis heute arbeitete ich an dem Roman,unbekuemmert um sein Schicksal,ohne Ehrgeiz,einfach nur aus Freude am nachdenklichen Schreiben;bis Ende 64 soll er - wenn nicht wieder verquere Schicksalswinke ablenken - fertig werden.-- Auch auf Lotte wartete eine Ueberraschung bei der Rueckkehr: sie erhielt,in Gegenwart von 70 eingeladenen Freunden feierlich,d.26.Juli vom deutschen Botschafter ueberreicht,das Bundesverdienstkreuz 1.Klasse - fuer ihren Einsatz fuer die deutsche Sprache und Kultur,der - so die Worte des Botschafters,der eine ganz persoenlich-freundschaftliche Rede hielt - weit ueber das beruflich zu leistende hinausging.Fast gleichzeitig ,im September,bekam sie eine Ehrenplakette von derAsociación Cultural Humboldt fuer ihre uneigennuetzige und "fructífera labor en pro de la interrelación cultural,Venezolano-Alemana durante 20 años". Und - aller guten Dinge sind drei:bald darauf fand noch eine persoenliche Feier bei den Freunden Bornhorst statt,mit dem ganzen Kreis der Bibliotheksgespraeche! Fuer eine Buergerin zweier Welten,wie Lotte es nun einmal geworden ist,versoehnt solche Anerkennung mit dem Schicksal, mit zweierlei Heimweh zu leben.-Gerade zu der festlichen Ehrung kam Freund Jojo (Graf Westerholt,mit Sohn Karli) aus Nancy zu uns.Wir machten eine Exkursion in die Selva de Guatopo,und dann (das aber war schon eine richtige Expedition)ging's mit Franz Dorn (u.dessen Sohn Peter) ins Delta des Orinoco: 1000 km kreuz und quer im Labyrinth der Caños,Begegnungen mit weltfernen Missionaren,mit den amphibisch lebenden Warao-Indios,mit Tieren und Pflanzen,die zwischen Luft und Wasser leben,weil "erde" hier ein Unterwasserbegriff ist...Leider waren unsere Kinder nicht dabei (Christine,Juergen und ihre Buben reisten gerade in den U.S.A. umeinander,Ursel und Siegfried waren ebenso wie Peter mit Arbeit eingedeckt.) Solche Reisen in Venezuela verbinden uns immer noch mehr mit dieser unserer zweiten Heimat,ohne dass wir die erste je verlieren.Im Gegenteil: Unsere Identaet als Deutsche,sogar als Mecklenburger und Tiroler,wurzelt ja in einem geschichtlichen Bewusstsein,das vor jeder Mauer oder Brennergrenze bestand und bis auf den heutigen Tag besteht.Auch die Andenreise,die wir mit Ingo,Benno,Christine und Peter machten (wie immer zu unsern Freunden Reserl Schwarzkopf und Manfred u.Ronalda Hartung) laesst sich ja nicht nach M.ue.M. (Pico Espejo 4765m,Pico Aguila m.Radarstation 4200m),sondern nur als Erlebniswert einstufen.- Und noch etwas Literarisches brachte uns dies Jahr:Ende September fand in Caracas ein internationales PEN-Club-Treffen statt,und es kamen auch 5 deutsche Vertreter von der Feder.Wir beide freuten uns dieser Begegnung,umsomehr als einer uns schon bekannt war: Hans Chrisoph Buch aus Wetzlar(!),der Drehbuchautor und "Eckermann" des Werther-Filmes,den Lotte hier Anfang des Jahres mit grossem Erfolg mehrfach vorfuehrte.Sie leitete ein Round-table-Gespraech mit Lesungen in der Asociación Humboldt,und dann vermittelten wir ihnen durch einen ausgiebigen Urwaldgang die ihnen unbekannte,uns vertraute Welt.Ebenfalls im Oktober kauften Christine und Juergen sich von einem zurueckkehrenden Deutschen ein kleines,aber seetuechtiges Motorboot,mit dem auch wir schon zwischen den kleinen Inseln im karibischen Meer umherflitzten und in Haengematten zwischen Kokospalmen das tropische Ambiente so genossen,wie es sich die Europaeer traeumen...Uebrigens hatte Lotte noch die Freude,dass ihr der Consejo de Desarrollo Científico y Humanístico gerade vor wenigen Tagen fuer ein weiteres Jahr finanzielle Unterstuetzung zusagte fuer die 2.Etappe ihrer grossen Romantik-Untersuchung.- Nun geht das Jahr zu Ende.Und das neue fangen wir mit einem eigenen Kalender an;denn wir sind unter die Kalendermacher gegangen;Calendario L.P.V. Mareschi - Fotos von uns allen dreien,Text von V.,Diagrammation usw.Peter. Es wurde ein guter Erfolg,und wir denken also naechstes Jahr weiter zu machen,hauptamtlich Peter. - Sylvester wird diesmal fuer Peter und mich nicht laut werden.Mit Freunden (Familie Dr.Weisel) fahren wir am 28.Dezember frueh ueber die sog.Escalera in die Gran Sabana hinauf :ein Unternehmen mit drei gelaendegaengigen Wagen,abenteuerlustiger Gemuetslage und durstigen Augen... Ueber die Loma,um unsere Palmen herum,fliegen in den letzten Tagen grosse Schwaerme von Schwalben - ob es Zugvoegel sind aus dem Norden?

