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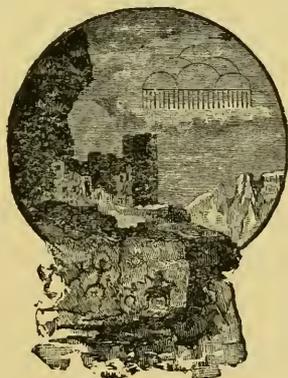
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JULIAN H. STEWARD, *Editor*

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THE USE OF WILD PLANTS IN TROPICAL SOUTH AMERICA

By CLAUDE LÉVI-STRAUSS

INTRODUCTION

It is not always easy to distinguish between wild and cultivated plants in South America, and there are many intermediate stages between the utilization of plants in their wild state and their true cultivation. Karl von den Steinen (1894) gives several examples of these transitional stages in Central Brazil: among the tribes of the upper Xingú River (Handbook, vol. 3, p. 321), he saw paths lined with piqui trees, which generally grow wild, and with mangaba and urucú trees that had been transplanted near the settlements and artificially irrigated. On the other hand, actual cultivation was very rudimentary. One native tried to plant discarded matches; others blew on tobacco plants to insure their growing. The *Tupí-Cawahib* of the upper Madeira River gather the seeds of an unidentified wild grass that grows in the forest, and in order to facilitate the harvest they tie together several stems before they are ripe, so that the seeds of several plants fall on the same spot and pile up in small heaps. The tribes of the Pimenta Bueno River leave on their clearings some palm trees, in the bark of which edible grubs develop. These are the first steps toward cultivation. W. E. Roth (1924, p. 214) writes:

It must be borne in mind that in the clearing of the forest the Indian will usually save from destruction any economic palms or edible fruit trees. Dance says that kushi ants will not have their nests near a cunaparu (*Phyllanthus* sp.) plant, the milky juice of which is acrid and insufferably irritant, and it is for this reason that many fields contain two or three of these plants.

In the Tropical Forests, gathering as well as cultivation may be highly developed, for the utilization of wild plants often entails refined exploitative techniques that require far more than the mere collection of wild foods. Few people, for example, have made a staple of a food as highly poisonous as manioc. The great skill shown in utilizing the vegetable environment is also shown in the various uses made of the same plant. For example, manicoba (*Manihot dichotoma*, *M. glaziovii*, *M. heptaphylla*, *M. piuhyensis*, *M. violacea*) is a source of poison; of rubber (borracha do Ceará, de Jequié, de Manicoba); and of food, its grated roots being consumed as flour after the poison has been extracted and its oily seeds being eaten (Pio Corrêa, 1909). *Protium*

heptaphyllum provides a balsam, a rosin for glazing pottery, and a drink, the last prepared from its fruits. The preparation of several wild foods requires various complicated processes, such as those for preparing bitter manioc and green-heart seeds (*Nectandra rodioei*). Roth (1924, p. 218) describes the latter:

The seeds are grated and put in fresh water, and a matter precipitates similar in appearance to starch. It is repeatedly washed to lessen its bitterness, which is never lost entirely. It is then mixed with rotten wood, pounded previously and sifted, and those who have it in their power mix a little cassava flour with it.

In tropical South America, the general cultural levels are determined historically rather than by the local plant resources, for no fundamental culture traits appear to depend directly on the botanical environment. Pine nuts in southern Brazil and Brazil nuts in northern Brazil are two important foods not found elsewhere, yet no special aspect of the culture of the tribes exploiting them can be directly related to their exploitation; conversely, no special traits are found in the areas lacking these nuts. Fibers from palm trees (*Astrocaryum* sp.) and from a bromeliad (*Bromelia* sp.) are used indifferently in the same area, though palm fibers are more commonly used in the north and *Bromelia* in the south, and differences in materials and techniques between these two areas are insignificant. Nordenskiöld (1924 a) is responsible for the notion that wild plants "set their stamp on the culture of the Indians." The example which he gives is unconvincing. He writes:

Thus, in 1909 I came across a couple of Guarayú Indians on the Rio Parapetí. They had long portable baskets woven out of paripinnate palm leaves. As we entered the Parapetí territory the baskets became worn out, but as there were no paripinnate palms in this part, they could not make new ones. If, for any reason, the Guarayú tribe were forced to migrate from their present region to the Parapetí region they would have to change the type of their portable baskets. [Nordenskiöld, 1919, p. 15.]

The statement draws its importance from a former statement by Nordenskiöld that "fanshaped leaves are of little use, while paripinnate are so useful" (ibid., p. 4). As a matter of fact, the Guiana Indians used both fan-shaped and paripinnate palm leaves, and both kinds have about equal value in basketry, so that the presence or absence of one or the other is of little consequence. The difficulty of the *Guarayú* mentioned was culturally, not environmentally, caused.

The facts, indeed, point in a quite different direction. Many vegetal species in South America have a widespread distribution, and the same vegetal environment surrounds tribes far distant from each other. For purely cultural reasons, these tribes make a very different use of their environment. The distribution of *Ficus*, *Bombax*, *Bertholletia*, and *Cariniana* does not explain the presence or absence of bark cloth; the two great centers of bark cloth, i. e.,

the upper Amazon and northeastern Bolivia, are cultural—not geographic—centers. The failure of Central Brazil to develop this industry was not because of the lack of convenient material; the *Bororo*, for example, make bark cloth, although only for the perineal band of women's dress.

The striking fact is that, far from depending wholly on the natural environment, South American Indians throughout the tropical area show exceptional ability to discover substitutes wherever a vegetal species is lacking. For example, Pardal quotes the substitution of the decoction of the bark of pariah (*Simaruba*, *Simaba*, *Picrasma*) for urucú (*Bixa orellana*) in the southern part of the tropical area where it is difficult to grow urucú. The principle of body ointment and adornment is preserved; the plant varieties used for this purpose differ. The same is true of the balsams: in the south, *Copaifera langsdorfi* replaces *Copaifera multijuga* of the Amazon; and when the Leguminosae listed in pharmacopoeia as yielding benzoin are lacking, they are replaced by either *Myrocarpus* or liquidambar (Pardal, 1937, pp. 104–105). For the varnishes, *Protium heptaphyllum* served in the north, *Bulnesia sarmienti* in the south; for stimulants, guaraná in the north, maté in the south; for weapons, arrow shafts are made either of taquara (*Chusquea* sp.) or of *Gynerium sagittatum*, according to the lack of one or the other in a definite region. The *Chané*, who lack even the latter, have replaced it with *Arundo donax* (Nordenskiöld, 1920).

It is also difficult to agree with another statement by Nordenskiöld (1919, p. 4), who says, "that the abundance of wild fruits, as well as the intensive dryness during part of the year and the flood during another part, account for agriculture being so underdeveloped in the Chaco." Nowhere in South America has the abundance of wild resources impeded agriculture. On the contrary, the various independent places of origin of agriculture postulated by Vavilov (1926, and after Sauer, 1937) all have many kinds of wild foods, and in South America incipient farming and developed exploitation of wild resources tend to be associated rather than mutually exclusive. That the abundance of wild foods does not preclude farming is shown in the case of Guiana:

One Indian (Akawai) will clear and, with his wife, plant 2 or 3 acres in as many weeks, and 7 or 8 acres will supply them with a year's food, so that 10 or 12 weeks in the year is absolutely all that is required for actual labor, and the rest of the time remains for pleasure, hunting, and fishing. [Roth, W. E. 1924, p.214.]

