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MEDICINAL USES OF SOUTH AMERICAN PALMS*

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Summary

Palms are the most versatile group of plants used by man, providing all of the basic necessities (food, shelter, fuel and fiber) as well as many ameliorants (spices, oils, waxes, gums, poisons and medicines). The importance of palms in the pharmacopoeias of South American Indians has received little attention. This paper presents the results of a literature search on the medicinal uses of South American palms and suggests that phytochemical screening of these species might result in the identification of new and useful biodynamic compounds.

Acreditamos que as palmeiros bem estudadas sob o ponto de vista da sua composicao quimica e acao fisiologica, poderao aduzir ainda, ao nosso arsenal terapeutico, muitos produtos de real importancia.**

F.C. Hoehne, 1939.

Introduction

In terms of usefulness and versatility, palms are the most important group of plants used by man throughout their tropical and subtropical distribution. In many places palms are considered the "Trees of Life" because of their bountiful yields as well as their grace and majesty. Palms represent important symbols in Judaism, Christianity, Hinduism, Buddhism, and Islam and many other religions (Schultes, 1977). Linnaeus was so awed by this regal group that he named them "Principes" — the Princes of the Plant Kingdom.

Nowhere is man's dependence on palms more evident than in aboriginal societies inhabiting tropical regions. Palms provide these people with foods, fibers, shelter, fuels, oils, waxes, gums, poisons, weapons and medicines. The

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**We believe that the palms, well-studied from the point of view of their chemical composition and physiological action, will be able to add to our therapeutic arsenal many products of real importance.

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late H.E. Moore, Jr., the foremost modern day student of the Palmae, has commented on the paramount role of palms in the indigenous cultures of the Neotropics:

> The importance of man as a biotic factor in the tropical ecosystem has been argued... However, to whatever extent man has been involved in the tropical ecosystem, palms have certainly been a major factor in making possible this involvement and even today, despite the advent of the corrugated tin roof and the rifle, they are of primary importance to many primitive Indian cultures (Moore, 1973).

The multitude of goods which can be produced from a single species of palm is worth noting. For example, the well known "Moriche" or "Buritĺ palm (*Mauritia flexuosa* L.f.) provides many South American Indian tribes with a veritable cornucopia of products. Both the "palmito" (palm heart) and the fruit are edible, and the fruit is said to have as much Vitamin C as citrus (National Academy of Sciences, 1976). The mesocarp contains an edible oil which is reported to be richer in Vitamin A than carrots and spinach (National Academy of Sciences, 1976). A starch is extracted from the pith of the trunk and is used to make bread. The sweet sap of the trunk is combined with the fruit and the unopened flower clusters to make wine. The young leaves contain a strong fiber which the Indians weave into hammocks, fishing nets, mats, hats and baskets. The petioles yield a cork-like material which is used to make sandals, rafts and even mattresses. The wood of the trunk is made into rafts and floats (Moore, 1973; National Academy of Sciences, 1976; Balick, 1979, 1980a; R.E. Schultes, pers. commun.).

The Buritĺ palm thrives in or near swamps and bogs, regions ill-suited for modern agriculture, and thus permits productive use of land which would otherwise be considered to be of marginal utility. This has important implications for solving one of the major problems faced by policy-makers in many tropical countries — how to increase productivity of regional ecosystems without reducing their rich biological diversity. Palms can play a major role in achieving this difficult goal. They are extraordinarily productive, yield a wide variety of desirable goods, and grow well in forested, semi-forested and even deforested regions.

Ethnomedicine and the search for new biodynamic compounds

While a number of recent works have discussed the commercial exploitation of palms for oil (Kitzke and Johnson, 1975; National Academy of Sciences, 1976; Balick, 1979, 1980b) and fiber (Kitzke and Johnson, 1975; Schultes, 1977), the potential of palms as sources of new and useful biodynamic compounds has received little attention.

Compared to the dicotyledons, monocotyledonous plants have given relatively little to modern medicine. Perhaps the most important monocotyledonary substances in current medical use are steroidal sapogenins extracted

from the Mexican yam, *Dioscorea*, which are used in the manufacture of oral contraceptives.

Nevertheless, the fact that a group of plants is not known to possess biodynamic compounds does not prove that they lack these substances. It may mean only that they have not been subjected to phytochemical investigation. In fact, only a small portion of the world's flora has been screened for biodynamic compounds (Farnsworth, 1966; Schultes and Swain, 1976). Testing of plants for the presence of new chemicals is a costly and time-consuming operation, and the most cost-effective method involves concentrating on plants which are known to be of value in ethnomedicine (Farnsworth, 1966). Local peoples often have a highly sophisticated knowledge of which plants have useful properties. Many of the major plant medicines in use today, such as reserpine from *Rauvolfia* and *d*-tubocurarine from *Chondodendron*, were "discovered" through ethnobotanical enquiry (R.E. Schultes, pers. commun.). Furthermore, our industrialized cultures may have very different uses for plant chemicals than the peoples who were originally found using them. Vincristine and vincaleucoblastine, two of our most effective anti-cancer drugs, were extracted from a plant investigated because local peoples were employing it to treat hypoglycemia (Cordell and Farnsworth, 1976).

Though palms are seldom considered to be of promise as sources of new and useful biodynamic compounds, evidence suggests that they may indeed have medicinal potential. The related families Amaryllidaceae and Liliaceae have a number of steroidal sapogenins. Recent testing of the Orchidaceae has turned up a number of unique orchid alkaloids (Schultes and Swain, 1976).

The Malaysian betel-nut palm (*Areca catechu*) is an important masticatory in the Far East, and contains a number of alkaloids, including arecoline ($C_8H_{13}NO_2$), arecaine ($C_7H_{11}NO_2$), arecaidine ($C_7H_{11}NO_2$), and guvacine ($C_6H_9NO_2$). Much experimentation has been undertaken with betel-nut palm fruit, including a recent study of its antifertility activity. Betel-nut oil was administered to female albino rats at two doses of 250 mg/kg and 500 mg/kg body wt. This resulted in antifertility activity of 60% and 80%, respectively (Garg, 1974). Arecoline was once widely employed as a vermifuge but was discontinued for human use due to its toxicity. It is still used in veterinary medicine (R.E. Schultes, pers. commun.) A recent study has shown betel-nut to contain active components which can break chromosomes (Panigrahi and Rao, 1982).

A large-scale survey of Malayan plants found five genera of palms (*Calamus*, *Caryota*, *Korthalsia*, *Pinanga* and *Plectocomiopsis*) to contain alkaloids or saponins in their fruits, seeds, leaves, stem and roots (Amarasingham et al., 1964). Three genera of South American palms (*Butia*, *Copernicia* and *Phytelephas*) are known to contain alkaloids (Willaman and Schubert, 1966; Willaman and Li, 1970).