Caracas,Loma Chica,Casa Tepui,Weihnachten 1963.

Family: 221
Genus : Gossypium
Species: Tomentosum

MALVACEAE
MALLOW FAMILY

GOSSYPIUM TOMENTOSUM Nutt.
HAWAIIAN COTTON; MAO, HULUHULU
Gossypium tomentosum Nutt.: Seem. Fl. Vit. 22. 1865.
Gossypium sandwicense Parl. Sp. Cot. 37. pl. 6. 1866.

Shrub 8 - 14 dm. high with angular twigs hoary with soft white tomentum. Leaves thick, especially beneath pale and usually densely tomentulose, above glandular-punctate with somewhat raised green areas spaced about 1 mm. apart which in glabrate leaves appear dark; petioles 2 - 4 cm. long, dark-punctate as are the main veins; blade broadly orbicular, usually 3 - 6 cm. long and 5 - 10 cm. wide, cleft into 3 ovate-acute lobes with occasionally the outer lobes each with single obtuse tooth, at base broadly cordate with narrow sinus; stipules subulate, 8 mm. long or less, deciduous. Flowers on 1 - 15 cm. long pedicels, forming a short few-flowered monochasium bearing persistent leafy bracts and flowers at long intervals of time; subtending involucral bracts 3, dark-punctate, ovate and somewhat cordate, 1.5-2 cm. long and 1 - 15 cm. wide, longitudinally ribbed with 5 - 12 shallow veins each of which projects into an acute tooth about 2 mm. long. Calyx 7 - 8 mm. high, truncate or nearly so, purplish-brown-punctate between 10 - 15 longitudinal veins. Corolla sulphur-yellow, adnate at base to staminal column; petals obliquely obovate-cuneate, 2.5 cm. wide at top, about 3 cm. long on one side and 3.5 cm. long on other, ciliate near base, prominently veined and obscurely yellow-punctate, shiny and glabrous except part exposed while in the bud. Staminal column pale, 14 mm. long, antheriferous from near base to apex; free part of stamen 4 - 6 mm. long, split half its length and with each half bearing a single anther sac. Ovary 5 mm. long and 3 mm. wide, conical, very densely purplish-brown-punctate, 3-celled with 2 - 4 ovules in each cell; style and stigma 2.5 - 3 cm. long, filiform-clavate, pale, glabrous below and densely papillose above. Capsule coriaceous, ovoid, cuspidate, about 1.5 cm. long, black-pitted, with involucre and calyx attached, dehiscing widely into 3 valves each of which holds 2 - 4 separable seeds. Seeds about 7 mm. long and 5 mm. thick, copiously covered with brownish firmly adhering hair (called "cotton") sometimes over 1 cm. long; cotyledons purplish-punctate.

TYPE LOCALITY: "Also collected in Oahu, Atoi [Kauai], Hawaii, Maui, Sandwich Islands."

LOCAL RANGE: Found on the larger islands as well as on Niihau and Kahoolawe. It grows on arid, rocky or clay plains not far from the sea. On the larger islands it is hence found chiefly on the dry, leeward side. On Oahu it is common near Koko Crater, and grows scattered between Honouliuli and Makua Valley. On Molokai it is extremely common on the southwestern end; elsewhere it is rare except near Kamalo. Specimens growing near Kaunakakai, according to Hillebrand, differ from the typical kind. On Maui the species may be found far from the sea in one of the valleys south of Wailuku. According to Watt ("Cotton Plants of the World" 71. 1907.) "In the British Museum there is a specimen with very small leaves, entire or three-lobed, which bears the remark that it is 'G. *parvifolium* Nutt. MS.' It certainly is nothing more than a variety, but it is worthy of separate mention. It would appear to have been collected at Owhyhee [Hawaii]. A specimen in the Kew Herbarium from the Molokai Island has the leaves very much narrower than is customary and is thus probably also this variety of the species." From our present knowledge of all these plants, it still seems best to treat them as a single species.

EXTRA RANGE: Endemic to the Hawaiian Islands but cited erroneously to the Fiji Islands as well. The closest relatives of this species are native to the Galapagos Islands and to Australia.
(Otto Degener, 7/3/'33) (Illustrated on following page)

Degener, a Botanical 'Splitter,'

Friday, August 29, 1980 Honolulu Star-Bulletin A-5

Speaks from Mokuleia

By Harry Whitten
Star-Bulletin Writer

Long before environmentalism became a popular movement, a strong "voice in the wilderness" from Mokuleia, Oahu, was calling for protection of Hawaii's endangered plants.