In the mind of the South American Indian, the principal geographical distinction is that between the savanna and the forest. The first is unsuitable for cultivation as well as for gathering and collecting wild foods; both animal and vegetal life on it are sparse.

The forest offers abundant wild plants and game, and its moist soil is fertile. The stupidity of the deer which in a myth tries to cultivate manioc in the savanna filled the *Bacairi* with mirth, according to Steinen (1894, p. 488).

Cooper (1942 a, 1942 b) has suggested that the tropical area of South America could be divided into two subareas according to the level of cultural achievement: ". . . the Orinoco-Amazonian farmers and the scattered tribes subsisting by a purely collecting economy or else with a rudimentary or recently acquired horticulture" (Cooper, 1942, b p. 147). The same author suggests that, considering the fairly close correlation between the cultural groups and the natural areas, the first group should be called Silval and the second Marginal, the latter subdivided into a Savannal and an Intrasilval subgroup. Irrespective of the usefulness of such a classification for practical purposes, it is necessary to keep in mind that farming always accompanies, and is never a substitute for, the exploitation of wild resources. The Silval area is not only an area of farming but is one with abundant wild vegetal food and industrial plants. Moreover, few tribes subsist solely by a collecting economy, and they are distributed at random in such varied places and in such geographic environments (the forests of Paraguay and the Guajira Peninsula, for instance) that their lack of farming seems to depend much more on the cultural history of each separate region than on geographical factors. Finally, there is no reason to consider that the rudimentary agriculture of the great majority of the savanna tribes was recently acquired. These remarks lead to the following conclusion: The characteristics both of farming and of the exploitation of wild plants in South America show that their place of origin was the Tropical Forest or the banks of the northern streams which are naturally bare and remain uncovered by water during most of the year (Roth, W. E., 1924, p. 214; see also Sauer, this volume, pp. 331-344). This Silval culture, based altogether on farming and on the exploitation of wild resources, which requires as much skill as farming, is the only genuine culture of tropical South America. (See also Handbook, vol. 3, pp. 883-886, on the two culture types in the Tropical Forests.)

All South American tribes clung to the forest whenever they were forced to change their habitat. This was true in the case of the *Tupí* during their long and widespread migrations. Petruccio (1932) noticed that the inhabited area of the Xingú River begins only at the points where the gallery forest becomes a true rain forest spreading inland. The savanna, where manioc does not grow, is always avoided and probably was occupied only by tribes driven into it by stronger populations. In the savanna the horticultural pattern was partially retained by turning to the best possible account the strips of gallery

forest along the streams. It was sometimes improved, as shown by Nimuendajú's discovery among the eastern *Ge* of a cultivated *Cissus* not reported elsewhere. Farming was abandoned in favor of hunting (*Bororo*) or of collecting and gathering wild foods, or of both. But there is little doubt that all nonhorticultural South American tribes were formerly farmers. The well-known text by Karl von den Steinen (1894) about the behavior of the *Bororo* in the presence of the gardens opened by the Brazilians is of little weight when compared to the fact that these very Indians were acquainted with an elaborate harvest ritual. Farming might have been forgotten among some *Bororo* as a result of the abundance of game along the marshes, but agriculture was not new to them.

Utilization of wild foods exists in the tropical area on two different levels: a basis level, in which it coexists with farming and is centered in or around the forest; and a subsidiary level, which is one of collecting brought about by compulsive adaptation to the savanna and which often remains partial and is always secondary.

THE PALMS

Several species of palms played an outstanding part in native cultures. Thus, for instance, Gumilla (1791, 1: 145) remarks that the muriche palm (*Mauritia flexuosa*) was the mainstay of the *Warrau* economic life. From it these Indians obtained wood for their pile dwellings, fiber for their clothes, ornaments, hammocks, and fishing tackle, starch for making bread, sap for their wine, the fruits for a sort of punch, and leaves for their baskets. They also extracted large edible larvae from its decayed trunk.

The pupunha, or peach palm (*Guilielma gasipaes*), is a palm long cultivated by the Indians, though it still grows wild. The edible fruit of the cultivated tree lacks the thick shell characteristic of the wild varieties. Palms are semicultivated, for wild palm trees are often spared on a clearing and tended together with the cultivated plants.

About 20 genera of palms were widely used, being exploited for the following purposes:

Edible fruits.—Several genera yield nuts which are edible after the shell of the fruit has been broken. Most important in the native diet are the uaguassú (baguassu, babassu), or pindoba nut (*Orbignya speciosa*), which is rich in oil, and the nuts of the genera *Acrocomia*, *Astrocaryum*, *Attalea*, *Catoblastus*, *Cocos*, *Copernicia*, and *Maximiliana*, which have different food values.

With other species, it is not the nut but the fleshy substance surrounding it which is consumed. Both the nut and the flesh are eaten of the mucaja or bacaiuva (*Acrocomia*), but only the flesh is eaten

of the caranai (*Mauritia horrida*) and the burití (*Mauritia vinifera*) in central and western Brazil, and of the mirití or ite (*Mauritia flexuosa*) in Amazonas and Guiana. This fruit is all-important in the diet of many tribes, because of the many vitamins contained in the mush prepared with its orange-yellow pulp. Thevet (1878) describes the uricuri or buri da praia (*Diplothemium maritimum*), a small tree with edible fruits relatively abundant between Rio de Janeiro and Cabo Frio.

The fruits of several palm tree genera are used only to prepare beverages or mushes. The most important are the assai (*Euterpe oleracea*, *E. precatória*), the manicol (*Euterpe edulis*), the bacaba or turu (*Oenocarpus distichus*, *O. bacaba*), the lu (*Oenocarpus* sp.), the patua or pataua (*Oenocarpus patua*), the aeta (*Mauritia flexuosa*), the kokerit or anajá (*Maximiliana regia*), the awarra or jawari (*Astrocaryum tucumoides*), and the marajá (*Bactris minor*). In most cases the ripe palm fruit is soaked in lukewarm water—boiling water would harden instead of softening them—and then the pulp is separated from the shell or kernel and made into a thick, oily, fragrant drink, which has a high nutrient value. These drinks may be consumed immediately or after standing a night, which gives them a slightly sour taste. Sometimes manioc flour is added to them.

Palm wine.—The sap of the *Mauritia vinifera* is drunk fresh or slightly fermented. It is collected in a trough-shaped cavity dug in the trunk of a felled tree (*Warrau*). The coroxo wine is made from the fruits of the *Acrocomia aculeata*. (See also Handbook, vol. 1, p. 418.)

Palm cabbage or palmito.—The “palmito,” i. e., the terminal shoot of several species of palm, is one of the few fresh vegetables in native diet. It is eaten raw, broiled, and sometimes boiled. The palmito of almost all the palm species can be consumed, but some have a bitter taste, as for instance the *Acrocomia*. The Brazilian Indians show a marked preference for the palmitos of the *Euterpe*, *Cocos*, and of several species of *Iriartea*. In the Chaco, the Indians consume the palmitos of the caranday (*Copernicia cerifera*).

Starch.—The *Warrau* extract starch from *Mauritia* in the following manner:

When an ite tree begins to fructify it is cut down, a large slice is cut off one side, and the stringy substance of the interior is cut into shreds, the remainder of the trunk serving as a trough, in which it is triturated with water, by which is disengaged a considerable quantity of starch. The fibrous particles are then extracted, and the sediment, or aru, formed into molds like bricks. This is spread out on stones or iron plates over the fire, and makes a very nutritive but at the same time unmasticable bread. [Roth, 1924, pp. 215–216; cf. Gumilla, 1791, 1: 149.]

