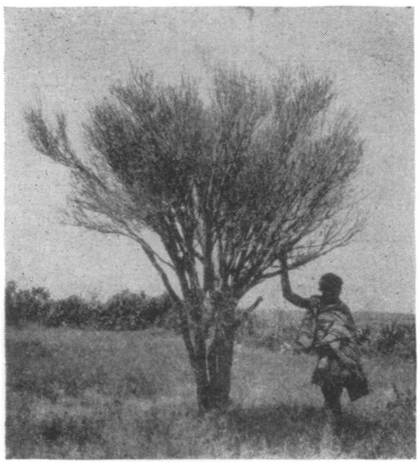


The largest intisy tree left alive. Before Madagascar's "rubber rush" of the nineties, there were great numbers of them that were half again as high.

Rare Intisy Rubber Tree

May Beat Edison's Goldenrod

By Frank Thone

WHEN Edison started his quest for a rubber-yielding plant that could be grown in the United States, his world-combing fingers reached, among other places, Madagascar. Like all tropical lands, this great island off the eastern coast of Africa has a number of rubber plants in its strange and fantastic flora, and one of these, a vine belonging to the milkweed family, came home to Mr. Edison's Florida farm for a try-out. Although this experiment started several years ago, before the now famous goldenrod plantation scheme was undertaken, no anouncement has so far been made of its outcome. Presumably the plants are still under cultivation, but have not yet shown such promise as to justify the great inventor in ceasing his search.

But the American consuls, Ford agents, and other volunteers who helped Edison in his search completely missed a much better rubber plant in Madagascar than the one which they sent home, and it has remained for a young man in the U. S. Department of Agriculture, Dr. Charles F. Swingle, to score a much greater success than they.

As a result of a two-man expedition to southern Madagascar, in which a French scientist, Prof. Henri Humbert of the University of Algiers, was the other participant, he has brought back to America living specimens of a tree so rich in rubber that strips of the pure gum can be pulled out of cuts made through its bark a few hours before. His young trees are now growing in the greenhouses of the Department of Agriculture in Washington, and a few of them on experimental grounds in Florida, Arizona and southern California.

The tree is not naturally a fast grower, so that it will be several years before it is known definitely how much can be expected of it in this country. But its record in its native land is most excellent. Too good, in fact; its discovery in 1891 caused a veritable "rubber rush," and almost brought about the extinction of the species through reckless exploitation by the whites and the crude gathering methods employed by the natives. Even before the botanists had got round to giving it a scientific name, the plant had become so great a rarity that when Dr. Swingle and his French colleague sought it a generation later they had great trouble in locating it, though they knew exactly what they were hunting for and at least approximately where to seek it.

The tree had been known to science for nearly forty years, and dried specimens of it were in at least a few of the leading European museums.

But they did not know whether the merciless collecting methods of the "rubber rush" that took hold of Madagascar in the nineties had left any of the trees alive in what had once been their native wilds. Reports were conflicting, and some botanists were quite convinced that the species was as dead as the dodo. In fact, Dr. Humbert, the recognized authority on the plants of Madagascar, had previously made two trips to the island without seeing a single living specimen.

When Dr. Swingle joined his French colleague at Marseilles he found the situation somewhat comically complicated at the outset. Prof. Humbert, he discovered, did not speak English, and his own French was exceedingly limited. However, by piecing out their vocabularies with German and Spanish and an occasional scrap of Latin they got along. After they arrived in Madagascar they both learned a little of the native Malagash language, and that helped a good deal, especially in identifying plants.

Their voyage, via the Suez canal, the Red Sea, and along the east coast of Africa through the Indian ocean, was of routine variety, Dr. Swingle says. But at Majunga, the port on the northwest coast where they landed, they just missed the

How intisy rubber was marketed. Natives pulled bands of pure rubber from cuts they made in the tree, and wrapped them into lumps as big as baseballs. This ball of rubber strings will bounce as well as a child's play ball.