The voice was that of botanist Otto Degener, now 81, whose popular book, "Plants of Hawaii National Parks Illustrative of Plants and Customs of the South Seas," is being revised for reprinting next year.

Degener and his wife, Isa, who has worked side by side with him since 1953, are jointly or singly authors of nine books and more than 400 articles in various journals.

They have been honored by a resolution from the state Senate and have received the Distinguished Service Award of the New York Botanical Garden and the Willdenow Medal of the Berlin Botanical Garden and Botanical Museum.

Degener, born in New York of Austrian-German descent, said the Degener family's coat of arms depicted a sheep because the family specialized in wool manufacture.

"HARDLY AS flattering an animal as a rampant lion," he commented. He has corrected any wrong impression by the vigor with which he has fought to protect Hawaii's native plants, as evidenced by many letters to editors and government officials during the years.

"Man is wrecking within less than 200 years a flora that has taken 20 million years to perfect," he wrote in a review denouncing introduction of passion flowers, goats, mouflon sheep and black-tailed deer.

The Senate resolution, adopted in 1979, said, "Dr. Degener's many works...comprise an unparalleled collection of information on plant life in Hawaii, and stand as a remarkable resource in itself to students, teachers, scientists, and laymen alike, both locally and worldwide."

Degener arrived in Hawaii in 1922, got his master's degree from the University of Hawaii, did doctoral work on the Mainland, taught at the UH, and then became a naturalist for what was then called Hawaii National Park.

"Knowing what interested the average tourist, I published 'Plants of Hawaii National Park,'" he said. He and Isa have revised the book several times.

Degener then started on his major work, "Flora Hawaiiensis," the first flora of Hawaiian plants since that of Wilhelm Hillebrand in the last century.

"FLORA" IS defined as a "systematic treatise of the plants of an area."

The Degeners have published six books so far in the "Flora Hawaiiensis" series; Book 7 is not quite complete, but when "fat enough" will be enclosed with hardback cover for a completed book. The book is being printed, with illustration and description, a page at a time.

The printing of material, in looseleaf form, was done deliberately so that as new plants are discovered, leaves about them can be inserted in the proper place in the books.

Degener said present knowledge of complicated native flora is in such a state of flux that any bound book about Hawaiian plants would be out of date in a few years.

He said that, starting in 1922, "due to the business acumen and good fortune of his parents, he was able to pursue this work for over three decades practically full time without outside financial aid."

The time came, however, when other income was needed. The project, which Degener describes as a "cottage industry," has in recent years been supported by grants, sales of books and rentals from property.

SHORTLY AFTER the end of World War II Degener found a grass he could not identify and was referred to a grass specialist, I. Hansen, of the Berlin-Dahlem Botanical Garden.

When the bachelor botanist went to Europe with his sister in 1952, he hunted up Hansen and was somewhat taken back to discover a woman, "I" standing for Isa.

After he recovered from his surprise, he married her. The two honeymooned in Europe and then flew to Hawaii.

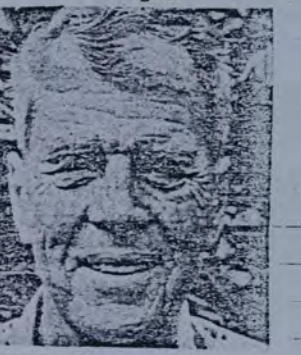
"The regular routine followed, delightfully vitalized by a helpmate," Otto wrote.

Degener is one of two living men to have a family of plants, the Degeneria, named for him. Peter Raven, director of the Missouri Botanical Garden, described Degeneria as "a living fossil, about 100 million years old."

The plant's discovery resulted from the eight months Degener spent botanizing in Fiji after leaving Anne Archbold's Cheng Ho expedition, on which he served as a naturalist.

The Fijian experience resulted in a book by Degener, "Naturalist's South Pacific Expedition: Fiji." Like the earlier book on Hawaii National Park, it contained much lore on customs and history as well as plants.

Isa Degener



Otto Degener

SEVERAL PLANT species have also been named for Degener.

Over the years the Degeners have sent a quarter of a million Hawaiian herbarium specimens to more than 50 educational institutions throughout the world. The New York Botanical Garden, where both Degeners are staff members, has received an especially rich collection of Hawaiian specimens.

Because of unsettled conditions in the world, "we no longer keep all our eggs in one basket," Otto said. "We scatter them." If specimens are destroyed by war or natural disaster in one place, they may survive in another place, he said.

He referred to the bombing of the Berlin Botanical Garden by British fliers, aided by Americans, which