This starchy food is known under the name of sagu in northern and

eastern Brazil (Pio Corrêa, 1909). The *Guayaki* extract a starchy flour from the pindo palm (*Cocos romanzoffiana*) (see Handbook, vol. 1, p. 436; also Vellard, 1939, p. 84).

Oil.—Oil can be extracted from several palm fruits by crushing and boiling them. It may be used in cooking, for lighting purposes, or in medicine; but more often the Indians mixed it with urucú or some other pigment to smear on their bodies. The palm species which produce oil are: *Orbignya speciosa*, *Astrocaryum tucuma*, *Astrocaryum tucumoides*, *Attalea speciosa*, *Maximiliana regia*, and *Oenocarpus* (*O. bacaba* and *patua*).

Salt.—The ashes of the fibers and of the fruits of some palm trees, such as jara (*Leopoldinia major*), and of the leaves of some other species, such as *Mauritia flexuosa*, are boiled and the decoction is allowed to evaporate in order to obtain a brownish powder which is used as salt. Staden (1928, pt. 2, ch. 11) saw and describes the whole process among the ancient *Tupinamba*: From the ashes of a palm trunk, they make a solution which they boil until the salt is separated. "It tasted like salt and was grey in colour."

House thatching.—Palm leaves are the most common plant materials for thatching the roofs and frames of native huts. The method of thatching depends upon the nature of the leaves. If the fronds are paripinnate, such as those of the anajá, the leaflets are made to fall limp and loose by tearing loose the "eye," i. e., the internal articulation of the leaves with the midrib. The palms are attached horizontally to the purlines, overlapping like tiles. For fan-shaped leaves, the techniques are more elaborate. The ancient *Tupinamba* parched the leaves of the pindoba over a fire and then plaited them before thatching their huts. Among the Guiana Indians, palm leaves preferred for thatching are: the truli or bussú (*Manicaria saccifera*), caranai (*Mauritia horrida*), burití or ite (*Mauritia vinifera*, *M. flexuosa*, or *M. armata*), dallibana (*Geonoma baculifera*), ubim and several *Geonoma* (*G. elegans*, *G. paniculata*, *G. pohliana*, *G. schottiana*), anajá or kokerit (*Maximiliana regia*), manicol (*Euterpe edulis*), turu or bacaba (*Oenocarpus bacaba*), assai (*Euterpe oleracea*), etc. (Roth, W. E., 1924, pp. 265–270).

Basketry.—Max Schmidt (1905) classifies twilled basketry in two classes depending on whether fan-shaped or paripinnate leaves are used. He believes that many decorative motifs in the art of these Indians come from the basketry patterns that are inevitably produced by using fan-shaped burití palms.

Paripinnate leaves, such as those of *Maximiliana regia*, *Orbignya speciosa*, *Orbignya phalerata* (cusi of the Chaco), two species of *Astrocaryum* (respectively, awarra and akko-yuro in the Guianas, tucúm and tucumá in eastern Brazil, murumuru or *Astrocaryum murumuru*

in the Amazon, and several species of *Desmoncus* (kamwarri or jacitara) are particularly suitable for making fans, mats, and temporary carrying baskets.

With the fan-shaped leaves of the burití or ite palm, the Indians of eastern Brazil weave fire fans, containers, trays, and rectangular baskets which are characterized by geometrical patterns (lozenges, etc.).

Twine, cords, and strings.—The young unopened leaves of the *Mauritia flexuosa* reduced to the cortical strips and soaked in water for several days are made into cords which have many uses in the Amazon Basin. The fibers of several *Attalea*, mainly those of the piacaba (*Attalea funifera*) or chiquichiqui (*Leopoldinia piacaba*) provide material for thick or small ropes. The name "tucúm" is given to several species of palm trees, mainly *Astrocaryum* or *Bactris*, particularly *Bactris setosa*, which give excellent fibers for strings and ropes used for making hammocks, nets, etc. These species are as important to the Indians of the Amazonian or Orinoco Basins as the Bromeliaceae known as caraguatá are to the Indians of the Chaco. The name "jupati" is given to plants of the genus *Raphia*.

Wooden objects.—Posts, fences, and palisades are often made of the wood of the catizal or paxiuba (*Socratea exorrhiza* and *Socratea durissima*). The natives of eastern Bolivia and the upper Amazon make their bows of the hard, black wood of chonta palm (*Guilielma insignis*). Clubs and spears are often carved of the same wood. The stem of the paxiuba (*Socratea exorrhiza*) serves to encase the *Arundinaria* tube of the blowgun. The gigantic trumpets of the Uaupés River Indians are made of sections of paxiuba palm (*Socratea exorrhiza*) wrapped with long strips of icbaru (*Eperua grandiflora*). Finally, the vegetal wax of the carandai or carnauba palm tree (*Copernicia cerifera*) must be mentioned here. This species is especially important in northeastern Brazil. Nordenskiöld (1929 a, fig. 1) has published a *Chacobo* manioc grater from Bolivia. It consists of a section of the trunk of a thorny palm tree. Often, to make a grater, thorns are imbedded in rows in a wooden plank.

Beads and ornaments.—The black polished shells of the small nuts of the *Astrocaryum* are practically everywhere carved into beads, earrings, and other types of ornaments. The wood of other palm trees is occasionally used for miscellaneous purposes. These are pati (*Orcus* sp. and *Cocos botryphora*), buri and buri-assu (*Diplothemium caudescens*, *D. campestre*), aracuri (*Cocos coronata*), curua or acuri or auacuri (motacu in the Chaco), several species of *Attalea* (*A. speciosa*, *A. phalerata*, *A. princeps*, *A. spectabilis*), buritirana (*Mauritia aculeata*) etc.

TIMBER WOOD

The number of species of trees used by the Indians in their industries is so large that a complete list would fill a volume. Here are enumerated the names of species most frequently mentioned in the old literature dealing with the culture of the Brazilian Indians.

Several kinds of aroeira are used: aroeira branca (*Lythraea moleoides*, *L. brasiliensis*), aroeira molle (*Schinus molle*, which also yields the so-called American mastic), and aroeira vermelha (*Schinus terebinthifolius*).

"Cedro" comes from several families of plants: imbuia (*Bignonia* sp.); cabreuva (*Myrocarpus* sp.); acareuba (*Calophyllum brasiliense*); conduru, a red wood (*Brosimum conduru*); ubiraeta or iron wood (*Caesalpinia ferrea*); barauna (*Melanoxylon brauna*); jurema (*Pithecellobium tortum* and *Mimosa verrucosa*); ivory white or "pau marfim" (*Balfourodendron riedelianum*); red guarabu (*Peltogyne confertiflora*); black caviuna or jacaranda (*Dalbergia nigra*); "Vinhatico," a yellow reddish wood (*Plathymenia reticulata*); and piquihi (*Caryocar barbinerve*). The genera *Tecoma* and *Couralia* provide various reddish and blackish woods. Jatahi and jatoba are trees of the genus *Hymenaea*; macarandiba is *Lucuma procera*; guapeveira is a species of *Chrysophyllum*; andira or "pau de morcego" is *Andira rosea* or *A. fraxinifolia*; jequitiba is *Couratari brasiliensis*; sucupira is *Bowdichia virgiloides* and *Pterodon pubescens*; arariba or araruva, a striped wood, is *Centrolobium robustum*; urucurana is *Hieronymia oblonga* and a species of *Alchornia*.

In addition, several palms, especially *Orbignya*, *Astrocaryum*, *Guilielma*, and *Iriartea*, are used for hut frames, weapons, fences, etc.