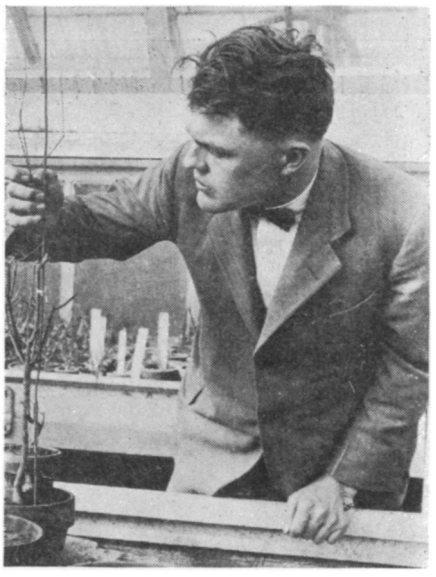
small steamer for Tuléar, the town near the southern end of the island that was to be their base. And there wasn't another boat for six weeks.

So they had to change their plans and proceed overland. The first three days were uncomfortable ones, on small, crowded river boats pushing precariously through waters infested with crocodiles. Then they came to the terminus of one of the excellent roads which the French have strung through the island, and made the rest of the trip to Tuléar by motor-bus, private automobile and narrow-gauge railway.

Arrived at Tuléar, they considered ways and means of getting into the brush where the treasure they hoped for might be growing. They hired the one motor truck available to get them to a small village at the edge of the desert. Here they assembled their forces of porters, whose loyalty was assured in part by a promise from the local magistrate of two weeks in jail for any man who deserted. A company of 38 was needed to carry the needed supplies of water, food, equipment and Dr. Swingle and Prof. Humbert.

For in the Madagascar desert, as in many other places in the tropics, white men do not walk. It is not so much a matter of prestige as of necessity; you simply cannot do a day's march and be in shape for going on again the next day. So Dr. Swingle and his companion were borne in the Malagash version of the palanquin of the Cæsars—a not-too-easy-riding litter known as a "filanzana." It was neither comfortable nor dignified, but it did save strength for botanizing, which is a strenuous enough job in the tangled, thorny scrub where the intisy bushes are to be sought.

Once, three days' march from the last water-hole, the last mouthful of water was gone, and the party found itself in a rather tight place. However, they knew they couldn't get back, and so kept on forward. Five of the porters collapsed. Things looked bad.



Explorer-botanist Charles F. Swingle examines one of his precious rubber plants from Madagascar, in the greenhouses of the U. S. Department of Agriculture at Washington, D. C.

Then they sighted a small native village, whence they were guided to a water-hole. The water was not greatly superior to that supplied by Gunga Din, but it served, and presently all hands recovered and were able to push on.

But, though they were in a botanists' paradise and had found a wealth of interesting plants, still they had not found the tree they particularly sought. The golden fleece of this expedition was apparently as elusive as that sought by the legendary Greeks under Jason.

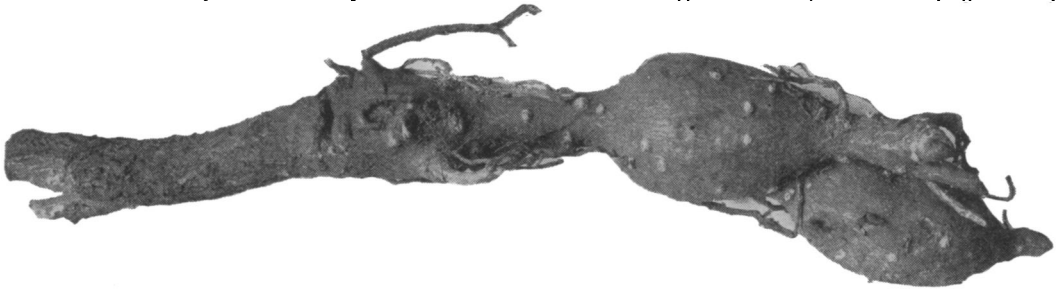
At last, on the sixteenth day of the uncomfortable, thirst-tortured filanzana travel, they found it. The plant, potentially of small tree size, exists now mostly as mere bushes, for the species has not yet recovered from the scourging it received over a generation ago. However, the assurance that it still exists, and that he could have all the specimens he could carry with him, made Dr. Swingle forget the toil and difficulties he had been through. The long journey, nearly halfway round the world, was a success.

