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A NEGLECTED MAYAN GALACTAGOGUE
IXBUT (*EUPHORBIA LANCIFOLIA*)

FREDERIC ROSENGARTEN, JR.*

A potentially important medicinal plant — indigenous to Guatemala, Belice and Honduras — is the perennial herb *Euphorbia lancifolia* Schlecht., commonly known as "ixbut" in Guatemala and El Salvador, and less well known as "hierba lechera" in southern Mexico. It is a member of the spurge family (Euphorbiaceae).

According to Black's Medical Dictionary: "Galactagogues are drugs which increase the flow of milk in nursing women. The normal stimulus of an infant's lips is the most powerful agent in producing milk, and a mother who has little or no milk should nevertheless hold the infant to the breast. Good food and the hormone, prolactin, from the pituitary gland increase the quantity and improve the quality of milk."(1)

Traditional Guatemalan folklore claims that ixbut (rhymes with "wish-boot"), taken as an herbal tea, will stimulate lactation and increase the flow of mother's milk in postpartum women. A modern report in the *Flora of Guatemala* (2) states: "It is said to double the quantity of milk given by cows that eat it. An infusion or decoction of it often is given to nursing women to increase their flow of milk, and it is claimed that it will cause the milk to flow after it has ceased normally, or even in women who have not given birth to a child."

In this connection, one still hears countless tales about the

*Associate in Economic Botany.

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wondrous powers of ixbut as a galactagogue, some of which border on the sensational: for example, there are numerous claims that aged grandmothers, or even great-grandmothers, after taking ixbut, have been able to suckle newlyborn infants through their withered breasts when the young mothers died in child birth.

An even more curious incident involving ixbut was reported in a Guatemalan newspaper in November 1952 (3): during the late 1890's, a Guatemalan physician, Dr. Pedro Molina F., was at his home near Flores, Petén. One afternoon, he received a message that he was urgently needed by a woman in labor. By the time he arrived at the isolated, humble, native hut, he managed to save the life of the baby girl, but the mother died. Dr. Molina thereupon asked the feeble great-grandfather, who appeared to be at least ninety years old, what woman was going to nurse the infant. This venerable progenitor replied that no woman was around, but no woman was in fact needed since he himself would be the wet nurse: he was going to drink a tea of the medicinal herb ixbut which would enable him to provide milk for his new great-granddaughter. The physician objected and reluctantly departed. Six days later, Dr. Molina returned to check on the condition of the baby: he found the old man boiling ixbut leaves in a pot of water: for five days he had been drinking the infusion, but he complained that his swollen breasts hurt him when the infant suckled. The physician examined the great-grandfather's breasts which indeed were enlarged like the teats of a perfect wet nurse and were exuding a milky juice that tasted like mother's milk. The baby was thriving.

I know of one authentic case: in 1963, Señorita Bertha García, a teacher in the dietary and anthropological service of the Institute of Nutrition of Central America and Panama (INCAP), was on a dietary survey with an INCAP technical, nutritional team in the village of Santa Cruz Balanyá, Departamento de Chimaltanango, when she met a 45-year-old Indian woman who was nursing a small 14-month-old baby. The woman's sister had recently died in child birth, and since the family was so poor they couldn't afford to buy milk or any other food for the infant — this woman, who had one son of twenty-five,

and had not nursed a baby for a quarter of a century, took it upon herself to nurse her infant nephew. So she started to take a tea made from ixbut leaves, three times a day — and took it for several months. Señorita García was skeptical: upon request, the mature, nursing aunt exposed her breast, which indeed contained an abundant supply of milk.

The word "ixbut" had its origin in the early Mayan languages of the Pokom group (4) — then gradually spread to the quiché and mam tongues of Guatemala (5). "Ix" meant woman: while "but" stood for an increase in the flow or volume of water. Hence the implication that the plant ixbut increased the volume of liquid (i.e., milk) in women (4).

Euphorbia lancifolia *Schlechtendal* in Linnaea 7 (1832) 143.

This herb was described by D. F. L. von Schlechtendal on the basis of material collected in a shady forest at Misantla, Mexico, approximately 60 miles northwest of Vera Cruz, in early 1829, by the German collector Christian Julius Wilhelm Schiede.

The original description by Schlechtendal follows:

> 36. *E. lancifolia* n. sp.: herbacea carnosula glabra alternifolia, inflorescentia dichotoma terminali. Caulis articulatus, articulis longitudine eximie diversis, glaberrimus, laevis, in statu sicco striis elevatis notatus teres. Folia alterna breviter petiolata late lanceolata aut rhombeo-lanceolata, basi acute apice vero acutissime acuminata, superficie obscurius viridi glabra, pagina infera dilutiori glaucescente pilisque minutis albis adpressis oculo armato tantum in conspectum venientibus adspersa, integerrima, margine paululum inflexo, majora 3¼—3¾ p. longa, 17—19 l. in medio lata, petiolo 4—5 lineari. Flores in apicibus caulis terminalem et ex ultimis axillis axillares cymas efformant dichotomas, paucifloras aborto florum v. ramulorum lateralium, inferiori in sua parte bracteis parvis lanceolatis acutis 1½ lin. longis oppositis viduis saepe obsessas. Involucrum campanulato-turbinatum 4-fidum, laciniis exterioribus inaequalibus 13 majoribus quarta erectis (an semper?) semirotundis inferne bilabiatis, labiis angustis lacinia brevioribus, laciniis interioribus alternis minoribus tenerioribus apice laciniatis. Stamina s. flores masculi more generis et flos centralis pedicellatus, dein elongatus nutans, ovario dense breviter piloso. Fructus non vidimus nec juniores. — In sylvis umbrosis Misantlae. Mart.

A contemporary description, published by Standley and Steyermark in *Flora of Guatemala* (2) follows:

"A perennial herb, somewhat fleshy and succulent, the stems terete, pale greenish, glabrous or nearly so, ascending or procumbent or prostrate, sometimes greatly elongate, as much as 2 meters long or more, and subscandent; leaves alternate, on very short, stout petioles, mostly rhombic-lanceolate and 5-9 cm. long, acute or acuminate, acute at the base, entire, green and glabrous above, pale beneath and inconspicuously and sparsely pilosulous or glabrate, the lateral nerves obsolete; involucres in small, almost naked, terminal cymes, campanulate-turbinate, 4-lobate, glabrous, the lobes obovate, fimbriate, the glands transverse-ovate, the appendage semiorbicular, crenulate, white or whitish."