An important first step in the search for new and potentially valuable biodynamic compounds is the compilation of available data on the aboriginal

uses of the plants in question. This paper presents the results of an ethnobotanical literature search on the medicinal uses of South American palms. Plants are listed by their citation in the original literature. A list of current synonomy is given in Table 1.

Species of palms used medicinally

(1) *Acrocomia antioquensis* Posada-Arango
Vernacular names: Colombia: Corozo, Corozo amolado, Corozo caucano, Corozo grande (Perez Arbelaez, 1956).
Medicinal uses: The flowers that have dropped off are employed as pectorals (Perez Arbelaez, 1956).
Other uses: The leaves have a good fiber, the seeds are a source of oil, and the wood is good for construction (Perez Arbelaez, 1956).

(2) *Acrocomia sclerocarpa* Martius
Vernacular names: Brazil: Bacaiuva, Bacaiuvera, Coco baboso, Coco de catarrho, Coco de espinhos, Macacauba, Macahiba, Macahuba, Macaibera,

TABLE 1

SYNONYMS OF PALM TAXA DISCUSSED IN THIS PAPER[a]

Acrocomia sclerocarpa Martius = *A. aculeata* (Jacquin) Loddiges
Astrocaryum ayri Martius = *A. aculeatissimum* (Schott) Burret
Astrocaryum segregatum Drude = *A. vulgare* Martius
Arecastrum romanzoffianum (Chamisso) Beccari = *Syagrus romanzoffiana* (Chamisso) Glassman
Attalea princeps Martius = *Scheelea princeps* (Martius) Karsten
Bactris minor Jacquin = *Bactris guineensis* (Linnaeus) H.E. Moore
Barbosa pseudococos (Raddi) Beccari = *Syagrus pseudococos* (Raddi) Glassman
Cocos coronata Martius = *Syagrus coronata* (Martius) Beccari
Cocos schizophylla Martius = *Syagrus schizophylla* (Martius) Glassman
Cocos weddellii Drude = *Syagrus cocoides* Martius
Cocos yatay Martius = *Syagrus yatay* (Martius) Glassman
Copernicia cerifera Martius = *Copernicia prunifera* (Miller) H.E. Moore
Desmoncus rudentum Martius = *D. orthocanthos* Martius
Diplothemium campestre Martius = *Allagoptera campestris* (Martius) Kuntze
Elaeis melanococca Gaertner = *Elaeis oleifera* (Humboldt, Bonpland and Kunth) Cortes
Guilielma insignis Martius = *Bactris insignis* (Martius) Baillon
Jessenia polycarpa Karsten = *J. bataua* (Martius) Burret
Mauritia minor Burret = *M. flexuosa* Linnaeus filius
Mauritia vinifera Martius = *M. flexuosa* Linnaeus filius
Raphia vinifera Palisot de Beauvois var. *taedigera* (Martius) Drude = *Raphia taedigera* (Martius) Martius
Scheelea butyracea (Martius) Karsten ex Wendland = *Syagrus cocoides* Martius
Socratea exorrhiza (Martius) Wendland = *Iriartea exorrhiza* Martius

[a]For the most part this list of names has been derived from Glassman's work (1972), A Revision of B.E. Dahlgren's Index of American Palms (Dahlgren, 1936).

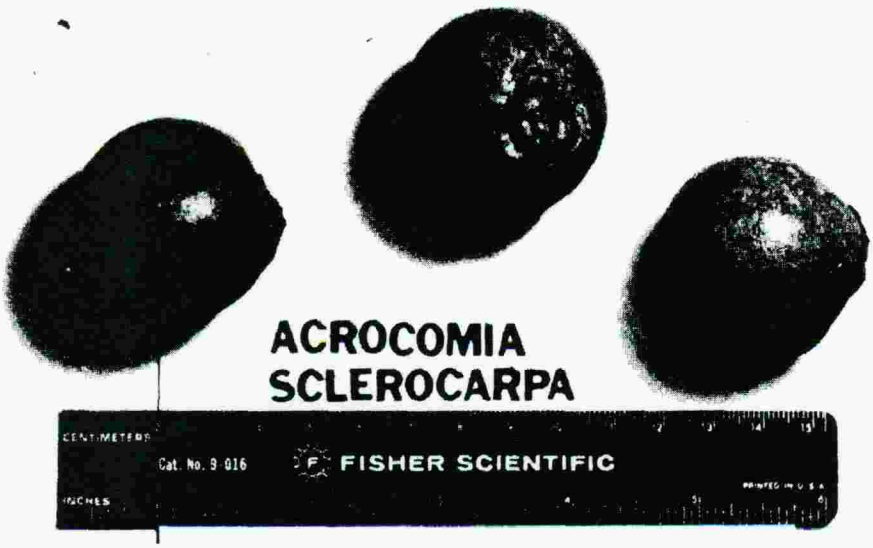

Fig. 1. Fruits of *Acrocomia sclerocarpa*.

Macaiuvera, Macaja, Macajuba, Macáuba, Macoya, Mocajá, Mocajuba, Mucajá, Mucujaseiro (Pio Correa, 1926; Bondar, 1964; Balick, 1979). Venezuela: Corozo, Corozo de vino, Palma de vino (Pittier, 1926). Known as Mocoya and Paraguay palm in the commercial oil trade (Balick, 1979).

Medicinal uses: In Venezuela, the sweet sap is fermented into a wine which is said to increase the likelihood of conception in women who tend to be infertile. The endosperm is used to treat catarrh in Brazil (Pittier, 1926).

Other uses: The mesocarp and kernel oils are similar to the oils extracted from the African oil palm *Elaeis guineensis*. Excellent for the manufacture of soap, the oil of *Acrocomia sclerocarpa* is also edible (Balick, 1979). The wood of the trunk is used to make lathing and the young leaves yield a good fiber (Farquhar and Siegal, 1945).

Comments: Consumption of the fruit to excess is said to cause fever (Hoehne, 1939) which may indicate the presence of biodynamic constituents.

(3) *Arecastrum romanzoffianum* (Chamisso) Beccari

Vernacular names: Brazil: Baba de boi (Rio de Janeiro and São Paulo), Cheribão (Rio Grande do Sul), Coco de Cachorro (Santa Catarina), Coco de sapo (Ceará), Coco juvena (Mato Grosso), Imburi de cachorro (Espirito Santo), Jureva, Palmito amargo, Patí, (Bahia), Pindó (Mato Grosso), Pindoba do sul, Tamara da terra (Pio Correa, 1926). Argentina and Paraguay: Datil, Jeribá, Jirivá, Jurubá (Pio Correa, 1926). Uruguay: Palma chiriva, Palma del monte ((Pio Correa, 1926).