Some woods are traditionally used for making specific objects. Clubs and macanas are generally carved of the hard wood of various Leguminosae, especially purpleheart (*Copaifera pubiflora*, *Caesalpinia* sp., and *Myrocarpus* sp.), snakewood (*Brosimum aubletii*), and amara (*Schwartzia tomentosa*). The Tupinamba used ibiratinga (*Funifera* sp., of the family Thymelaeaceae) to make the staves of their spears. The Guiana Indians made their best paddles of the fluted projections of the yaruru or paddle wood (*Aspidosperma excelsum*); the Tupinamba of *Genipa americana* or of uaca (*Ecclinusa ramiflora*).

The light woods or "gameleiras" include a great many species of *Ceiba* (e. g., copaubucu, *Ceiba erianthos*) and *Ficus*, as well as ubiragara ("barriguda," or "barrigudo" tree, *Cavanillesia arborea*, and several other *Bombacaceae*), umbaubeira (*Cecropia adenopus*), apeiba (*Apeiba* sp.), and paraparaiba (*Cecropia* and *Triplaris*).

These light woods are used mainly for making ear or lip plugs (*Suya*, *Botocudo*, etc.), cylindrical containers for feathers and orna-

ments (*Bororo*, etc.), rafts or jangadas (on eastern Brazilian coast, *Apeiba* sp. or *apei* is used), and canoes (*Cavanillesia arborea* and *Ceiba pentandra*).

Canoes.—In Guiana, canoes and corials were made out of the following trees: Siruaballi (*Nectandra* spp.), tenyari or mara (*Cedrela odorata*); purpleheart (*Copaifera pubiflora*), kabukalli (*Goupia glabra*), itenalli (*Vochysia tetraphylla*), silk-cotton tree (*Ceiba pentandra*), crab-wood (*Carapa guianensis*), incense tree (*Protium guianense*), *Dimorphandra mora*, and several species not yet identified. In northern Brazil canoes were dug out of the trunks of *Cedrela odorata* and *Ceiba pentandra*. The Indians of central Brazil make their canoes from the bark of jatoba (*Hymenaea courbaril*). The same bark was probably used by the *Tupinamba*. The *Tupí* dug canoes out of a Bombacaceae or of *Ficus doliaria*. *Iriartea ventricosa* is used for the same purpose.

Bows.—In the Guianas bows are made from at least half a dozen different timbers. Those which have been identified are the purpleheart (*Copaifera pubiflora*), burakura, burukuru, burokoro, leopard-wood, or snakewood (*Brosimum aubletii*), and *Lecythis ollaria*. In Brazil the most common bow wood is *Tecoma conspiciua*, called for that reason pau d'arco.

Perfumed woods.—Beads of necklaces are often carved from fragrant woods. These are: carunje (species of *Ocotea* and *Nectandra*), vanilla (*Vanilla* sp.), cinnamon wood or anhaybataa (*Pseudocaryophyllus sericeus*, *Cinnamodendron axillare*, and *Capsicodendron pimenteira*), rosewood or jacaranda (*Dalbergia nigra*), and pau santo (species of *Bulnesia* and *Zollernia*).

Certain other woods have an unpleasant odor: ubirarema or "canella merda" (*Nectandra myriantha*), pau d'alho (*Gallesia scorododendrum*), and several vines which smell like garlic (*Lundia longa*, *Clytostoma noterophilum*, *Segueira floribunda*, *Adenocalymna allium*, etc.).

FIBERS

Fibers used by tropical Indians in their industries come mainly from palm trees (see p. 472). Fibers are also extracted from several Bromeliaceae, mainly *Bromelia fastuosa* and *B. serra*, which are known as caraguatá, gravata (*Tupí*), chaguar (*Quechua*), pita, kuraua, etc.

In the Guianas and in many regions of Brazil, the Indians utilize the fibers of both palm trees (tucúm) and of bromeliads, though the first give thinner and better strings. In the Chaco and southern Brazil, the Indians employ almost exclusively fibers of Bromeliaceae.

In Colombia, Ecuador, and Perú, the Indians obtain the fibers for their ropes and textiles from the agave.

The Brazilian Indians use vines and creepers of many species for ropes, cables, or strings. Those called cipo belong to many families and genera. Cipo-embé is the adventitious root of a plant of *Philodendron*. The timbó group includes thinner varieties of vines (*Serjania* and *Paullinia*) which may be twined or plaited. Timborana (*Lonchocarpus* sp. and *Malpighiaceae* sp.) serve the same purposes. In the northwestern parts of South America, the name bejuco is given to *Vitis tiliifolia*, *Trichostigma octandrum*, *Entada gigas*, etc.

Roth (1924, p. 118) lists nibbi or sippi, mamuri, and muna (*Carludovica* sp.) as bushropes which in their natural condition may be used as twines.

Paina (*Chorisia speciosa*), embiriti (*Bombax munguba*), and goyaimbira (*Cecropia concolor*) are trees which yield a fibrous substance used by the Indians. The cottonlike wads which the Indians attached to the butts of blowgun darts come from the fruits of *Bombax globosum* and *Eriodendron samauma*.

Bark cloth.—Bark cloth may be obtained from several species of trees. In eastern Bolivia and on the upper Amazon the Indians use bark of trees of the genus *Ficus*, which are known in Bolivia as bibosi. From the Guaporé to the Orinoco River cloth is made from the bark of species of *Bertholletia* and *Cariniana*; in the northern parts of the continent and in the West Indies, from cabuya (*Fucrea gigantea*), majagua (*Hibiscus tiliaceus*), memiso (*Muntingia calabura*), and manbarakrak (*Lecythis ollaria*); and in eastern Brazil, the bark of embiriti (*Bombax munguba*).

MISCELLANEOUS

According to Von den Steinen (1894), the Xingú River Indians cultivated a wild grass which they used as razor blades. The fruit of a Bignoniaceae ("pente de macaco," *Pithecoctenium echinatum*) was used as a comb by the Tupí and other tribes. The Tapirapé use the fruits of a grass ("capim flecha," *Streptogyne crinita*) as tweezers for plucking the hair (Baldus, quoted by Hoehne, 1937, p. 115).

As the two more important fruits used as containers were cultivated (*Crescentia cujete*, cuia, güira, and *Lagenaria siceraria*), only the shell of *Lecythis blanchetiana* (one of the numerous sapucaia nuts) and the hollowed-out seeds of several palm trees (*Astrocaryum*) and the staunch flour containers made from the leaves of *Heliconia* and *Calathea* may be mentioned here. The leaves of *Heliconia bihai* and of several *Geonoma* were also used for roof and wall thatching.

The calabashes of the upper Rio Negro are lacquered with a decoction of carayuru—Bignoniaceae and cassava leaves sprinkled with human urine (Roth, W. E., 1924, p. 302).

In addition to numerous palm nuts (see *The Palms*, p. 469), a great many nuts (genera *Bertholletia* and *Lecythis*) and seeds ("olho de

cabra" or comedoi: *Ormosia nitida*, *Omphalea diandra*, *Myroxylon toluiferum*, and others) are used as beads in necklaces, tassels, and the like. Several hard-shelled seed pods, including *Thevetia peruviana* and *Juglans* sp., were made into rattles for accompanying songs and dances. Also used for rattles in Guiana were many nuts and seeds known only by their local names: Kawa and cerewu or cerehu seeds and caruna and ahouai nuts. The hollow cylinders used to strike the ground as a dance accompaniment are made of trumpet wood (*Cecropia*) or bamboo (*Gadua*). The drums of the Orinoco are hollowed from the trunk of several trees: silverballi (*Nectandra*); karuhoho (*Arawak*), simaruba (*Warrau*) or muratatau (*Carib*); omu (*Warrau*); and sometimes of *Mauritia flexuosa* (Roth, W. E., 1924, pp. 464-466). Bundles of palm leaves (*Maximiliana maripa*) enter into the construction of the *Oyana* drums dug in the ground and struck with the feet (*ibid.*, pp. 468-469).