The range of *Euphorbia lancifolia* is now known to include southeastern Mexico, Guatemala, Belice, El Salvador and Honduras. It seems to be most abundantly represented in Guatemala where it has been recorded from Alta Verapaz, Escuintla, Petén, Izabal, Santa Rosa, Suchitepequez, Retalhuleu, Guatemala, Sacatepequez, Quezaltenango, San Marcos, Quiché and Huehuetenango. It prefers damp thickets, occasionally growing, however, in pine forests or in open fields. Ixbut may be found at many different elevations: at 1,000 feet or less on the warm lowland areas of the Pacific coast in the Departments of Escuintla, Suchitepequez and Retalhuleu — to areas up to 5,800 feet and sometimes higher in the Departments of Quezaltenango, San Marcos and the Alta Verapaz, in the cool highlands.

The vernacular names of *Euphorbia lancifolia* have been reported as *ixbut* and *sapillo* (2), but the plant is usually known throughout Guatemala, and even beyond the borders of the country, as *ixbut*. It was introduced to Cuba, where the name has been recorded as *isbut*.

Ixbut may have originated in the warm, humid drainage basin of the region known today as the Departamento del Petén, Guatemala — possibly near San Benito, southwest of Lake Petén Itzá (6). (See map, Plate 28)

Ixbut plants may be readily multiplied by root cuttings. In the Cobán region (Alta Verapaz), ixbut is often cultivated as a medicinal herb near villages, so it will be readily available as a galactagogue.

Standley and Steyermark (2) report: "Rather curiously, it is claimed in Cobán that the plants often cause the death of cattle

and horses eating them, and this may be the result of the inherent properties of the seeds."

I have never heard reports during my field work in Guatemala that would indicate toxicity in *Euphorbia lancifolia;* nor in my discussions with local physicians has any such danger been expressed. It should be emphasized that the leaves and branchlets of ixbut, not the seeds, should be utilized. Furthermore, the seed, which is minute, apparently is not used by the native population. It is probable that the report about the death of horses and cattle is the result of a confusion of ixbut with another plant, possibly another species of *Euphorbia*, which genus does have toxic species.

Roys points out (7) that in ancient Maya medicine, in the "Ritual of the Bacabs," the Maya doctors believed in curing like with like: a vine that looked like a serpent was considered a fitting cure for snake bites; a yellow fruit was given as medicine to cure jaundice; red plants or fruits were prescribed for patients who vomited blood or suffered from dysentery. Since ixbut contained an abundant, sticky, milky sap, which exuded from its broken stems and leaves, it was fitting that it may have been recommended to increase milk flow in nursing mothers.

Erwin P. Dieseldorff, a German naturalist who settled in the Cobán region of Guatemala during the latter part of the nineteenth century, included ixbut in a booklet which he wrote on medicinal plants of the Alta Verapaz (10). He described it as a prevalent herb growing especially well in damp areas. The dark green ixbut leaves, containing a milky latex, should be cooked in water together with their tender branchlets to prepare an herbal tea, to be used as a galactagogue.

In March 1971, the Instituto Indigenista Nacional de Guatemala published a bulletin (9) concerning popular medicine in rural areas of Guatemala. The medicinal plant ixbut is mentioned several times in this report, especially to increase lactation in postpartum nursing mothers. It was listed as a popular folk remedy in Cobán and Chamelco, in the zone of Kekchí; and in San Cristobal Verapaz and Tamahú in the zone of Pocomchí.

Usually it is recommended that the ixbut leaves be boiled in water; the liquid allowed to cool; sugar added, and the drink

consumed three times a day. In Tamahú, it is likewise suggested that fresh ixbut leaves be eaten, uncooked, like a salad.

In another portion of this same report, fresh ixbut leaves are recommended as a cure for sexual impotence, in the village of San Cristobal Verapaz.

By 1945, *Euphorbia lancifolia* had been introduced to Cuba (8), where it was recommended as a galactagogue. Just as in Guatemala, it was reported in Cuba that "isbut" could increase lactation up to 100% in nursing mothers.

In 1949, Dr. Manuel Serrano, a botanist, chemist and pioneer in the serious testing and utilization of ixbut in Guatemala, reported on a series of controlled tests that had been carried out on a group of nursing mothers at or near the General Hospital in Guatemala City — in collaboration with Merck & Co., Inc. (11). Of the 86 postpartum women tested, 54 showed an abundant increase in the production of milk after taking ixbut. In some cases, mothers who during earlier parturitions had been unable to nurse, were able to do so effectively after drinking an herbal tea of ixbut for several days. In one case, following a Caesarean section, the milk secretion had been almost nonexistent; 48 hours after the administration of ixbut, however, the lactic secretion increased to such an extent that not only was the child thoroughly satisfied, but the excess of mother's milk soaked the sheets during the night.

The results of the ixbut tests were carefully checked by Dr. Serrano. The duration of the therapy was usually from 3 to 5 days. The parts of the ixbut plant utilized were those above the ground, i.e., the stems, leaves and flowers — but not the roots. The average dose of ixbut given to the women: 5 leaves or 5 sections of stem (about 5 grams) were brewed to make a cup of herbal tea; then 6 cups of ixbut tea were given daily to each patient.

The chemical analysis of the mothers' milk carried out before and after the intake of ixbut showed that the quality of the milk did not undergo any notable change in its composition, even though the ixbut may have excited additional secretion.

Dr. Serrano cautioned that the ixbut tea should not be allowed to ferment: when it turns yellow, it should be discarded since it might cause diarrhea.

Time magazine published an article in 1949 (12) entitled "Milkweed," in a section devoted to Medicine. It described some of Dr. Manuel Serrano's experiments with ixbut in Guatemala: controlled testing of 1,800 women who had experienced trouble in nursing their babies indicated that 50% could not nurse at all without ixbut; 35% who could nurse only a little showed notable improvement after taking ixbut; while 15% did not benefit from ixbut.

