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Book Reviews *(continued from p. 119)*

plants, carnivorous plants, ground covers, succulents); "they summarize basic horticultural practices" (e.g., propagation, pruning, grafting); and a few explain terms (e.g., cultivar, ploidy).

About 260 illustrations—most of them associated with family articles—are in the book. The majority of these have never been published before, but some are from Bailey's *Manual of Cultivated Plants* (1949) or Lawrence's plant taxonomy texts.

Following the main part of the book is a list of about 3,200 "Authors [of botanical names] Cited," which includes years of birth and death; a 1,105-word "Glossary of Botanical Terms"; and an "Index to Common Names," which contains about 10,400 entries—each cross referenced to the appropriate scientific name.

It was George Sarton who wrote, in his "Notes on the Reviewing of Learned Books" (Isis 41. 1950), that "When a book is very good, it suffices to describe it, and to praise it briefly." Such a book is *Hortus Third*.

J.W.T.

The Peach. Varieties, Culture, Pests, Marketing, Storage. Edited by Norman F. Childers. 3rd ed. 659 pp. illus. Horticultural Publications, New Brunswick, New Jersey, 1975. $13.95 domestic, $14.95 foreign.

This jumbo paperback (resembling a city phone directory with a colorful, peachy cover) is the second updating of the proceedings of the National Peach Conference that took place at Rutgers University in 1965. Urged and aided by Stark Brothers Nursery and led by the indomitable horticulturist-author Childers, over 70 experts in peach (and nectarine) growing and marketing have updated their contributions to this overall view of the perils and progress of the queen of mild-temperate fruits.

We owe much to these devoted workers who constantly strive to produce the perishable peach and deliver it, fresh or preserved, at the peak of perfection, to the eager consumer. The goal of the grower however, is often thwarted by a storage and distribution system that brings to the market outwardly handsome—but permanently unripe and inedible—fruits.

In the United States there is a decline in per capita consumption of fresh peaches, but an advance in peach processing. Since the ripe peach, promptly canned, is a luscious, year-round necessity, let us hope that this volume will inspire horticultural students, develop many into a new crop of peach growers, and encourage and help present producers to overcome the many problems besetting this delicate industry. The book, a sincere effort to communicate a wealth of practical knowledge, is an offset printing of clear typescript and numerous good photographs.

J.F.M.

Tea. T. Eden. 236 pp. illus. Longmans. London, 1976. $29.50.

The widely acclaimed first edition of this work appeared in 1958; a second edition, in 1965. *Tea* has become an indispensible handbook for both field and factory operations. Moreover, since many of the studies on tea have been carried out at a very few research centers and have been published in specialized reports or journals, most of the information in the book would, perhaps, not have otherwise reached a wide audience. Now, some 11 years later, the third edition is before us.

A page-by-page comparison of first

Book Reviews *(continued*

The Ethnobotany of the Paumarí Indians[1]

GHILLEAN T. PRANCE,[2] DAVID G. CAMPBELL[3] AND BRUCE W. NELSON[4]

The ethnobotany of the Paumarí Indians was studied because their plant uses are fast being forgotten with the encroachment of western culture. A brief description of some of the common plants used in everyday life and of their food crops is given. The two narcotic snuffs made from Tanaecium nocturnum *(Bignoniaceae) and* Virola elongata *(Myristicaceae) are described in some detail. A list of medicinal and poisonous plants is also given.*

During 1974 and 1975 we made two visits to the Paumarí Indians, who live near the Rio Purús, Amazonas, Brazil. The Paumarí are now in constant contact with Western civilization and are fast losing much of their own culture. Hence, an attempt was made to obtain as much information about their uses of plants as was possible in two short visits.

The Paumarí are of Arawak origin and, until recently, were mainly a nomadic tribe. There are several known groups of Paumarí all within a 200 km radius of Lábrea on the Rio Purús. Groups are known on the Rios Ituní, Sepatiní, Purús and Cunhuá. We visited two villages close to each other on Lake Marrahã, about 8 km from the Rio Purús at 65°17′W, 7°28′S. The two villages formed a good contrast, because one was on the lake margin on periodically flooded ground, the other on high ground which is not flooded. All agriculture took place at the village on high ground, none on the flooded area.