The bushes grew in a soil so rocky and dry that it took the hardest kind of labor to dig up the roots he wanted. The native porters, who could pack a heavy load all day, knew little about digging, and only by offering more than triple pay was Dr. Swingle able to hold them to the job. After he had obtained a good supply of living plants and a quantity of the remarkable storage roots, he called the job done and as soon as possible prepared for his journey homeward, carefully guarding from the rigors of the long voyage the uncouth bundles he had sweated—and almost bled—to obtain.

This great prize of Dr. Swingle's expedition belongs to the plant family of the euphorbias, widespread in tropic and temperate lands in both hemispheres. Many ornamental and economic plants already well known are euphorbias. The poinsettia we use at Christmas is known to botanists as *Euphorbia pulcherrima,* which means "very beautiful euphorbia." The familiar castor bean of our backyard gardens is a member of the family. And more important still is another relative, *Hevea brasiliensis,* the South American tree that now produces, in its new home in the East Indies, nine-tenths of the world's rubber.

The Madagascar tree is known botanically as *Euphorbia intisy.* The "intisy" part is one of the names by which it is known among the natives; the rubber which it used to produce in commercial quantities was also known as "intisy," and the tangled growth of mixed varieties of peculiar desert bushes where the plant still survives is called the "intisy brush."

In the prime of the old intisy brush, the biggest trees reached a height of about twenty feet, according to reports. The largest specimen now surviving is only about two-thirds that size, and it has survived only because it grew in a sort of botanical garden, now neglected and semi-abandoned. The tree, like many plants that grow in deserts, has no leaves. Or rather, it forms small, narrow leaves that drop off almost at once, leaving the (*Turn to page* 350)



The water-jug roots of the intisy tree enable it to survive in a desert as dry as anything we have in Arizona or Nevada.

Rare Intisy Rubber Tree—*Continued*

long, thin, switch-like green-skinned branches all naked. The whole growth comes to resemble somewhat a gigantic inverted broom.

The intisy rubber tree is unique among all rubber-producing plants in that its milky sap, or latex, yields rubber of very high grade directly, without the troublesome dipping and smoking of the primitive Brazilian process, or the more modern chemical treatments used in the East Indies. All that the natives needed to do was cut a long gash in the rind of the tree and let the latex ooze out. When they came back the next day there would be a strip of pure rubber, in consistency almost like the rubber bands on your desk, lying stuck in the cut, and all they needed to do was take hold of one end and pull. They wound these long strips into balls and took them directly to market. It was the simplest from of rubber collecting that has ever been practiced.

But it was also the most destructive. In their eagerness to get the longest possible strips, the natives cut gashes spirally round every branch on every tree they could find, and this drastic girdling usually resulted in death after one "bleeding." The rubber production of the island, which had jumped to nearly a million pounds a year after the discovery of the intisy brush, dwindled again to almost nothing.

One thing that probably helped the persecuted plants that survived the massacre to carry on was the thoroughness of their adaptation to desert life. Real desert plants are usually organized to offer stubborn resistance to desperate environments, and the intisy is one of the best-organized desert plants known. Its leafless, switchlike stems, coated with wax, yield very little water to the demands of the arid air, and the gum that forms in every wound effectively stops bleeding of sap. Finally, intisy has one of the most efficient of water reservoirs, stowed safely underground, in its roots. Dr. Swingle states that no other plant has anything quite like it.