Dr. Serrano pointed out to *Time* that he was convinced that ixbut increased milk flow — actually milk, and not water. The active principle in ixbut that caused the increase in lactation had not been isolated in 1949. (Today, thirty years later, it still has not been determined just what this active principle may be.) Dr. Serrano in 1949 ruled out the milk-producing hormone *prolactin:* while prolactin did not enable his wife to nurse her four babies, ixbut did.

Between 1949 and 1951, the late Dr. Efrén C. del Pozo of Mexico City, former Secretary General of the Unión de Universidades de America Latina, carried out considerable research on ixbut in collaboration with Merck & Co., Inc., both in Mexico City and in Guatemala City (13).

During 1949, Dr. del Pozo's first testing was made at the Centro Materno Infantil Ávila Camacho in Mexico City on 21 nursing women. The ixbut plant material had been shipped by Air Cargo from Guatemala City and was thus from 4 to 7 days old. During 1950, Dr. del Pozo carried out further research at the Mexico City Penitentiary: 14 lactating mothers were tested: 11 were given ixbut, while 3 were left as controls. In 1951, a third series of tests involving ixbut took place in Guatemala City under Dr. del Pozo's direction, at the Maternidad de Guarderías Infantiles, on 22 nursing women and 3 non-lactating women.

On the whole, the results of Dr. del Pozo's experiments on the effect of ixbut were inconclusive and somewhat negative, even though in some nursing mothers a variable increase of lactation was noted following treatment with an aqueous extract of ixbut: average dose approximately 750 cc., a 10% infusion, daily for 25 days.

Dr. del Pozo made the following observations following three years of research on ixbut:

(1) For an accurate evaluation of any galactagogue such as ixbut, a long control period is necessary, since short term trials are unreliable;

(2) As a result of his studies, Dr. del Pozo concluded that ixbut does not induce lactation in non-lactating women — despite popular, folkloric claims in Guatemala to the contrary.

(3) Ixbut does not produce breast pain or congestion in lactating women between the second and fourteenth month of lactation;

(4) Ixbut does not produce any appreciable change in breast volume or in the mammary glands of nursing mothers;

(5) The active principle (if any) of ixbut does not seem to be unstable. Very fresh plant material administered in Guatemala did not show higher activity than material several days old. This fact is also contrary to popular belief in Guatemala;

(6) Ixbut seems to have higher activity as a galactagogue in Guatemala during the month of November, i.e., in the early part of the dry season in Guatemala City shortly before the plant blossoms;

(7) On the whole, in the opinion of Dr. del Pozo, the lactogenic properties of ixbut have been considerably exaggerated — not only in the case of women, but also when he carried out ixbut tests on postpartum female cats;

(8) Dr. del Pozo, however, pointed out that the striking effects of ixbut reported in Guatemala by lay people cannot be totally denied on the basis of his testings. The Guatemalan claims refer mainly to ixbut used during the first days after delivery when lactation is started; while his tests were designed usually to explore lactagogue effects from two to fourteen months after childbirth;

(9) Furthermore, Dr. del Pozo personally knew of the case of a woman in Mexico City who had to feed artificially two of her previous children for lack of natural milk. When she received infusions of fresh ixbut, she was able to breastfeed her third child with a remarkable increase of the volume of milk.

During 1952, Merck & Co., Inc. discontinued its research on ixbut. It was felt that although ixbut may have some effects as a

galactagogue during the first days of lactation, these results were highly irregular and difficult to prove.

Ixbut has been used, off and on, for many years to supplement cattle feed in Guatemala (4). In 1894, Fermin Rosal noted that his own cows in Cuyotenengo, on the Pacific coast of Guatemala, were not producing anywhere nearly as much milk as the cows on the neighboring hacienda which were being fed ixbut.

In 1911, Eduardo Saravia Castillo elaborated a Guatemalan product called "GALAC-LATEX" as a supplement for cattle feed, in which ixbut was the principal ingredient. This galactagogue was apparently successful for a few years, but it is no longer produced.

In June 1927, Professor Guillermo Gándara carried out an experiment in La Ceiba, El Salvador, concerning the effect of ixbut on milk production in cows (14). The poorest producer was selected from 8 milch cows. This cow had been producing on the average 2 bottles of milk (each bottle roughly 3/4 liter) daily. For 5 consecutive days the cow was given, as a dietary supplement, an infusion of ixbut — 250 grams per liter of water; then normal forage for 3 days; then 3 days more of the dietary supplement of ixbut. At the end of 11 days, this cow had tripled its production of milk from 2 bottles to 6 bottles per day.

In 1947, J. Ignacio Aguilar noted in southeastern Mexico that ixbut would increase milk yields in cows, when mixed with other cattle forage (15). He recommended mixing ixbut in small quantities — about 1.5 grams ixbut leaves per kilo of the cow's weight — in an aqueous solution to supplement other cattle feed in order to provide a balanced diet for dairy cows. He observed, however, that too much ixbut should not be fed to the cows: for a few days milk yields would increase substantially, but then gradually decrease as the animals' physical condition deteriorated, possibly due to overstrain and exhaustion.

According to Aguilar, ixbut is a galactagogue par excellence for dairy cows, superior to alfalfa and other tropical, leguminous forage plants. Ixbut is extremely vigorous and more resistant to plant diseases than alfalfa. For best results, ixbut should be planted in warm, shady, protected areas where there is

constant humidity. It is readily propagated by root cuttings; it should be planted in rows 35 centimeters apart, with approximately 25 centimeters between the plants in the rows. After two years, under favorable conditions, an average of 25 tons of green ixbut forage may be harvested per hectare per year; with two cuttings in the rainy season and one in the dry season. Each time the forage is cut, new growth is stimulated. If cared for properly, an ixbut pasture should last 15 to 20 years.

In a laboratory analysis, Aguilar (15) found that ixbut leaves *(Euphorbia lancifolia)* contained 7.46 per cent protein, as compared to 4.72 per cent for alfalfa *(Medicago sativa)*.