Medicinal uses: The fruit is macerated in wine or the liquid is made into a syrup to prepare what is reputed to be a pectoral (Pio Correa, 1926).
Other uses: The "palmito" is bitter yet edible. The pulp of the fruit is fibrous, mucilaginous, edible and is good forage (Pio Correa, 1926).

(4) *Astrocaryum ayri* Martius
Vernacular names: Brazil: Ayri, Brejaúba, Coco de ayri, Coqueiro brejaúba, Iri, Yri (Pio Correa, 1926).
Medicinal uses: The mesocarp produces an oil which is employed as an anti-helminthic (Pereira, 1929). The unripe fruit contains approx. 10 g of a potable liquid (Agua de ayry) taken as a laxative and to treat jaundice. When the fruit ripens, the liquid endosperm solidifies, containing 18% of the oil known as "Oleo de ayri". This substance is dried and reputed to be used as taenifuge (Pio Correa, 1926). The fruits are used in Brazil to treat erysipelas (Usher, 1974).

Fig. 2. Fruits of *Astrocaryum* sp. (M.J. Balick et al., no. 922).

Other uses: The fruit is edible and when unripe contains a drinkable endosperm. The mesocarp oil is used for illumination. The wood is used to make walking canes, bows and lathes (Pereira, 1929).

(5) *Astrocaryum murumuru* Martius
Vernacular names: Murumuru (Farquhar and Siegal, 1945; Schultes, 1977).
Medicinal uses: The mesocarp is edible, sweet, and aromatic and is said to be a light aphrodisiac (LeCointe, 1934).
Other uses: The endosperm contains up to 40% fat and is the basis of a commercial trade in Brazil (Balick, 1979). The leaves are the source of a very strong white fiber. The fruit is fed to cattle and swine (Schultes, 1977).
Comments: It has been reported that a paste prepared from the fruits of this palm is used to treat sprains and fractures in Suriname (May, 1965), but these fruits may actually be from *A. sciophilum* (Miquel) Pulle (Wessels Boer, 1965).

(6) *Astrocaryum segregatum* Drude
Vernacular names: Suriname: Awarra (May, 1965; Wessels Boer, 1965).
Medicinal uses: The mesocarp is used to treat coughs and as a breath purifier (May, 1965).

(7) *Attalea oleifera* Barbosa Rodrigues
Vernacular names: São Paulo: Coqueiro catulé, Caqueiro catolé (Pereira, 1929).
Medicinal uses: The oil of the seed kills Bicho de pé (*Tunga penetrans?*) and is used to treat erysipelas (Pereira, 1929).
Other uses: The mesocarp is oleaginous and edible, and gives oil used for the manufacture of soap, for illumination, and as a condiment. The husk of the fruit gives a good fiber and the palmito is edible (Pereira, 1929).

(8) *Attalea princeps* Martius
Vernacular names: Brazil: Acurí, Auacurí, Coqueiro naiá, Guacurí, Naía, Rucurí, Uacurí (Pio Correa, 1926). Bolivia and Peru: Motacú (Pio Correa, 1926).
Medicinal uses: The oil of the fruit pulp is used to keep the hair in good condition (Cardenas, 1969). The endosperm in its liquid form prior to maturation is recommended for treating ophthalmia. The endosperm gives an edible oil which seems to be a good treatment for combating baldness (Pio Correa, 1926).
Other uses: The leaves are used to make roofing (Cardenas, 1969). The dried epicarp burns well and is used to smoke-cure rubber. The endocarp yields an excellent edible oil. Indians in Brazil extract an edible starch from the mesocarp. The "palmito" is edible and the fruits can be eaten after cooking. The stem is used for construction, and the leaves produce a good fiber and are also used as forage (Pio Correa, 1926).

(9) *Attalea spectabilis* Martius
Vernacular names: Brazil: Curuá piranga, Uauassú (Mato Grosso) (Pio Correa, 1926).
Medicinal uses: An anti-rheumatic liniment is prepared from the endosperm. Dissolved in water, the endocarp makes a thirst-quenching drink which is taken as a febrifuge (Pio Correa, 1926).
Other uses: The endosperm yields an oil which is used to make soap and is edible after refining. The seed cake is good forage (Pío Correa, 1926).

(10) *Bactris minor* Jacquin
Vernacular names: Colombia: Chonta, Corocito, Lata sabanera (Garcia Barriga, 1974).
Medicinal uses: The fruits are employed in decoction as an anti-helminthic, as a laxative, and to treat snake-bite (Garcia Barriga, 1974).

(11) *Bactris oligoclada* Burret
Vernacular names: Guyana: Kidalebanaro (Fanshawe, 1950).
Medicinal uses: A decoction of the "palmito" is employed in the treatment of bronchitis (Fanshawe, 1950).

(12) *Bactris* sp.
Vernacular name: Peru: Uwarahiba (Bora) (Balick, pers. observ.).

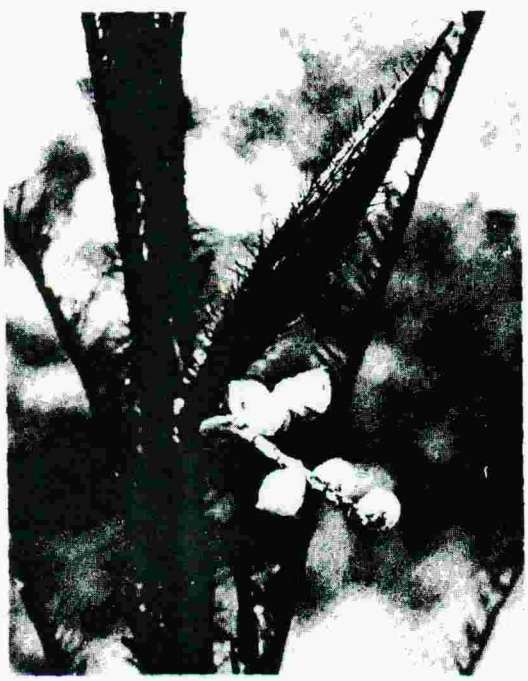

Fig. 3. Fruits of *Bactris* sp.

Medicinal uses: The ripe fruits are edible and the endosperm is very sweet. They are said to have a soporific effect when consumed in large quantities Balick, pers. observ.).
Comments: This collection (Balick et al. no. 1050) is most closely allied to *Bactris chaetoclamys* Burret or *B. macroacantha* Martius.

(13) *Barbosa pseudococos* Beccari
Vernacular names: Brazil: Coco amargoso, C. verde, Gariroba, Palha bronca, Palmito amargoso, Paty amargoso (Pio Correa, 1926).
Medicinal uses: The "palmito" is bitter and taken as a stomachic after it has been macerated in cold water (Pio Correa, 1926).
Other uses: The "palmito" is edible after maceration in cold water. The new leaves furnish a fiber used to make hats and other woven goods. The wood is used in light construction (Pio Correa, 1926).