Each root is thickened in a series of sausage-like swellings, and practically the whole of the enlargement consists of water. The water is stored in swollen-up cells with which each "sausage" is filled. It is good water, too—the very slight "planty" taste did not deter Dr. Swingle and his party from slaking their thirst on these roots, in preference to the very poor drinking water usually obtainable at the desert water holes. He has given the structures the special name "hydriarhizas," which means "water-jug-roots."

It is these peculiar water-jug-roots which enable this plant to live in a country subjected yearly to a six-months drought, and where sometimes no rain falls for as many years.

Twenty of the original plants which Dr. Swingle dug in Madagascar survived the 10,000-mile trip, and thirty cuttings were rooted from these plants last summer. All of these original plants are growing, hence the total nursery stock now amounts to fifty specimens—possibly the most valuable lot of fifty plants now in America. Several of the water-filled roots which he also brought are still alive, but they have not put forth any shoots or leaves. Apparently the roots lose the power to produce stem-buds when they swell up and gorge themselves with water, if indeed the roots of this plant are capable of producing stems.

Most of the young plants are still growing in the greenhouses of the U. S. Department of Agriculture at Washington. They are being used for propagation, to increase the number of plants as rapidly as possible, and it is expected that several hundred rooted plants will be obtained during the present season.

However, a few have already been set outdoors, to test their possibilities. Two are at an experimental planting ground of the Department of Agriculture near Miami, Florida. This is a habitat with very much greater rainfall than the native home of the intisy; but it is always worth while giving a new plant a chance in a different setting, to see whether it may not possibly thrive better in a strange world than it did at home.

Two other plants have been set out near Yuma, Arizona, and two more on Torrey Pines Hill, near San Diego, California. The climatic conditions of our Southwest are very much like those of southern Madagascar, except that the winter temperature is not quite so high. It is therefore most probable that the new rubber tree will find its most congenial home on the wide plateaus south of the Colorado river and on the dry foothills and coastal country of California.

The one question still unsettled is whether the intisy can stand the light winters of this region. If it has even a little frost tolerance its range in the United States will be greatly extended. It is known that light frosts sometimes occur in part of the region where intisy naturally grows, but these are very light indeed and very seldom. Perhaps intisy will have to be entrusted to some of our neighbors to the south, such as Mexico, or the leeward side of Haiti, Porto Rico, Jamaica, etc. In either case, it will be comforting to have a rubber supply either on our own territory or on that of a friendly neighbor not separated from us by a wide sea that might under conceivable circumstances some day be closed to us.

There is no possibility of getting a hurry-up crop from intisy, such as Edison envisages as an emergency rubber supply from goldenrod. It is a higher-grade rubber plant than goldenrod, but a much slower grower.

Even if intisy proves adapted to American climate, and notwithstanding the extremely high quality of the rubber which it yields, it is quite possible that it might not prove commercially feasible for plantation methods of growing. If such proves to be the case, Dr. Swingle has suggested that a large acreage of this plant might be set out in the Southwest on tax-free land, leaving it to look out for itself until some day when it might be badly needed.

Science News-Letter, May 31, 1930

Diesel Engine—*Continued*

in the ordinary passenger car. Its cost and weight must be reduced and it must be made more flexible.

The Diesel has been used primarily in small stationary power plants, locomotives and ships. Its weight per horsepower has been many times that of the automobile engine and its speed constant and slow.

Research has accomplished much toward making an automobile power plant out of the original slow moving monster. In fact, several airplane engines have been developed, but their economies of weight cannot be applied to the automobile because they are radial type motors.

In high-speed Diesel engines, crude oil is injected into the cylinder just as it is needed for explosion. It is finely atomized as it enters through a minute hole under a pressure of thousands of pounds per square inch. Ignition is caused by the great heat of compression.

Science News-Letter, May 31, 1930