GUMS AND RESINS

Most of the gums known to the Indians are obtained from the Leguminosae. They are generally used as drugs, but may also be employed in the native industries.

Lighting substances.—All kinds of rubber burn quickly with a bright flame. In addition to its other industrial uses, rubber is collected in lumps of coagulated latex and carefully kept to light fires. The lump is drilled with the fire drill, which produces a highly inflammable dust. The rosin of the locust tree (jatoba, jatahi, simiri, algarroba—names which in different regions are given to the same or different species: *Hymenaea courbaril*, *Cassia blancheti*, and others) when lighted or thrown in a fire gives a brilliant light. Guaconax (*Amyris maritima*) and almecega (*Hedwigia balsamifera* and *Protium heptaphyllum*, the latter "the haiowa of the *Arawak*, shipu or sibu of the *Warrau*, and sipipio of the *Carib*" (Roth, W. E., 1924, p. 80)) serve the same purpose.

Plastic substances.—On the upper Guaporé River, the translucent rosin of *Hymenaea courbaril* and probably of many other trees is made into nose and lip plugs by means of wooden molds. The *Guaraní* used the rosin of a tree called abati timbabỹ in the same way. Several rosins are applied as a glaze to the whole or to parts of newly fired ceramics: in southern Brazil, Paraguay, and northern Argentina the rosin of "pau santo," "palo santo" (*Bulnesia sarmienti*); and in the north, that of icica (*Protium brasiliense*, *P. heptaphyllum*, *P. gwianense*, *P. aracouchili*, *P. carana*) and of *Hymenaea courbaril*. The *Nambicuara* make their pots waterproof by washing them when still hot with a decoction of the resinous bark of a *Mimosa*. The same thing is said of the *Warrau* (Roth, W. E., 1924, p. 133).

Gums and glues.—The rosins already mentioned and especially that of balata or turara (*Mimusops globosa*) and of “pau breo,” manni, ohori, or manil (*Moronobea coccinea*) are widely used for fastening points and feathers to arrows, for waxing threads, for calking canoes, and for attaching stone chips or thorns on cassava graters, blades to knives, and axes to their handles.

Balsams.—The rosin of the *Hymenaea courbaril* is chewed for pains in the stomach and flatulence, and is burned for fumigations in case of colds and headaches. The balsam of acouchi (*Protium* sp.), umiri (*Humiria floribunda*), and wallaba (*Eperua* sp.) are said to heal wounds. The same virtues are ascribed by Indians and Whites to *Copaifera multijuga*, *C. officinalis*, and *C. langsdorffii*, which are known as copayba, cabima, curucay, curaki, purukai, mawna, mararen, and maran.

Corohiba or cabureiba (*Myroxylon toluiferum*, the tolu balsam of Colombia and Venezuela) is popular with the Indians of central and southern Brazil. According to Soares de Souza (1851), the ancient *Tupinamba* collected it with pads of cotton, which they later squeezed.

Other balsams used by the tropical Indians are: cabreuva (*Myrocarpus frondosus*, *M. fastigatus*), obira (Apocynaceae), imbauba or ambay (*Cecropia adenopus*), corneiba (*Schinus terebinthifolius* or *Lithraea brasiliensis*), and gayac (*Guaiacum officinale*).

The *Guayba*, *Tunebo*, and *Chiricoa* used a rosin called mara (*Protium* sp.) for hunting deer, which are said to be attracted by its odor.

OILS AND UNGUENTS

To make oil of crab wood (caraba or andiroba, *Carapa guianensis*) “the Roucouyenne of Cayenne . . . preserve the seed for a year by burying it in the ground and making veritable silos of it . . . The Oyampi of the Oyapock River boil the seeds, expose them for several weeks to the air in a scooped-out tree trunk, crush them with their feet, and finally let them drip on an inclined palm leaf” (W. E. Roth after Crévaux, 1924, p. 85). The oil is used to anoint the hair and skin and to prepare paint. From makeima bark (*Mespilodaphne pretiosa*, Roth, W. E., 1924, p. 86) the *Macushí* extract an ethereal oil for use against diarrhea and dysentery. Most species of Lecythidaceae, some of *Eugenia* and *Virola*, and *Bertholletia excelsa* (the Brazil nut) have fruits which, when boiled and crushed, yield an oil or a vegetable tallow which may be used as a food, as an unguent, or for lighting purposes. Palm oils are described under The Palms (p. 471).

PIGMENTS AND DYES

The most important pigment in all tropical South America is certainly the urucú or roucou (called achiote in México, mantur in

Quechua, *bija* in the West Indies, and, in other dialects, *arnotta*, *faroa*, *kuseve*, *shiraballi*, *mubosimo*, and *majepa*). *Bixa orellana* is cultivated by most tribes, although many of them merely transplant young wild plants to places near their huts. *Bixa orellana* is, however, a widespread wild plant and thus belongs to the large group of plants which have not been modified through cultivation. The red pigment of the urucú comes from a thin skin covering the seeds. These are washed and mashed, and the pigment, which settles to the bottom of the container, is dried, mixed with animal or vegetal oil or gum, and made into balls or cakes. Urucú dye is used to color cotton thread and to paint weapons, ceramics, and implements, but it is employed especially to anoint the body and even the hair. Whether this widespread custom has a predominantly esthetic or hygienic function (protection of the body against heat and insects) is a much-debated question. In northern Argentina, where cultivation of *Bixa orellana* is difficult, a decoction of pariah bark (*Simaruba*, *Simaba*, and *Pricrasma*) or "palo amargo," is used instead. Bodily ointments are also made from *guavira* (*Campomanesia*), *taperihúá* (*Cassia*), *caburehi* (*Myrocarpus*), and *isipo kati* (*Aristolochia*) (Pardal, 1937, pp. 99 ff.). Thevet (1878), Léry, Gomara, and others have described the unguent used against body parasites and made of *hiboucouhu*; Hoehne considers this plant a *Myristica* (Hoehne, 1937, p. 126).

Another red paint used for body and pottery decoration and varying from orange to purple according to the technique of preparation is *caraweru*, *barisa*, *barahisa*, *biauro*, etc., which comes from the boiled or fermented leaves of *Bignonia chica*. It is kept in small straw baskets or in tubes. Unripe *Genipa* fruit of the *jagua* or *xagua*, *launa* or *lana*, *tapuriba*, *tabuseba*, etc. (*Genipa americana*) yields a juice which becomes black or dark blue when exposed to the air. From Argentina to the Guianas, it is used as a dye and as a paint for the body and for pottery and utensils. The tree is sometimes cultivated but also occurs wild. From *arrisaura* or *karasaru* berries the natives of the Guianas extract a clear blue used for body paint.

The following dyes are used more for native handicrafts than for the body: "Pau brasil" of the old travelers or *oroboutan* of the *Tupinamba* (*Caesalpinia echinata*), used to dye feathers red; other red dyes are *yzipo* roots mentioned by Dobrizhoffer (1822), *mespil* or *itarra* (*Bellucia aubletii*) used in the Guianas to paint the paddles, the inside of calabashes, etc., *maba bunakara* (*Coussapoa latifolia*) and *buri-badda* (*Homalium?*), *Maparakuni erythroxyllum* of the north-eastern *Arawak*, and *kuruwatti* (*Renealmia exaltata*) used as a remedy for ophthalmia, as a dye, and on the Pomeroon supposedly as the pigment for tattooing in the old days (Roth, W. E., 1924, pp. 90-91).