THE BOTANY OF THE PAUMARÍ

As is the case of most Indian tribes, the Paumarí depend heavily upon plants for many aspects of their life in the forest. They use plants to provide food, build houses, weave baskets, poison fish, etc. Some of the more interesting plants are discussed in more detail after this general discussion of their botany.

The Paumarí eat a large number of fruits from the forest, as one would expect in a nomadic tribe. While we were there, in May, the following fruits were in season and were much used: Bacurí (*Rheedia* sp.), Piquiá [*Caryocar villosum* (Aubl.) Pers.] Inga (*Inga* sp.), Abiú (*Pouteria* sp.), Açaí (*Euterpe oleracea* Mart.). The local names are in Portuguese, not Paumarí. Fruit are used also as bait to catch fish. They use the seeds of Andiroba (*Carapa guianensis* Aubl.) as bait for catching Matrinchã (*Brycon ailarii*) and of the palm Jauarí (*Astrocaryum jauary* Mart.) as bait for the Tambaqui (*Colossoma bidens*).

Table 1 gives a list of the cultivated crops observed in the Paumarí fields. The crops are all cultivated by the Indians living on the high ground. The most surprising fact is that they have 14 different varieties of casava in their fields. We did not expect this from a formerly nomadic tribe, and such a large number of varieties indicates that they have been cultivating casava for a long time. They could cultivate casava as a semi-nomadic tribe, since it is vegetatively produced. Some varieties have names in their own language and others only Portuguese names, the latter indicating perhaps more recent introduction.

The Paumarí, like most other tribes in central Amazonia, do not eat any fungi and were amused by the idea. They have one word for all fungi—*Badiadimurobuni* (translated this means "the ear of the spirit or ghost"). We showed both Polyporaceae and Agaricaceae to them and got the same name. Their knowledge of fungi contrasts sharply with that of the Yanomamo described in Fidalgo and Prance (in press).

Weaving material is from two sources. For basket work, which they do very well, they use a species of *Ischnosiphon* (P23436), which they call Arumã, the name used by the local Brazilians. For weaving their big sleep-

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Fig. 1. Paumarí woman peeling the stem of Arumã (*Ischnosiphon* sp.) to obtain material for b... ...ets.

Table 1. Food crops found in Paumarí plantations.

English	Portuguese	Paumarí	Scientific Name
Yam	Cará	Adákin	*Discorea* sp.
Bitter Casava	Mandioca	Budá	*Manihot esculenta*
Sweet Casava	Macaxeira	Simacá	*Manihot esculenta*
Tarrow	Taioba	Bakaraihiwadeen	*Xanthosoma violaceum* Schott
Peach Palm	Pupunha	Kawiri	*Guilielma gasipaes* (H.B.K.) Bailey
Sweet Potato	Batata doce	—	*Ipomea* spp.
Pineapple	Abacaxi	Anana	*Ananas*
Banana	Banana	Sipatihin	*Musa*
Corn	Milho	Djaruwa	*Zea mais* L.
Sugar Cane	Cana de acuçar	—	*Saccharum* sp.
?	Cubiu	Cadjara	*Solanum sessiliflorum* Dun.

...mats, they use the fibrous bark of various ...s of the Annonaceae. The Paumarí also ...w cotton and spin their own thread.

NARCOTIC SNUFFS

1. Koribó-nafuni

Ingredients:

Nicotiana tabacum L. (Tobacco)

Tanaecium nocturnum (Barb. Rodr.) Bur. & K. Shum. (Bignoniaceae). *Campbell, Nelson & Ramos P21215, P21248; Prance, Kerr et al. 23428.* Paumarí name—Koribó.