In 1949, Dr. Manuel Serrano (11), in collaboration with Merck & Co., Inc., investigated the effect of ixbut on the milk production of 6 goats in Guatemala City. The goats were given a 5% aqueous infusion of fresh ixbut plant material daily, for a period of 4 days. No signs of toxicity were noted. A modest increase in goat's milk production was observed in each case.

During 1949, tests were made of the insecticidal properties of 78 species of plants from tropical America used as fish poisons, insecticides or drugs (16). Through several years, roots, stems, leaves, flowers and seeds were collected and tested at the Puerto Rico Agricultural Experiment Station, Mayaguez, Puerto Rico, to determine the toxicity of the materials to insects.

Five species were found to be highly toxic; 30 species partially toxic; while 43 species, including ixbut *(Euphorbia lancifolia)* were found to be non-toxic to insects.

In 1957 (17), Squibb, Braham and Scrimshaw carried out experiments on the utilization of the carotenoids of ixbut *(Euphorbia lancifolia)*, teosinte *(Euchlaena mexicana)*, yellow bamboo leaves *(Bambusa vulgaris)* and green bamboo leaves *(Bambusa ventricosa)*, by New Hampshire chicks over a 5-week feeding period. The carotene content and vitamin A activity of dehydrated forage meals prepared from these ingredients were studied. It was found that ixbut contained the highest carotene content of the four forages and maintained the highest serum levels of vitamin A. The dehydrated meals prevented mortality and permitted good weight gains.

The chemical composition of these dehydrated forage meals was as follows:

Ingredients	Ixbut	Yellow bamboo leaves	Green bamboo leaves	Teosinte
Ash, gm.%	9.8	21.3	19.7	12.5
Calcium, mg.%	1,519	—	—	1,163
Iron, mg.%	53.3	13.4	8.0	147.6
Phosphorus, mg.%	400	86	86	320
Moisture, gm.%	9.2	8.6	6.6	4.0
Ether extract, gm.%	5.9	2.5	2.3	3.1
Crude fiber, gm.%	16.2	21.7	24.4	21.6
Nitrogen, gm.%	1.90	1.61	1.55	1.20
Carotene, mg.%	15.05	12.32	8.61	8.28
Vitamin C, mg.%	73	6	8	38
Vitamin B_2, mg.%	0.66	0.90	0.65	0.57
Vitamin B_1, mg.%	0.04	0.10	0.16	0.10
Niacin, mg.%	4.22	2.54	3.10	3.32

The following chromatographic analyses of dried ixbut leaves from Guatemala City, Guatemala, were reported by the chemical research laboratory of SISA Incorporated of Cambridge, Massachusetts, on August 21, 1979:

EXTRACTION OF *EUPHORBIA LANCIFOLIA* (IXBUT)

In order partially to characterize some of the principles of *Euphorbia lancifolia*, an extract of dried ixbut leaves was prepared and the extract subjected to gas-liquid chromatography (figure 1) and high pressure liquid chromatography (figure 2).

The gas-liquid chromatographic analytical method separates the components of the extract primarily on the basis of their volatility with the most volatile materials appearing first.

The high pressure liquid chromatographic analytical method separates the components primarily on the basis of polarity. With a "reverse phase" column of the type used here, the more polar components appear early on the chart.

Since in both of these methods each peak on the chart corre-

sponds to at least one component in the mixture, the results shown in figure 1 and figure 2 indicate that the extract contains a large number of components. These components have not been identified but the results indicate that these methods, particularly the high pressure liquid chromatographic method, could be used to separate some of the components in quantities large enough for further chemical and biological characterization. The analytical scans are, in effect, the signature of ixbut in chromatography under the stated conditions, for future reference.

PROCEDURE

A 5.0 g sample of dried leaves of *Euphorbia lancifolia* was homogenized briefly with 100 ml of ethanol in a blender. The mixture was transferred to a Soxlet apparatus and extracted at reflux with 250 ml of 95% ethanol. These extraction conditions were chosen to approximate the use of the plant by boiling the leaves in water to give an herbal tea.

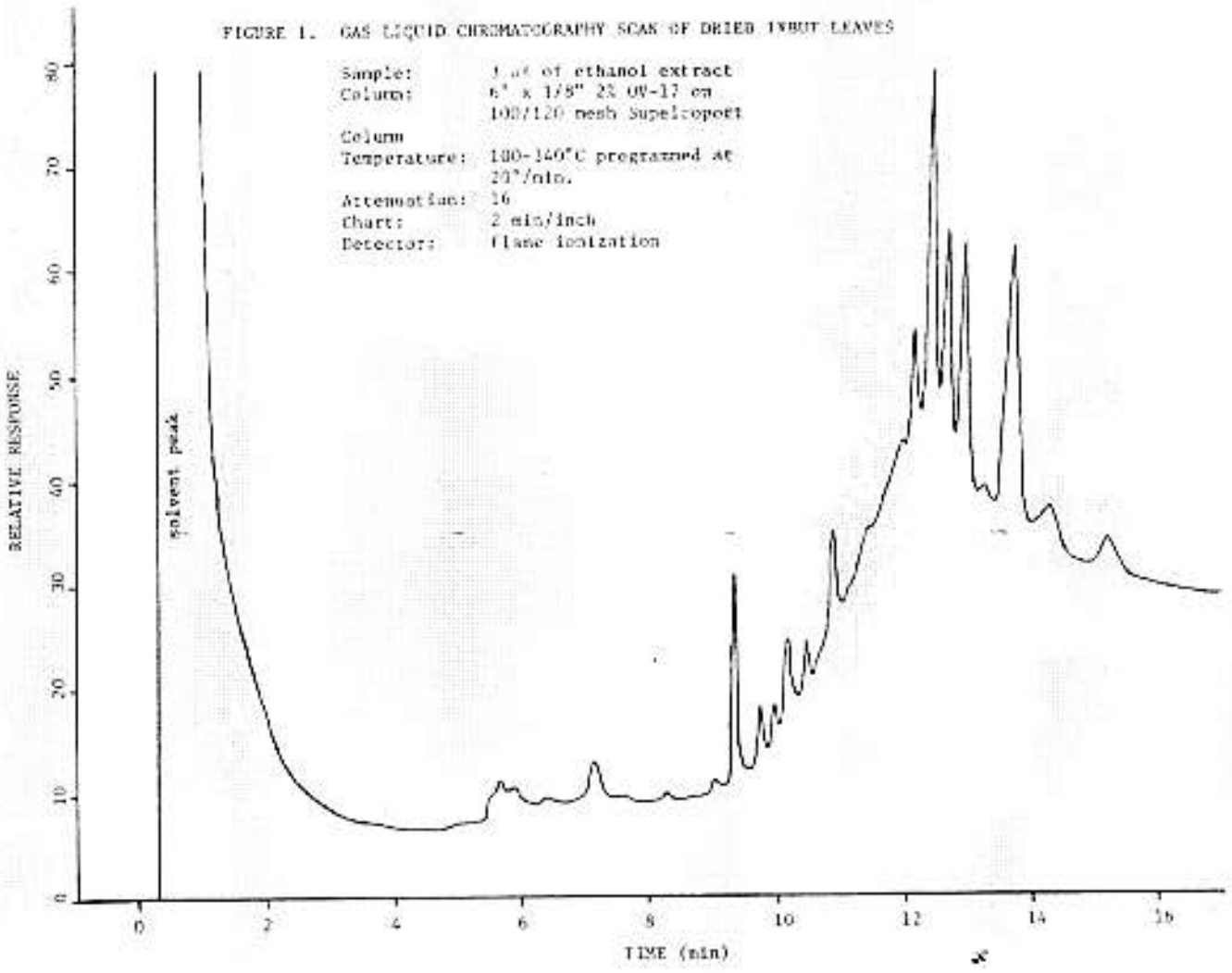
The ethanolic extract was subjected to gas liquid (glc) and high pressure liquid (hplc) chromatographic analyses.