(14) *Chamaedorea* sp.
Vernacular names: Colombia: Caña de San Pablo, Caña de vibora (Perez Arbelaez, 1956).
Medicinal uses: This palm is employed in the treatment of snakebite in Colombia (Perez Arbelaez, 1956).

(15) *Cocos coronata* Martius
Vernacular names: Brazil: Aricury, Butiá (Santa Catarina), Butiá seiro (Rio Grande do Sul), Cabecudo, Coco cabecudo, Coqueiro cabecudo, Coqueiro diocori, Licury, Licury-seiro, Nicury, Urucury, Urucury-yba (Pernambuco) Pio Correa, 1926; Balick, 1979).
Medicinal uses: The seed contains 38% of a colorless oil which, when eaten, is said to be an effective treatment for wounds caused by stingrays (Pio Correa, 1926).
Other uses: This palm yields a marketable wax, an edible oil, and an edible fruit. The kernel oil is used in the manufacture of soap (Balick, 1979). A starch can be extracted from the pith. The leaves are used to thatch houses and produce a weavable fiber (Pio Correa, 1926).

(16) *Cocos schizophylla* Martius
Vernacular names: Brazil: Alicury, Aricuri, Arikury, Ariry, Nikury (Bahia), Ouricury, Urucury (Pio Correa, 1926).
Medicinal uses: The juice extracted from the fruits prior to ripening is used to treat ophthalmia (Pio Correa, 1926).
Other uses: The endocarp is oily, mucilaginous, and edible. The leaves are used to weave hats (Pio Correa, 1926).

(17) *Cocos weddellii* Drude
Vernacular name: Brazil: Patí.
Medicinal uses: The fruits are considered poisonous and are not eaten.

Fishermen on the Island of São Luis in Maranhão employ the inflorescences as a piscicide (Hoehne, 1939).

(18) *Cocos yatay* Martius
Vernacular names: Brazil: Butía, Coqueiro jatahy.
Argentina: Yatahy (Pio Correa. 1926).
Medicinal uses: The endosperm is an anti-helminthic (Pio Correa, 1926).
Other uses: An edible starch is extracted from the pith. The endosperm furnishes an edible oil of good quality. The pulp around the seeds contains sugar and is fermented to produce an alcoholic drink. The leaves are used to make hats, baskets and woven goods (Pio Correa, 1926).

(19) *Copernicia cerifera* Martius
Vernacular names: Brazil: Carnáuba, Carnahubeira (Pio Correa, 1926).
Medicinal uses: The roots are depurative and diuretic, and have been used to treat rheumatism, arthritis and skin diseases (Braga, 1960). The roots are employed as a diuretic and alterative (LeCointe, 1934). The wax is used to make unguents and plasters (Pio Correa, 1926).
Other uses: This palm is the source of the famed carnaúba wax of commerce (Usher, 1974).
Comments: The roots are known to contain an alkaloid (Willaman and Schubert, 1961).

(20) *Desmoncus polyacanthos* Martius
Vernacular names: Brazil: Curumbamba, Jacitara, Rutim, Umbamba (Pio Correa, 1926). Suriname: Asitaremoe (Carib), Bambamaka (Bushnegro), Kamoeali (Arawak), Pierieh (Wayana), Pierietoima (Trio) (Wessels Boer, (1965).
Medicinal uses: The roots are considered depurative and are used medicinally in rural areas (Pio Correa, 1926; LeCointe, 1934).
Other uses: The stem is used to make chairs and switches for animals (Pio Correa, 1926).

(21) *Desmoncus rudentum* Martius
Vernacular names: Brazil: Atitara, Jacitara, Jequitá, Palmeira do brejo, Urubamba, Urum (Mato Grosso) (Pio Correa, 1926).
Medicinal uses: The roots are reported to be an effective treatment for skin ailments such as eczema. Taken in decoction, they are a powerful purgative (Pio Correa, 1926).
Other uses: The stem is used to make flexible canes and chair seats (Pio Correa, 1926).

(22) *Diplothemium campestre* Martius
Vernacular names: Brazil: Ariry, Buri do campo, Coco de vassoura (Mato Grosso), Coqueiro ariri (São Paulo), Coqueiro pissandó, Embury, Guriry do campo, Imbury, Pissandó, Pissandú (Pio Correa, 1926; Pereira, 1929).

Medicinal uses: The juice of the green fruit is used to treat eye infections (Pereira, 1929). The meaty part of the fruit is bitter and is used as a febrifuge (Pio Correa, 1926).

Other uses: The fruit is edible (Pereira, 1929). The leaves of the palm are used to make brooms and other woven goods. An extract of the fruit is employed as a mordant (Pio Correa, 1926).

(23) *Elaeis melanococca* Gaertner

Vernacular names: Brazil: Caiahuá, Caiaué, Cayaué, Dendeseiro do Pará (Pio Correa, 1926; Farquhar and Siegal, 1945). Colombia: Corocito, Corozo, Corozo antu, Corozo manteca, Corozo del sinu, Noli, Yoli (Balick, 1979).

Medicinal uses: Colombian curanderos use the oil as a medication for stomach inflammation (Duke, 1968). In Brazil and Colombia the oil is used as a hair tonic and a treatment for dandruff. Some Indians anoint themselves with oil to repel insects. The hairs in the leaf axils are considered hemostatic (Pio Correa, 1926). The fat from the fruit is used in Colombia as a hair tonic and as a treatment for dandruff (Usher, 1974).

Other uses: The pulp oil serves as a butter substitute and the kernel oil is used as an illuminant, for cooking, and in the manufacture of soap. The fruit is rich in Vitamin A (Balick, 1979). The hairs in the leaf axils are used to start fires (Pio Correa, 1926). The oil is used for machinery (Usher, 1974).

(24) *Euterpe edulis* Martius

Vernacular names: Argentina: Yayih (Pio Correa, 1926). Brazil: Iucara, Jicara, Jucora, Palmito, Palmito doce, Palmito jucora (Pio Correa, 1926).