Besides *Genipa americana*, a black dye is extracted from inga or shirada bark (*Inga lateriflora*). It is mostly used in basketry. Several yellow pigments come from tatajiba or tayuva (*Chlorophora tinctoria*), which has an edible fruit, and from an unidentified plant which Soares de Souza called caapiam (Hoehne, 1937, pp. 241-242). A blue, indigolike dye comes from *Anil trepador* (*Vitis sicyoides*) and from anil-assi (*Eupatorium* sp.). The old literature mentions several other vegetable dyes which are not yet identified. The sakuapéra of the *Arawak* and *Warrau* is *Henriettea succosa* (Roth, W. E., 1924, p. 90).

SHAMPOOS

Shampoos include the Brazilian "arvore de sabão"; this is the Guiana and West Indian "I" of the *Taino*, identified by Roumain (1942, pp. 65-66) as *Gouania lupuloides* or *G. polygama*, certain roots and fruits of *Sapindus divaricatus* used by the *Tupí*, cjaru (*Colletia spinosa*) of Bolivia, Chile, Uruguay, and Argentina, and *Sapindus saponaria* of Venezuela, Brazil, and Argentina.

RUBBER

According to W. E. Roth (1924, pp. 83-84), *Sapium jenmani*, or *S. cladogyne*, and some species of *Hevea* were probably the original sources of rubber. The *Omagua* made balls, rings, and syringes from the milky sap of a creeper which, from the structure of its fruits and flowers, must be ascribed to a genus of the Apocynaceae.

The rubber balls of the *Paressí* and *Nambicuara* are made of the latex of mangabeira (*Hancornia speciosa*). The name "caucho" (rubber) is given to *Castilla elastica* and to *Sapium eglandulosum*. The rubber latex of soveira or sorveira (*Couma guianensis*, *C. macrocarpa*, *C. utilis*) can be drunk either pure or diluted with water. The Indians coat their skin with the latex of several rubber trees in order to suffocate parasite worms lodged under the epidermis.

FOODS

Tubers.—Wild food plants include roots, fruits, nuts, and shells. Few tubers have been identified, because the Indians generally collected them only in time of scarcity, when they were substitutes for manioc, *Dioscorea*, *Zanthosoma*, and other cultivated tubers. Among the wild tubers eaten is mandioquinha do campo (*Zeyheria* sp.).

Green vegetables.—Green vegetables are scarce in native diet, being limited to manioc leaves, palm shoots (q. v.), a species of *Cissus*, which Nimuendajú found cultivated among the eastern *Ge*, and a very few others.

Nuts and seeds.—Besides palm nuts (p. 469), which are consumed from the Chaco to the Guianas, there are two other nuts of great value.

The *Caingang* and *Guaraní* of southern Brazil depend for several months each year on the nuts of *Araucaria angustifolia*. The *Tupí* called these iba, the fruit "par excellence." To the *Araucanians* they are just as important. In the Amazon Basin, sapucaia (*Lecythis olaria* or *L. pisonis*) and Brazil nuts, tocari (*Bertholletia excelsa*), are not negligible items of native diet. These nuts were a favorite food among many tribes of the Beni and the Madre de Dios Rivers.

Other nuts with food value for the Indians are those of piqui ("Almendras del Brasil"), sawari or chachapoya (*Caryocar barbinerve*, *C. brasiliense*, *C. tuberculosum*, *C. amygdaliforme*) comanda-iba (*Sophora tomentosa*), comanda-assu (*Mucuna altissima*), and jatoba or locust tree (*Hymenaea courbaril*).

In the Guinas, cassava flour is often increased, mixed with, or even replaced by flour made of the following seeds. Mora (*Dimorphandra mora*), greenheart (*Nectandra rodiaei*), dakamballi (*Vouacapoua americana*), pario, and nuts of the sawari tree (*Caryocar tuberculosum*). W. E. Roth (1924, pp. 219, 230) quotes Schomburgk on the occurrence of wild maize (?) on the eastern foot of the Pacaraima Range. Not only seeds and nuts are occasionally added to cassava flour, but also soft wood.

Wild rice (*Oryza subulata*) is abundant in Uruguay, Rio Grande do Sul, in the marshes of the upper Paraguay and of the Guaporé Rivers (Hoehne, 1937, pp. 33-39), and in the Orinoco Valley, but the Indians of the last region do not seem to have consumed it. According to Hoehne, *Oryza sativa* may be aboriginal in South America.

Although peanuts (*Arachis hypogaea*, *A. nambyquarae*) were generally cultivated, "southern Brazil, and particularly São Paulo, Paraná, and Mato Grosso, is the land of origin of the different peanuts. All known species still exist there in wild state . . ." (Hoehne, 1937, p. 216).

Fruits.—Some widely distributed fruits were used both cultivated and wild: caraguatá (*Bromelia fastuosa*); inga, shirada, or pacay (*Inga vera*, *I. lateriflora*, *I. bahiensis*, *I. fevillei*); maracuja (*Passiflora quadrangularis*, *P. alata*, *P. edulis*); and pineapple (*Ananas sativus*). The use of the following centers around the Chaco, southern Brazil, southern Bolivia, and northern Argentina: The important algarroba or aloja (*Prosopis alba*), principally used as a drink; guabiroba (*Myrtus mucronata* and *Psidium multiflorum*, *P. corymbosum*, *P. cinereum*, *P. guazumaefolium*); guavira (*Campomanesia*); tamarin, common in the Chiquitos region but lacking in Paraguay, according to Dobrizhoffer; tusca (*Acacia aroma*); taruma (*Vitex montevidensis*); and chañar (*Gourliaea decorticans*). A curious use of quebracho, wood yielding tannin, may be mentioned here:

The *Guaraní* burn pieces of the tree *tayy*, receive the smoke or soot arising from them into a clean dish, and by pouring hot water upon it, convert it into ink which

mixed with gum and sugar is by no means to be despised. [Dobrizhoffer, 1822 1: 398.]

The "fructa do lobo" (*Solanum grandiflorum*, yielding the alcaloid, grandiflorina) has a central and southern distribution in the savanna lands of central Brazil. Its delicious large peachlike fruit seems to be the object of a food prohibition in several regions. Some varieties may be toxic.

Cashew (*Anacardium occidentale*) is generally cultivated, but another wild species, *Anacardium giganteum*, yields small fruits which the Indians collect at the foot of the tree after the monkeys have thrown them down. The Brazilian Indians consume the fruits of several other species of Anacardiaceae: umbú (*Spondias tuberosa*), hobo, jobo (*Spondias monbim*, *S. dulcis*, *S. robe*), caja-mirim, maropi or hog-plum (*Spondias lutea*), and acaju or acaja (*Spondias monbim*). The tuberlike roots of umbú are edible.

Mangaba fruits (*Hancornia speciosa*) are so important to the savanna tribes that when they are in season the Indians undertake large expeditions for the sole purpose of collecting them. Likewise of great importance are the fruits of several *Psidium* (*P. turbiniflorum*, *P. guayava*, *P. variabile*), and of several *Myrtaceae*, such as cambuy and jaboticaba (*Mouriria pusa*), both common trees in eastern Brazil.