The glc analysis was carried out on a 6ft x 1/8 inch stainless steel column of 2% OV-17 on 100/120 mesh Supelcoport using a Varian 1400 instrument equipped with a temperature programmed run from 100°C to 340°C at 20°/min. temperature rise. The glc scan for this run is shown in figure 1.

The hplc analysis was done on a 30 cm x 3.9 mm "reverse phase" column of μ Bondapak C_{18} using a Water ALC 200 instrument with an ultraviolet (254 nm) detector. A satisfactory analysis was obtained using acetonitrile as the mobile phase. The hplc scan for this run is shown in figure 2.

According to Dr. Juan José Urrutia, Chief, Nutrition and Infection program of the INCAP, ixbut is rarely used at the present time as a galactagogue in Guatemala City. On the whole, the pure Indian in the rural areas of Guatemala produces more milk for breast feeding than the urbane mother of white or mixed racial background in the city.

FIGURE 1. GAS LIQUID CHROMATOGRAPHY SCAN OF DRIED INBUT LEAVES



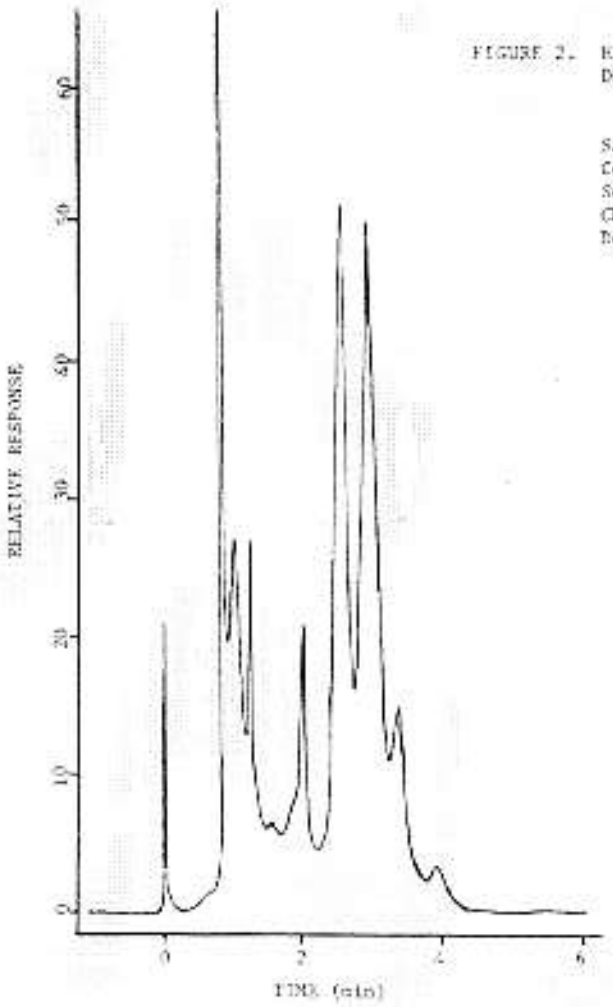


FIGURE 2. HIGH PRESSURE LIQUID CHROMATOGRAPHY SCAN OF DRIED IXBUT LEAVES

Sample: 25 µl Ethanol extract
Column: 30 cm x 2.9 mm ; Bonapak C_{18}
Solvent: acetonitrile 4 ml/min
Chart: 2 min/inch
Detector: ultraviolet absorption (254 nm)

In remote regions of Guatemala, the Indian women today still utilize ixbut, but only when they have trouble producing breast milk, especially during the first 3 days postpartum. In these far-off localities, the baby has no other food or water, and depends on his mother's milk for both, during a period of 2 months or longer.

In Guatemala City, on the other hand, the urbane women are no longer interested in ixbut; they can obtain other foods for the baby such as powdered milk, bottled milk, eggs and vegetables.

Dr. Juan José Hurtado V., a specialist in pediatric medicine in Guatemala City, concurs that ixbut is used much less in Guatemala in 1979 than it was 30 years ago when he was a resident intern. In those days, Dr. Hurtado heard a great deal about the merits of ixbut as a galactagogue: midwives frequently recommended it. In fact, when Dr. Hurtado was born in Guatemala City in 1926, his mother took an infusion of ixbut leaves three times a day for several days and was able to breast-feed him. At that time, ixbut was a "fashionable" medicinal herb, readily available in several local markets. At the present time, it is vitually impossible to find ixbut in any market in or near Guatemala City. According to Dr. Manuel Serrano, ixbut is still sold in small quantities, from time to time, in the more remote, indigenous markets of San Felipe Retalhuleu, Cobán and Colomba.