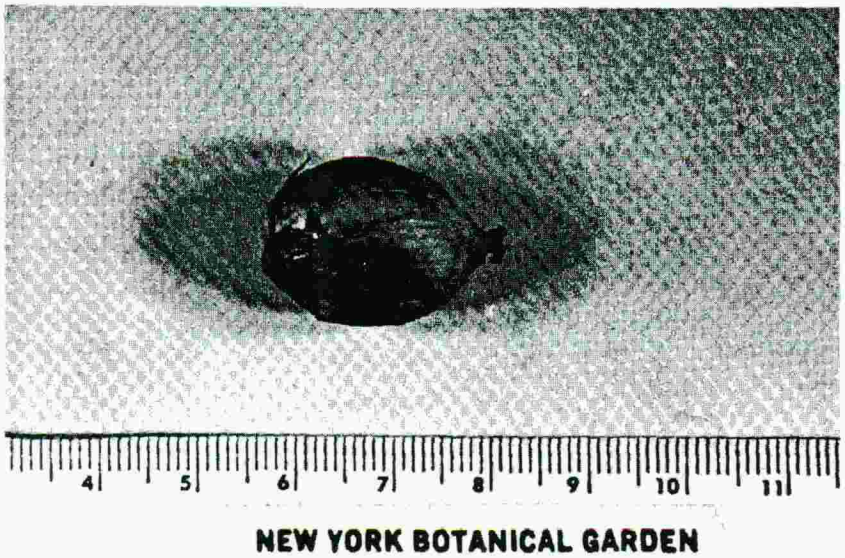

Fig. 4. Fruit of *Elaeis melanococca*, now called *E. oleifera* (Killip and Smith no. 14459).

Guyana and Venezuela: Manicole (Pio Correa, 1926; Fanshawe, 1950).

Medicinal uses: The roasted "palmito" is applied to soothe scorpion stings. The juice from the roasted "palmito" should be taken internally at the same time (Fanshawe, 1950). The sap of the young stem is used as a hemostatic (Pio Correa, 1926).

Other uses: The "palmito" is edible. The sap of the young stem is fermented to produce alcohol. The young stem gives a good fiber, similar to that of "piassaba." This fiber is used to make brooms. The fruits are used to smoke-cure rubber. These fruits yield a type of wine with nutritive properties similar to those of chocolate. The leaves are used as forage (Pio Correa, 1926).

(25) *Euterpe oleracea* Martius

Vernacular names: Brazil: Açal, Açaizeiro, Assaí, Jicara, Jucara, Palmiteiro, Piriá (Prance and da Silva, 1975; R.E. Schultes, pers. commun.). Colombia: Assai, Manaca (Schultes, 1977). Suriname: Manaka (Arawak), Pinapalm, Prasara (Bushnegro), Wapoe (Trio, Wayana), Wasei (Carib) (Wessels Boer, 1965; Prance and da Silva, 1975; Plotkin and Werkhoven, unpublished).

Medicinal uses: The Matowai Bush negroes of Suriname apply the sap to cuts as a hemostatic (unpublished data). The fruit furnishes a dark green oil used in rural medicine, principally as an anti-diarrheal agent (Prance and da Silva, 1975).

Fig. 5. Fruits of *Euterpe oleraceae* (M.J. Balick et al., no. 904).

Other uses: The "palmito" is edible and the oil from the fruit pulp has industrial applications (Farquhar and Siegal, 1945). The fruit is used to make ice cream and a beverage in Peru and Brazil. This species might also be the source of a strong structural fiber (Schultes, 1977).

(26) *Euterpe stenophylla* Trail ex Burret.
Vernacular names: Guyana: Winamoru (Fanshawe, 1950).
Medicinal uses: A decoction of the roots is mixed with the roots of *Manicaria saccifera* Gaertner and bamboo leaves and is employed in the treatment of bronchitis (Fanshawe, 1950).

(27) *Euterpe* sp.
Vernacular name: Winamoru (Warao) (Wilbert, 1975).
Other uses: In the Orinoco Delta, the fruits of this species are eaten by cotorra parrots and are considered poisonous to all other birds. Shamans of the Warao tribe employ the leaf stipule as a wrapping for sacred tobacco cigars (Wilbert, 1975).

(28) *Guilielma insignis* Martius
Vernacular names: Brazil: Ceriba, Chonta, Palmeira real, Piriguao, Pirijao (Pio Correa, 1926). Bolivia: Palma real (Pio Correa, 1926), Tembe (Cardenas, 1969).
Medicinal uses: The oil from the seeds is said to be anti-rheumatic (Pio Correa, 1926).
Other uses: The fruits are eaten fresh or dried and are considered to be among the finest of palm fruits. The wood is used to make bows and arrow points and the spines are used in tattooing (Pio Correa, 1926).

(29) *Iriartea ventricosa* Martius
Vernacular names: Brazil: Coqueiro do matto (São Paulo) (Pereira, 1929). Ecuador: Taraputu (Río Pastaza region) (M. Shemluck, pers. commun.).
Medicinal uses: The inner layer of the leaf sheath is employed with a species of *Iris* to give women strength during childbirth (M. Shemluck. pers. commun.).
Other uses: The wood is used in light construction and to make lathes (Pereira, 1929). The "palmito," the fruit, and the seed are edible (M. Shemluck, pers. commun.).

(30) *Jessenia bataua* (Martius) Burret
Vernacular names: Colombia: Ataíto, Come, Comenya, Cuperi, Milpesos, Ñumuñu (Tukano), Obango (Guahibo), Palma milpé, Patabá, Sejé, Yavecohanu (Kubeo) (Acero Duarte, 1979; Balick, 1979; Schultes, 1979). Peru: Sacumana, Ungurauy (Balick, 1979).
Medicinal uses: The oil is believed to have anti-tubercular properties. In Peru the palm oil is mixed with sweet almond oil and used as a purgative and to

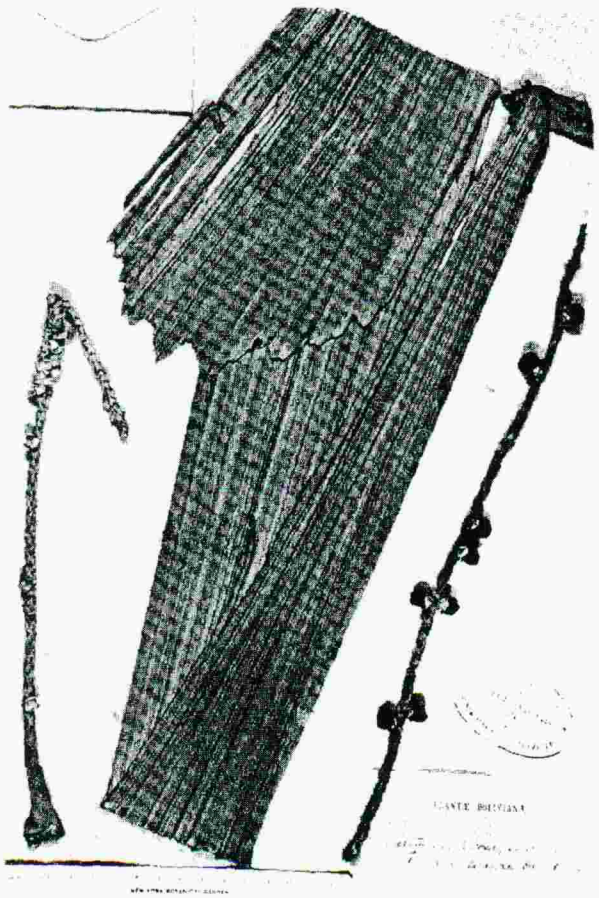

Fig. 6. Leaf section of *Iriartea ventricosa*, the sheath of which is used medicinally (A.M. Bang, no. 1734).

treat chronic cough and bronchitis. The oil is taken as a purgative. The Bora Indians take an infusion of the seedlings as a snakebite antidote. The palm oil is mixed with a local liniment in Peru and rubbed on arthritic inflammations (Balick, 1980b). The Waorani of Ecuador employ the adventitious roots as a treatment for worms, diarrhea, headaches and stomach ailments (E.W. Davis, pers. commun.).