The following species yield fruits which are eaten occasionally by the Indians: Cambuca (*Myrcia* sp.), massaranduva or macarandiba (*Lucuma procera*), mucugé (*Couma rigida*), ubauba (*Pourouma cecropiaefolia*), ubacaba (*Britoa triflora*), murici (*Byrsonima*), canapu (*Physalis pubescens*), *Cereus* sp., *Eugenia* sp., *Genipa maerianae* and *G. edulis*, *Malpighia* sp., "banana do brejo" (*Mostera deliciosa*), etc.

In the northern part of the continent and in the Antilles, fruits eaten include the following: Oiti coro (*Couepia rufa*), oiti da Bahia (*Moquilea salzmannii*), piquia (*Macoubea guianensis*), bacopary (*Rheedia brasiliensis*), icaco (*Chrysobalanus icaco*), bacury (also cultivated) (*Platonia insignis*), abio (*Lucuma caimito* and *Pouteria caimito*, which are different from the caimite of the West Indies, *Chrysophyllum caimito*), the mamee apple or "abrico do Para" (*Mammea americana*, to be distinguished from the mamey of Cuba, *Calocarpum mammosum*), several species of *Couma*, several Annonaceae (*Annona muricata*, *A. reticulata*, aratiqu), and several species of cacao (*Theobroma cacao*, *T. bicolor*, *T. grandiflorum*, *T. speciosum*). The wild kakau (*Theobroma sylvestre*) and the "cacau selvagem" (*Pachira insignis*), which are eaten raw, are important food items for the tribes of the upper Madeira River (Lévi-Strauss, ms.).

Some kinds of mushrooms were consumed on the Orinoco, and are also considered a delicacy by the *Nambicuará*.

DRINKS

When no water is available, the Indians know how to quench their thirst with the sap of several vines and creepers. This sap resembles pure, clear water, and it can be gathered easily in a calabash. The best known vine is the waterwhithe (*Vitis* sp., *Entada polystachya*) and salisali (*Lonchocarpus rufescens* or *Lonchocarpus nicou*), a creeper also used for drugging fish. Its water is clear and fresh, but only its first flow can be drunk, because later it becomes white and milky, and is toxic (Crévaux, 1883, p. 278).

In periods of drought the *Arawak* of Pomeroy obtained water from truli fruits (*Manicaria saccifera*). Water may also be obtained from the sheath bases of the leaves of several plants: some *Tillandsia*, the buri palm (*Mauritia flexuosa*), and caraguatá (*Bromelia* sp.).

A great many beverages, some of them fermented, are prepared from the fruits, seeds, and roots of wild plants. A popular liquor is made with the cultivated and wild pineapples (*Ananas sativus*). The ancient *Tupinamba* prepared a fermented beverage with cashews (*Anacardium occidentale*). In the Chaco, beer is made with chañar (*Gourliaea decorticans*), mistol (*Zuziphus mistol*), tusca, and algarroba pods (*Prosopis*), etc.

Refreshing drinks are obtained from hitchia (*Byrsonima spicata*), hlawaraballi (*Protium heptaphyllum*), guavira (*Campomanesia*), and several species of *Psidium* sp. and *Eugenia* sp.

CONDIMENTS

The preparation of salt from the ashes of leaves or fibers of some palm trees has been described (see *The Palms*, p. 471). Another type of vegetable salt is obtained by boiling an aquatic plant, oulin, weya, weira, weyra, or huya (*Mourera fluviatilis*). It is a dirty brown and inferior in quality. Roth, who describes its preparation among the Guiana Indians, considers it the same as the caruru salt mentioned by Coudreau (Roth, 1924, p. 223), and it is probably the same as the *Trumai* salt made from waterlilies (Quain, ms.; see Upper Xingú, Handbook, vol. 3, p. 326). Numerous tribes, for instance the *Nambicuará*, cannot bear the taste of salt, but tribes which do enjoy it use native salt, bitter as it is, in large quantities. There is, in fact, a strong contrast in the like and dislike of various tribes for "hot" foods.

Peppers (*Capsicum*) are usually cultivated, but wild peppers (*Capsicum rabenii*, *C. baccatum*) occur on the Brazil coast (Soares de Souza, quoted by Hoehne, 1937, p. 218). The coastal *Tupí* used a "long pepper which is crushed together with salt, pinches of which are swallowed after each mouthful"; this may be *Piper longum* or the bitter grass jambi or nhamby (*Eryngium foetidum*), which was

also known to be used as a condiment (Hoehne, 1937, pp. 157-158, 252). Jambi has also been identified as *Ageratum conyzoides*.

The *Nambicuara* flavor "tonka beans," known in Brazil as cumaru (*Dipteryx odorata*), by crushing handfuls of them with grasshoppers. The *Tupí-Cawahib* add tocari (Brazil nut, *Bertholletia excelsa*) to maize when preparing maize beer (Lévi-Strauss, ms.).

There are other condiments of animal or mineral origin.

POISONS

The composition of curare has been the object of many discussions. Sampaio (1916) lists the following plants which are used in the preparation of the curare of the *Nambicuara* and *Paressi*: *Strychnos*, *Lisianthus virgatus*, *Cassia rugosa*, *Dioscorea* sp., and species of Apocynaceae, Marcgraviaceae, and Sapindaceae. Vellard (1939), however, has proved that the *Nambicuara* curare consists only of the extract of a plant of the genus *Strychnos*. There is no doubt that this and other species of *Strychnos* (*S. medeola*, *S. toxifera*, *S. cogens*, *S. crevauxi*) provide the active element in the preparation of the more elaborate poison of the Amazon Basin.

Dance, quoted by W. E. Roth (1924, p. 151), makes mention of two other arrow poisons: the heauru-canali and the hurubuh, similar to the hog tannia.

"Bresillet" or carasco (guao of the *Taino*) was perhaps used as an arrow poison, and Oviedo mentions it as a cosmetic for whitening the skin (Roumain, 1942, p. 29). It is doubtful if the poisonous manceniller (*Hippomane mancinella*) was ever used for arrow poison. A poisonous bamboo used in the Guianas as an arrow point is said to be *Guadua latifolia* (Roth, W. E., 1924, p. 151); Roth quotes Barrère that arrows were poisoned in Cayenne with the milk of the pougouly tree (*Ficus venenata*) and with several other ingredients.

Among other poisons were *Thevetia ahouai* (eastern Brazil), *T. peruviana* (northern Brazil and West Indies), and *T. bicornuta* (Mato Grosso), commonly known in Brazil as "Chapeu de Napoleão," which Thevet (1878) stated were used for revenge in love affairs. The *Nambicuara* used the rosin of certain Bombacaceae as a magical poison, and there are many other unidentified native poisons, such as pakurú-neará, a cardiac poison of the *Chocó* mentioned but not identified by Nordenskiöld (1930) and studied by Santesson (1929). In Surinam there was an especially poisonous arum called punkin, *Arum venenatum surinamense* (Roth, W. E., 1924, p. 564). Most poisons are kept secret by the natives.

Several wild grasses are known as poisonous to animals.

The so-called fishing poisons include a large number of plants

the physiological action of which is not at all identical. Some are true poisons, some act only by suffocating the fish.

Hoehne (1937, pp. 98-99) lists for Brazil three groups of fish poisons: guarana timbo (*Dahlstedtia pinnata*); many species of *Tephrosia*, in particular *Tephrosia toxicaria*; and the group of the "timbo do cerrado" comprising *Magonia pubescens*, *Indigofera lespedezoides*, and a species of Sapindaceae.