Dr. Hurtado categorizes ixbut as a non-toxic, beneficial, medicinal herb, rarely used or even mentioned today in Guatemala City.

The American Academy of Pediatrics and the Canadian Pediatric Society have recently issued a joint statement to encourage all physicians to recommend breast-feeding (18). The "breast is best" movement is apparently gaining in popularity. *The Harvard Medical School Health Letter* stresses the critical role of breast feeding in preventing gastroenteritis in infants in developing countries. Respiratory infections, meningitis and other overwhelming infections are less frequent among breast-fed infants.

Mrs. Dina Nathusius is one of the Guatemalan leaders of La Leche League International, Inc., of Franklin Park, Illinois —

a group interested in fomenting natural nursing of babies through breast-feeding. Mrs. Nathusius points out that in the local Guatemalan chapter of La Leche League, young mothers are advised it is perfectly allright to take ixbut if they want to, just as their mothers and grandmothers used to many years ago, since it is not toxic and might indeed help them psychologically — by giving them confidence, by relaxing them and so helping them to nurse their babies. Some young mothers have indeed informed Mrs. Nathusius that ixbut has aided them to breast-feed their babies. Mrs. Nathusiu confirms, however, that very little ixbut is utilized at the present time in Guatemala in comparison to two generations ago.

In *Maternity Nursing* (19), it is emphasized that worry and emotional tension have an adverse effect on lactation in the nursing mother. Perhaps, as Mrs. Nathusius suggests above, ixbut itself may at times be beneficial as a tranquilizer — due to its soothing, relaxing effect upon those postpartum mothers who have confidence in its power as a tried and true galactagogue.

In 1950 (13), Dr. Efrén del Pozo, in fact, found in experiments of his own as a Mexican physician, that intravenous injections of ixbut caused a fall of blood pressure and a marked slowing of the heart, in tests carried out on lactating women in the Mexico City Penitentiary.

Dr. Lewis H. Sarett, Senior Vice President, Science and Technology, of Merck & Co., Inc., has the following comments to make about ixbut: to date the active principle of this galactagogue has not been isolated: if found, it would consist probably of pure crystals resulting from a chemical fractionation of the fresh plant material.

It is a long and costly process now to introduce a new drug. The problems following Thalidomide during the late 1950's and early 1960's led to the Kefauver-Harris amendments of the Pure Food and Drug laws in 1962 — designed to prevent a recurrence of the Thalidomide tragedy in any new drug.

Although there is a trend towards a greater utilization of products of nature, there are much longer delays in gaining Food and Drug Administration approval for their use. For example, even if ixbut, let us say, should prove to be an

effective galactagogue for dairy cows, the F. D. A. might take a dim view of adding a drug orally to cattle feed which would show up in milk for human consumption — unless it were completely metabolized in the liver or in the intestinal tract.

In order to gain approval of drug regulatory agencies in most countries, it would be necessary to measure the level of the product (ixbut) and its metabolites in milk. An adequate safety ratio would have to be determined: all major metabolic products should be checked to determine their toxicoligical effects on at least two species of animals, with the drug adminstered over a period of several years. Extreme caution would be necessary.

CONCLUSION

Ixbut, *Euphorbia lancifolia*, is a potentially important, natural galactagogue of Central American origin, worthy of further chemical and pharmacological study.

This medicinal herb has been used for centuries in Guatemala, in Maya medicine, to increase the flow of milk in postpartum, lactating mothers. If used in moderation, it seems to have no toxic side effects in humans.

Ixbut, when mixed with cattle fodder, is reputed to have increased milk yields in cows.

Since the active principle of ixbut has never been isolated, considerable research would be necessary before any valid conclusions could be drawn concerning its future importance in medicine or in the dairy industry.

The voucher collection of leaves of *Euphorbia lancifolia* upon which this article is based (Frederic Rosengarten, Jr. *s. n.*, July 10, 1979, Guatemala City, Guatemala) has been deposited in the Botanical Museum of Harvard University.

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ILLUSTRATIONS: Plates 24, 25, 27, 30 and 31 by A. Gutt; plate 26 from *Las Plantas Medicinales del Departamento de Alta Verapaz*, by Erwin P. Dieseldorff, 1940; plates 28 and 29 by Elmer W. Smith; plates 32, 33, 34 and 35 by Dr. Manuel Serrano.

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PLATE 24

Plate 24. The rank, much-branched, perennial herb, ixbut — 7 years old. Botanical Garden, Guatemala City.