Other uses: Indians make a fermented "chicha" from the fruits (Acero Duarte, 1979). The Xiriana-teri make a dark-blue dye for their bodies from the fruit (Anderson, 1978). The processed pericarp yields an oil which tastes like olive oil and is excellent for cooking and for use as a salad oil (Balick, 1979). The oil is also used to preserve meat. The "palmito" is edible. The Bora Indians culture grubs (*Rhynchophorus palmarum*) in the stem (Balick, 1980b). The Waorani break-up the fibrous leaf bases and use them to clean the bore of blowguns, to start fires and to make flares. The leaves provide thatch (E.W. Davis, pers. commun.).

Fig. 7. Seedlings of *Jessenia bataua*, which are used as a snakebite remedy.

(31) *Jessenia polycarpa* Karsten

Vernacular names: Colombia: Bataba, Consá, Coroba, Cuumú (Karijona), Guacaria (Makuna), Guapée (Matapa), Ko-maí-he (Witoto), Milpes, Milpesos, Nõmia, Numuñame (Guananos), Patabá (Yeral), Punamá (Yukuna), Reña (Kubeo), Seje grande, Unama, Unamo (Schultes, 1951; Perez Arbelaez, 1956; Garcia Barriga, 1974; National Academy of Sciences, 1976; Balick, 1979). Venezuela; Jagua (National Academy of Sciences, (1976).

Medicinal uses: The mesocarp oil is used during childbirth and to treat bronchitis, consumption, pulmonary afflictions and tuberculosis (Balick, 1979). The oil of the fruit pulp is employed as an anodyne in the Darien (Duke, 1968). The oil has been used in the Colombian Llanos for many years to treat tuberculosis and other pulmonary ailments with good results. It is also employed in the treatment of bronchial problems, grippe, and colds and is either taken orally or injected (Garcia Barriga, 1974). The Witoto Indians believe that the fruits have anti-tubercular properties when eaten (Schultes, 1951).

Other uses: The mesocarp oil chemically resembles olive oil and is employed for cooking and in the manufacture of soap and cosmetics (Balick, 1979).

(32) *Leopoldinia major* Wallace

Vernacular names: Brazil: Iará-assú, Jará-assú (LeCointe, 1934).

Medicinal uses: Indians in Brazil employ the ashes of the fruits as an antidote

for curare poisoning. The ashes are applied directly to the wound (Le Cointe, 1934).

Other uses: Indians use the ashes as a salt substitute. The endocarp is used to make buttons and earrings (LeCointe, 1934).

(33) *Manicaria saccifera* Gaertner

Vernacular names: Brazil: Turvy, Ubussu (Balick, 1979). Colombia: Guágara, Palma de jicara, Timiche (Perez Arbelaez, 1956; Balick, 1979). French Guiana: Tourlouri, Turury (Balick, 1979). Guyana: Timiti, Troolie (Fanshawe, 1950; Balick, 1979). Suriname: Timiti (Carib), Toeroli (Carib), Troeli (Bushnegro) (Wessels Boer, 1965).

Medicinal uses: In Guyana, the milk of the young fruits is a remedy for coughs, and for "thrush", a fungoid infection of tongue or mouth of babies. The roots of this palm and the leaves of bamboo are mixed with a decoction of the roots of *Euterpe stenophylla* to treat coughs and asthma (Fanshawe, 1950). In Venezuela, the Indians extract a milk from the fruits to treat coughs and asthma (Pittier, 1926). The Warao Indians employ this palm as follows: (a) To alleviate coughing and to suppress fever, the water of the fruit is carefully strained through a cloth to remove impurities. Three cups of the liquid are drunk each day. (b) The fresh eophylls of *Mauritia* sp. are mixed with *Manicaria* water to prepare a potion used to treat coughs and fever; to this mixture is added the urine of a child of the opposite sex, and after leaving the mixture to sit for 48 h, it is applied to the body, especially to the temple and forehead. The treatment is repeated three times a day. Small children are washed with the liquid from head to toe to stop diarrhea accompanied by fever. Occasionally, they are given a small quantity to drink. The water of the fruit is said to facilitate breathing in congested patients; the grated "palmito" is mixed with the fruit water and imbibed (Wilbert, 1975).

Other uses: Each tree produces about 7 kg of fruit per year, yielding 57% of an oil similar to coconut oil. The Indians use the spathes as hats (Balick, 1979), as backpacks (Perez Arbelaez, 1956), the petioles to start fires, and the leaves for roofing (Pittier, 1926).

(34) *Mauritia aculeata* Humboldt, Bonpland, and Kunth

Vernacular names: Buriyrana, Caraná, Caranái, Carandáhy, Cauiá, Uliyá (Pio Correa, 1926).

Medicinal uses: The fruits are soaked in water to make a cooling tonic (Pio Correa, 1926).

Other uses: The leaves are used to make woven goods (Pio Correa, 1926).

(35) *Mauritia flexuosa* Linnaeus filius

Vernacular names: Brazil: Boriti, Buritĺ, Murity do brejo (Balick, 1979). Bolivia: Caranday-guazu, Idevi (Balick, 1979). Colombia: Aguaje, Canangucha, Miriti, Moriche (Acero Duarte, 1979; Balick, 1979). French Guiana: Palmier