The *Tephrosia* species are known under the name of tingui in most parts of Brazil and as yarro-conalli by the *Macushi*. The barbasco of eastern Bolivia and the upper Amazon is *Serjania perulacea*. In Perú the name barbasco is also given to *Tephrosia toxicaria*. The ochoho of eastern Bolivia is *Hura crepitans*.

In the Guianas, the following fish poisons were identified: *Tephrosia*, haiari, heri, nako (kumu or cube of Perú) (*Lonchocarpus nicou*, *L. densiflorus*, *L. rufescens*), quanami, gonami, kunalli, etc. (*Clibadium asperum*, *C. surinamense*). On the Demerara, cumapuru (*Phyllanthus conami*) leaves are bruised with leaves of kunami, a shrub, and the dried light pericarp of the arisauru (*Derris pterocarpas*), which give buoyancy to the mass, and cast into the river along with pellets of dough to tempt the fish and to paralyze and kill them (Roth, W. E., 1924, pp. 203-204); haiara-balli (*Muellera frutescans*) is an *Arawak* poison. According to Gumilla, alligators were shot with arrows made of poison bamboo (Roth, W. E., 1924, pp. 202-207).

There are several antidotes for poison, among them a decoction of *Potalia amara* leaves for cassava poisoning, the only one identified by W. E. Roth (1924, p. 711). (See Medicines, below.)

MEDICINES

Early travelers were surprised at the number of herbs known to the Indians and by the fact that the natives always used "simple" remedies, each employing only one plant at a time, whereas Europeans relied more on semimagical combinations of several herbs.

Few primitive people have acquired as complete a knowledge of the physical and chemical properties of their botanical environment as the South American Indian. With the exception perhaps of the cinchona bark (*Cinchona* sp., several Rubiaceae, especially "cascarilla" of the Spaniards, *Cinchona pubescens*), there is no species used in modern pharmacopoeia which was not familiar to the natives in pre-Columbian days. Furthermore, it is probable that only a fraction of the herbs used by modern Indians are presently known and exploited. The following list is only partial and fragmentary, and it is limited to the species mentioned most frequently in the literature.

For most internal disorders, the natives administer an emetic followed by a purgative. The principal emetic is the root of the

ipeca or poaia (*Cephaelis ipecacuanha*), but in certain regions of the Guianas, the Indians use the bark of the wallaba tree (*Eperua* sp.), a small creeper (*Vandellia* sp.) and tobacco juice (Roth, W. E., 1924, p. 704). Other emetics known to the Indians in central Brazil are *Cissampelos glaberrima*, *Manettia ignita*, the kaamarã' tai (*Asclepias curassavica*), and kaa' chsa (*Chiococca anguifuga*).

A great many purgatives are known to the Indians: several Cayaponia (tayuya of the *Tupí*); cassia (taracu, *Cassia occidentalis*); several kinds of nuts, such as anda-uassu (*Johannesia princeps*) and "pinhão do Uruguay" (*Jatropha curcas*); jeticucu or "batata da purga" (*Operculina convolvulus*); several species of *Ipomoea*; sarsaparilla (*Herreria salsaparilha*) and its numerous substitutes (*Smilax aspera*). Against worms the Indians use gameleira branca, the latex of *Ficus anthelmintica* or *F. glabrata*, *F. dolaria* and of some other Moraceae, the seeds of *Andira*, etc.

For gastric disturbances, the Brazilian Indians take paico (*Chenopodium*) and *Dryopteris*; the Guiana Indians, *Jatropha gossypifolium*, *Boerhaavia hirsuta*, *Chelonanthus alatus*, *Allamanda aubletii*; and the marginal Indians of the Tropical Forest area, yerba del moro (*Amaranthus* sp.) or urutu (*Alternanthera repens*).

For healing wounds, the Brazilian Indians used besides balsams (q. v.) the crushed seeds of *Mucuna altissima*, tupixaba (*Scoparia dulcis*), hiboucouhu (*Virola* sp.), crushed seeds of the toxic fruits of *Carapa guianensis*, pounded and parched leaves of *Piper jaborandi*, and *Pilocarpus pennatifolius*.

Astringent herbs of native pharmacopoeia are camara (*Lantana camara*), *Polypodium crassifolium*, *Oxalis tuberosa*, and *O. angustifolium*.

To stop bleeding, the Indians used *Arenaria lanuginosa*, *Oenothera rosea*, *Chrysophyllum glycyphloeum*, and some mushrooms (*Polyporus coccineus* and *Geaster saccatus*).

Among the drugs used to cure eye pains, a constant complaint of South American Indians, Roth mentions red-pepper juice, the leaves of mokumoku (*Caladium arborescens*), a decoction of Wansimai roots, and the purplish red juice of kuruwatii (*Renealmia exaltata*). A plant "similar to a palm tree" (*Jatropha urens*, according to Hoehne) serves the same purpose.

Febrifuges include decoctions of the barks of *Diospyros paralea*, *Scoparia dulcis*, *Lisianthus purpurascens*, *Tachia guianensis*, *Strychnos pseudo-quina*, *Cassia amara*, amapaima or casca preciosa (*Cryptocarya pretiosa*), *Uaria febrifuga*, and *Nectandra rodiaei*, and infusions of *Eryngium foetidum*, *Byrsonima crassifolia*, and guarana (*Paullinia sorbilis*). Other febrifuges listed in the literature are: quina (*Hortia brasiliana*), quinaquina (*Myroxylon* sp.), "quina do matto" (*Esen-*

beckia febrifuga), taperihúa (*Cassia* sp.), coroba (*Jacaranda oxyphylla*), caapeva (*Pothomorphe sidaefolia*), caapomonga (*Plumbago scandens*), and camara (*Lantana* sp.).

Against diarrhea and dysentery, the Indians made infusions of the bark of *Byrsonima crassifolia*, *Ambelania acida*, *Jatropha curcas*, *Stachytarpheta jamaicensis*, *Cephalis ipecachuanha*, and *Acroclididium camara* or *Akawai* nutmeg, and of the seeds of greenheart (*Nectandra*); also of the sap of the wild nutmeg as a mouth wash and a cure for "yaws" (Roth, W. E., 1924, p. 709).

Antidotes used in Guiana for snake and spider bites, sting-ray wounds, and poisonous arrows are: *Dracontium dubium*, *Byrsonima crassifolia*, *Rhizophora magle*, and *Potalia amara* (Roth, W. E., 1924, pp. 710-711). The *Yahapé* used *Kyllinga odorata* and *caapia* (*Dorstenia* sp.).

Sedatives known in Brazil include guaxima (*Urena lobata*) and ubirataya or ibirarta-iba (*Pilocarpus pennatifolius*). *Abutua* (*Chondrodendron platyphyllum*) and *Verbena erinoides* are appetizers. To cure venereal diseases, the Indians used the bark of hyvourahi (*Pradosia glyciphloea*, according to Hoehne) and several species of Bignoniaceae.

Other special plant uses are: Aphrodisiacs (*Justicia pectoralis* and *Jatropha* sp.), contraceptive (*Stenomesson variegatum*), cure of toothache (mohomoho or jaborandiba, *Piper* spp.), hernia remedy (samambaia, *Pteridium aquilinum*), and cure of pulmonary afflictions (*Gnaphalium spicatum*), blisters (*Ranunculus pilosus*), scurvy (*Nasturtium pumilum* and *N. officinale*), hemorrhoids (*Tillandsia usneoides*), and catarrh (*Mirabilis peruviana*).

Several species of *Datura* and *Thevetia* are used for their anesthetic properties.

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