PLATE 25

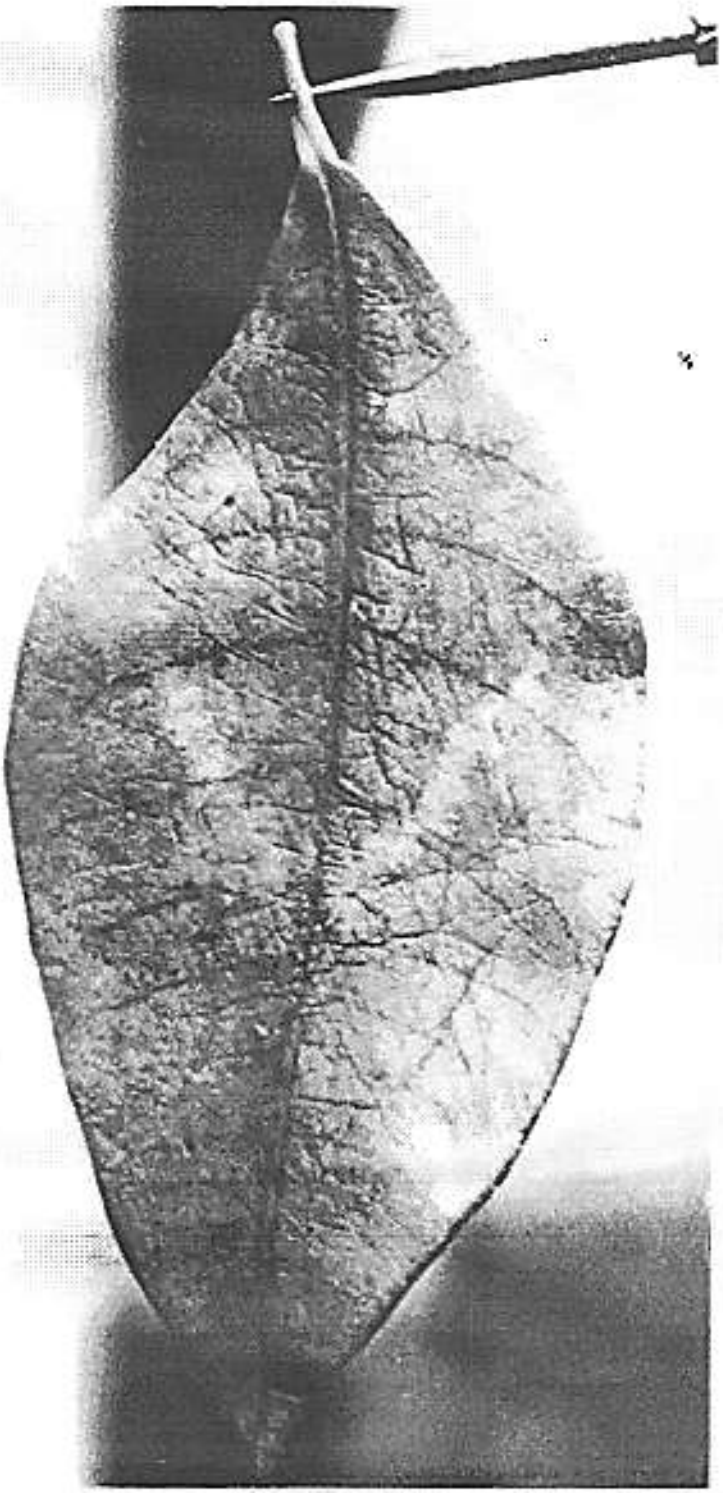


Plate 25. The rhombic-lanceolate, dark green ixbut leaf, 5 to 9 cm. long, is usually characterized when fresh by a unique white "V", stretching from midrib to margin.

PLATE 26

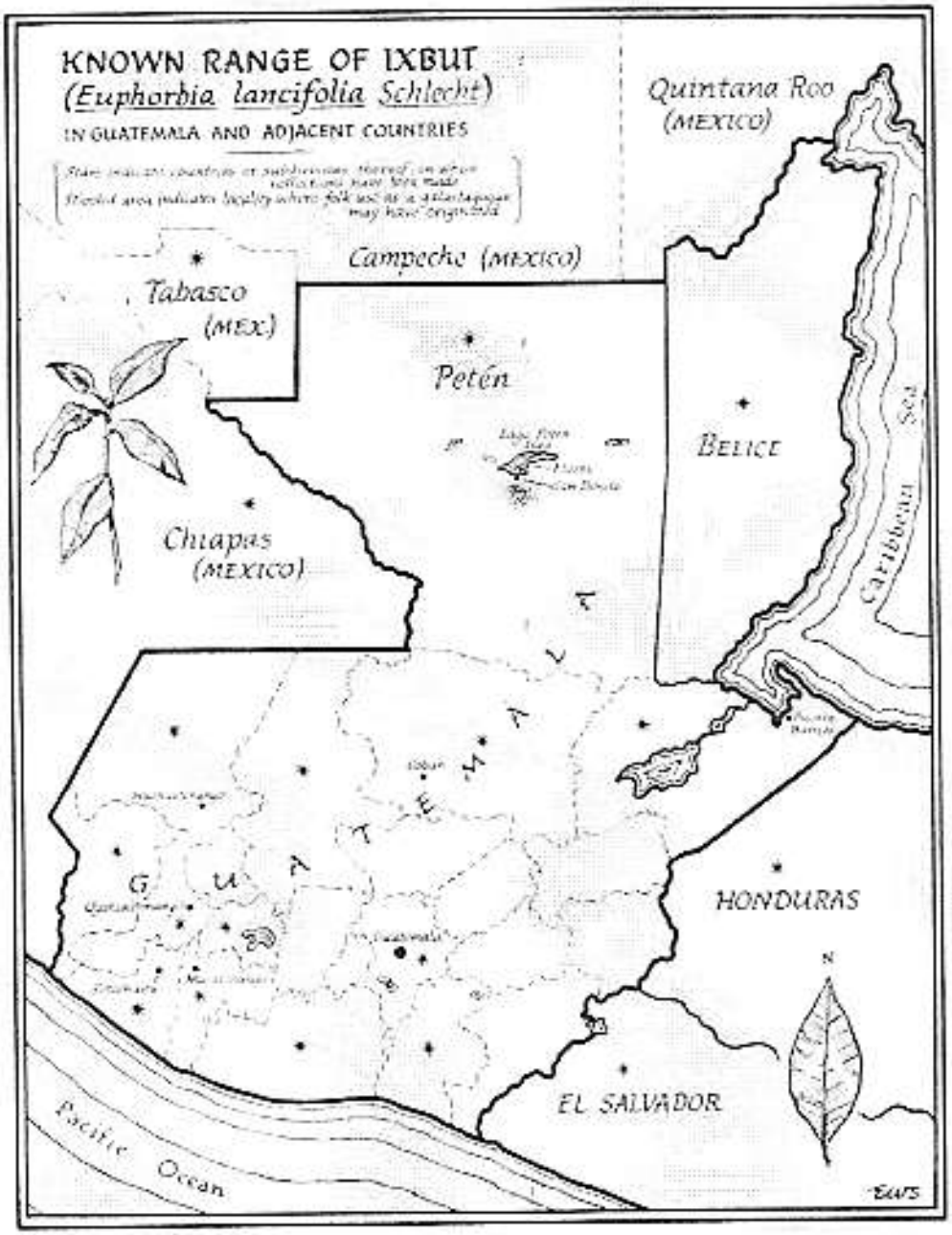
Ixbut

Plate 26. Drawing of ixbut from Erwin P. Dieseldorff's *Las Plantas Medicinales del Departamento de Alta Verapaz*. Note the typical V-markings on the leaves.