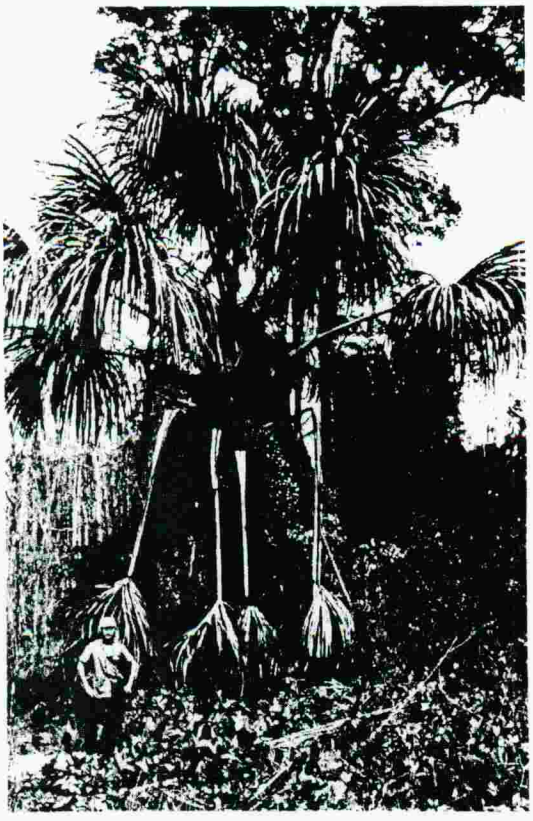

Fig. 8. *Mauritia flexuosa*, which yields a medicinally useful sago-like substance from its stem.

bache, Pibache (Prance and da Silva, 1975; Balick, 1979). Guyana: Ita, Ite (Fanshawe, 1950; Balick, 1979). Peru: Aguaje (Prance and da Silva, 1975). Suriname: Ite (Arawak), Koj (Trio, Wayana), Maurisie, (Bushnegro) Morisi, (Carib) (Wessels Boer, 1965).

Medicinal uses: The sago-like pap prepared from the stem pith is considered to be an excellent remedy for dysentery and diarrhea (Fanshawe, 1950). The mesocarp is preserved in the leaves of *Asclepias curassavica* and used to make a refreshing drink which is said to be a good digestive and laxative (Pittier, 1926).

Other uses: The fruit is edible and contains an edible oil. The "palmito" is also edible, and a sago starch is extracted from the pith and used to make bread. The sap from the trunk is combined with the fruit and the unopened flower cluster to make wine. The young leaves are the source of

a strong fiber used to make woven goods, and sandals are made from a cork-like material extracted from the petioles. The trunk wood is made into rafts, posts and bridges, and buttons are made from the seeds (National Academy of Sciences, 1976; Acero Duarte, 1979; Balick, 1979; Schultes, 1979).

(36) *Mauritia minor* Burret

Vernacular names: Brazil: Murití (Perez Arbelaez, 1956). Colombia: Buritĺ, Cananguche, Gui-ne-na-ko-ne (Witoto), Miritĺ, Nanicuni (Coreguaje) (Schultes, 1951; Perez Arbelaez, 1956). Ecuador: Aguaschi (Perez Arbelaez, 1956). Peru: Achul (Perez Arbelaez, 1956).

Medicinal uses: A refreshing drink made from the fruits serves as both a digestive and a laxative (Perez Arbelaez, 1956). Indians in the Colombian Amazon prepare a highly nutritive drink from the fruits. This beverage, called "Chicha de cananguche," has the reputation of strengthening those who are weak due to old age (Schultes, 1951).

Other uses: The leaves are used to cover roofs and to make ropes, cords, and hammocks. Buttons are made from the seeds (Perez Arbelaez, 1956).

(37) *Mauritia vinifera* Martius

Vernacular names: Brazil: Buritĺ (Braga, 1960).

Medicinal uses: The leaves are added to baths as an emollient. The juice of the young stem is taken as a tonic (Braga, 1960).

Other uses: The fruits yield up to 20% of a light yellow oil. A good starchy flour can be made from the trunk (Balick, 1979). The leaves have a strong fiber and are used to cover houses (Braga, 1960).

(38) *Maximiliana maripa* (Correa de Serra) Drude

Vernacular names: The Waorani of Ecuador call the fruiting tree "Oompa" (E.W. Davis, pers. commun.).

Medicinal uses: The Waorani employ an infusion of the fruits to treat colds (E.W. Davis, pers. commun.).

Other uses: The fruits are edible. The Waorani cut the petioles into short lengths and use them to make blowdarts (E.W. Davis, pers. commun.).

(39) *Oenocarpus distichus* Martius

Vernacular names: Brazil: Bacabá de azeite, Bacabá de oleo, Bacabá do Pará, Coqueiro bacabá, Yandy bacabá (São Paulo) (Pereira, 1929; Balick, 1979).

Medicinal uses: The mesocarp produces a green oil used as an emollient (Pereira, 1929).

Other uses: The oil of the mesocarp is similar to olive oil and is employed as a condiment and for illumination. The "palmito" is edible (Farquhar and Siegal, 1945). The fermented sap serves as vinegar. The wood is employed in light construction (Pereira, 1929). The mesocarp is dried, made into a concentrated paste and carried on trips into the jungle. Reconstituted

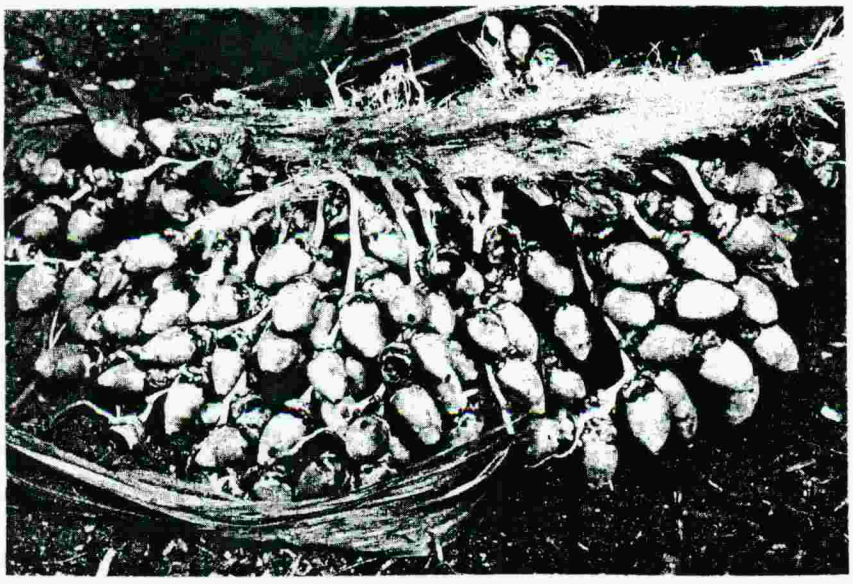

Fig. 9. Section of the fruiting panicle of *Maximiliana maripa*.

by adding water, it produces a delicious drink (Pio Correa, 1926). The fresh fruits are also used to make a popular drink (Usher, 1974).

(40) *Oenocarpus mapora* Karsten
Vernacular name: Mapora (Balick, 1980b).
Medicinal uses: The Bora Indians of Peru mix one handful of green fruits with two cups of hot water, and consume this preparation as a laxative (Balick, 1980b).
Other uses: The seeds are dried and made into necklaces (Balick, 1980b).