PLATE 27

Plate 27. Ixbut in the Botanical Garden, Guatemala City. The leaves contain a milky latex, possibly the source of the active galactagogue principle.

PLATE 28


KNOWN RANGE OF IXBUT
(Euphorbia lancifolia Schlecht)
IN GUATEMALA AND ADJACENT COUNTRIES
Quintana Roo
(MEXICO)
Campeche (MEXICO)
Tabasco
(MEX.)
Petén
BELICE
Chiapas
(MEXICO)
Caribbean Sea
HONDURAS
EL SALVADOR
Pacific Ocean

EXPLANATION OF PLATE 29

(1) Flowering stems, about one half natural size.
(2) Root system with nodules, about one half natural size.
(3) Inflorescence (cyathium), showing nectar glands, the four fimbriate lobes of the cup, and the single, pendent, developing female flower, about seven times natural size.
(4) One segment of the dried dehiscent seed capsule, about six times natural size.
(5) Fresh seed, about six times natural size.

Botanical Illustration by E. W. Smith

PLATE 29

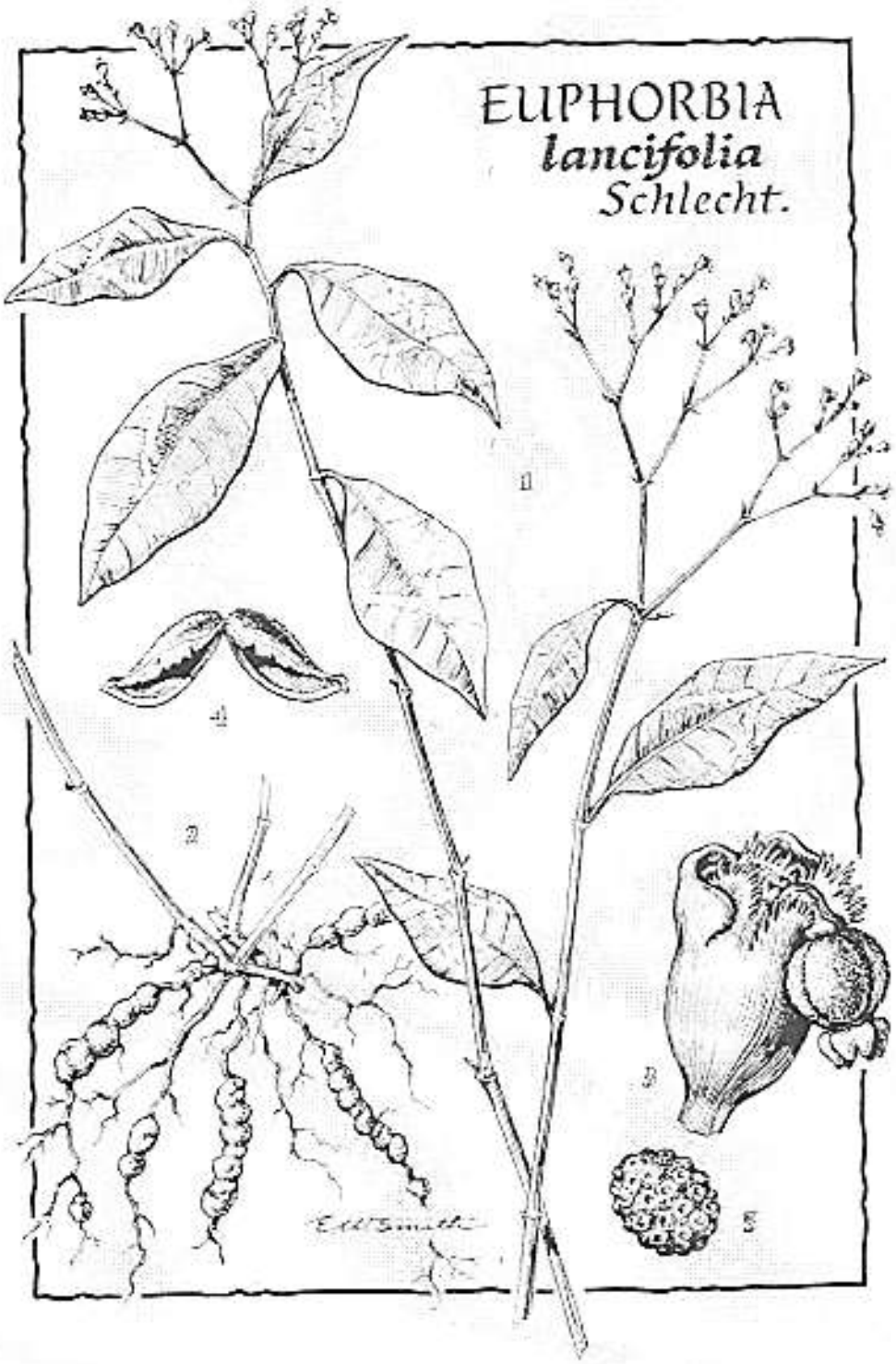


PLATE 30

Plate 30. Ixbut in the Botanical Garden, Guatemala City.

PLATE 31

Plate 31. Close-up view of root system of ixbut.

PLATE 32

Plate 32. An 18-year old, postpartum, Indian mother selects ixbut leaves for brewing in her herbal tea. Quezaltenango, Guatemala.

PLATE 33

Plate 33. The traditional Guatemalan Indian preparation of ixbut tea: brew about 5 grams (5 fresh, macerated ixbut leaves) in 250 cc. of boiling water; allow to cool; add sugar as desired.

PLATE 34

Plate 34. Dosage of ixbut herbal tea, traditionally recommended in Guatemala: 6 cups daily for 3 to 5 days to promote lactation. (Daily dose of 30 grams of ixbut in infusion.)

PLATE 35

Plate 35. 24 hours after this young Indian mother had taken ixbut tea, she was able successfully to breast-feed her baby.