(41) *Oenocarpus minor* Martius
Vernacular names: Brazil: Coqueiro bacabá-mirím (São Paulo) (Pereira, 1929).
Medicinal uses: The mesocarp produces a green oil employed as an emollient (Pereira, 1929).
Other uses: The oil from the mesocarp is used as a condiment and for illumination. The fruit pulp is cooked, producing a resin which when dried leaves an edible substance which is made into a wine-like beverage. The fermented sap serves as vinegar. The wood is employed in light construction (Pereira, 1929).

(42) *Raphia vinifera* Palisot de Beauvois var. *taedigera* Drude
Vernacular names: Brazil: Jupaty (LeCointe, 1934).
Medicinal uses: The mesocarp yields an oil which is used for massage in cases of gout, rheumatism, and paralysis (LeCointe, 1934).

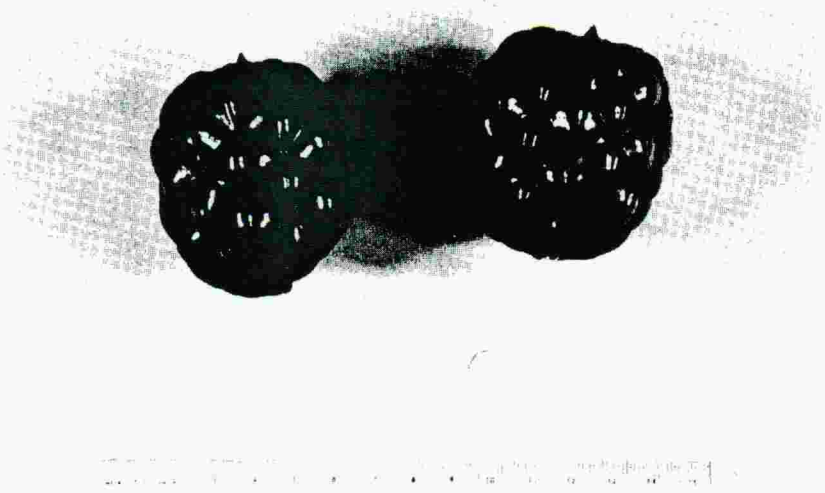

Fig. 10. Fruits of *Raphia vinifera*, the mesocarp of which yields a medicinal oil (N.L. Britton, s.n.).

Other uses: A white fiber extracted from the petiole is used to make hats and small baskets (LeCointe, 1934).

(43) *Scheelea butyracea* (Mutis) Karsten ex Wendland
Vernacular names: Colombia: Corozo de puerco (Valle), Corozo de vaca, Cuesco (Tolima), Curumuta, Palma de vino, Palma real (Perez Arbelaez, 1956).
Medicinal uses: The sweet sap of the trunk is fermented into a wine which is both delicious and medicinal (Perez Arbelaez, 1956).
Other uses: When squeezed or boiled, the endosperm yields a butter which is eaten or employed in lighting. The "palmito" is cooked and eaten. The young leaves are used as thatch (Perez Arbelaez, 1956).

(44) *Scheelea princeps* (Martius) Karsten
Vernacular names: Motacú (Bolivia).
Medicinal uses: Oil extracted from the endosperm is applied to the hair to maintain it in excellent "physiological condition" (Cardenas, 1969).
Other uses: The leaves are used for thatch and its wood for houses, bows, and arrows. Motacú is also harvested for heart of palm (Cardenas, 1969).

(45) *Socratea exorrhiza* (Martius) Wendland
Other uses: The exudate from the prop roots (which causes severe itching to the skin) is used as an admixture in the curare of the Mayongong (Mariquitare) Indians at Auaris, Brazil (G.T. Prance, pers. commun.).

(46) *Syagrus comosa* Martius
Vernacular names: Brazil: Babão (Ceará), Catolé (Piauí), Coqueiro catolé, Gariroba, Guariroba do campo, Guarirobinha do campo, Palmito amargoso (Pio Correa, 1926).
Medicinal uses: The "palmito" is somewhat bitter and is used as a stomachic. The fruit pulp is a diuretic. When roasted, the endosperm is taken as an anti-diarrheal agent (Pio Correa, 1926).
Other uses: The "palmito" is employed as a condiment, especially as a seasoning for meat. The mucilaginous pulp of the fruit is used to make a refreshing drink. A good cooking oil can be extracted from the fruit (Pio Correa, 1926).

(47) *Syagrus oleracea* (Martius) Beccari
Vernacular names: Brazil: Coqueiro amargoso, Coqueiro guariroba, Gariroba, Guahiro, Guariroba, Paty amargoso (Pio Correa, 1926).
Medicinal uses: Although very bitter, the "palmito" is good to eat and is highly regarded as a tonic, a carminative, an anti-hysteric agent and above all, as a stomachic (Pio Correa, 1926).
Other uses: The trunk is made into fence posts and is used in construction. The leaves are eaten by animals when better forage is unavailable. The cotton-like hairs of the petioles and rachis are used to start fires. The fruit pulp is edible and is excellent pig feed. The endosperm is oleaginous and the oil is good for making soap (Pio Correa, 1926).

(48) *Syagrus picrophylla* Barbosa Rodrigues
Vernacular names: Brazil: Babão, Catolé, Coco-babao, (Ceará) (Braga, 1960).
Medicinal uses: A beverage produced by the fermentation of the mesocarp is a diuretic (Braga, 1960).
Other uses: The fruit produces a good oil which is used for eating, for perfume, and as a hair tonic (Braga, 1960).

Conclusion

Palms clearly play an important role in the South American indigenous pharmacopoeia. Some 48 species are outlined here, and further ethnobotanical field investigation will undoubtedly add to this list.

Nevertheless, the biodynamic constituents of the palms remain almost unstudied. By examining the aboriginal uses of palms, we can focus our attention on species which offer the greatest promise as sources of new and useful chemical compounds. Those outlined in this paper should all be considered candidates for investigation in the search for useful biodynamic compounds.

Palms figure largely in the economic future of tropical South America. The agronomic domestication projects currently underway are focusing on production of edible oils. The attraction of extracting yet another useful

product from the palms can add to the economic incentive for expanding the scope of such programs. As Schultes (1974) has written: "As we consider the domestication of a new crop plant, the great importance of the multipurpose plant must nowadays be borne in mind. It will be sounder economically to develop a plant that, in addition to fibers, may yield another useful product, such as a wax, an oil, food for humans or animals, or some medicinally valuable constituent."

Palms are the staff of life for the Neotropical indigenous populations, and their knowledge of the uses of palms has been refined during centuries of symbiotic co-existence with their environment. By learning from these people, we can better utilize the tropical forest resources in a manner which may benefit both the local population and all humankind.

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