The leaves of Koribó, which are very pun... with an almond-like smell when ...ked, are used to prepare the most fre...ly used snuff of the Paumarí Indians. ...reen leaves are shredded, then roasted ... they are dry. In this crisp condition, ... are ground to a fine powder with a mor... (made from the empty pyxidium of a ...al nut) and pestle, then rubbed through a ... for a final pulverization. The resultant ...der is then mixed with tobacco snuff ...ared by the same method, and the mix... is called Koribó-nafuni.

The snuff is used only on special occasions ... by the shamans before treatment of a ... It is mainly used in rituals which are ...rmed for the protection of children and ... by men only. These rituals are fre...nd are performed so that a child may ... to eat any new food. They are accom...ed by sacred songs, the singing of which ...stricted to such festivities. The ritual ...place for each kind of animal food, and ... may not begin to eat the meat of any ..., nor any new food, until he has been through this ceremony. The ceremony is performed by the men of the tribe for their children, and prior to the ceremony, the men take Koribó. The men rub their hands on the food, or the bones of the animal which is to be introduced into the diet of the child, then on the head of the child. Next, the men circle the area, imitating the animal which the child may begin to eat. This is performed in a state of trance.

Koribó-nafuni is also taken by the tribesmen at the puberty rites of the girls of the tribe. The snuff is inhaled through a hollow bone, usually the leg bone of a water bird. Apart from the ritualistic use of Koribó, the shamans use it before they treat any illness. The usual treatment is for the shamans to suck violently on the patient, sometimes on the affected part, in order to extract the illness. After they have sucked on the patient, they run into the forest and retch violently until they vomit. Next, they return to the patient and display some object such as a grasshopper, a piece of wood or bone, etc., which they claim to have drawn out of the patient.

The women do not usually use the snuff, but they take Koribó in another form. They drink a tea made from the root bark. About two tablespoons of fresh root bark are brewed in water and drunk. It produces drowsiness, an inability to concentrate and reduces awareness. The effect of half a cup of this infusion is slight but apparent.

The bignoniaceous plant Koribó is occasionally cultivated by the Paumarí, but it also occurs naturally in the local forests. They cultivate it, using local stocks, although this cultivation is a newly introduced

Fig. 3. Koribó [*Tanaecium nocturnum* (Barb. Rodr.) Bur. & K. Schum.] the main ingredi[illegible] Paumari narcotic snuff.

feature and results from the change from a more nomadic way of life. Their main source of Koribó is still from the surrounding forest.

Accidentally, we had good proof of the toxic effect of Koribó. We collected a large amount of the vine for chemical study and kept it in the room where we were staying. The doctor of our expedition, Dr. João José Ferraroni, sat beside the heap of Koribó. Several Indians commented on the smell of Koribó in the room, mentioned its toxic effect and left the room. After half an hour, Dr. Ferraroni said he was not feeling well and began to leave the room. He was so dizzy that he had to crawl out on all fours. He headed straight for the lake to take a bath. After he lay down to recuperate, he had a bad headache and then talked a lot in his sleep, not one of his normal habits. We asked an Indian who had taken the snuff what effect it had. He said that it made him dizzy, gave him a headache and the desire to throw himself into the lake at once, the exact symptoms that our doctor experienced. Needless to say, we removed the samples of Koribó from our living quarters.

There was a noticeable difference in intelligence between the women and the men, the women being much more alert and intelligent. This can perhaps be attributed to the fact that they do not take much of the Koribó snuff.

Results of chemical analy[illegible] of our material are not yet available. *Tanaecium nocturnum* was studied in Colombia by Grajales Diaz (1967), who reported an extremely high concentration of hydrogen cyanide in the fresh leaves. Presumably fumes from fresh material are poisonous. We noted the caution of the Paumari, since they did not want to remain near the fresh plant. The toasting in preparing the snuff probably removes the cyanides and leaves intact the intoxicating compounds.

It is interesting to [illegible] that *Tanaecium nocturnum* is used as [illegible] animal plant [illegible]

Fig. 4. Paumari Indian grinding the powder for Koribó-nafuni, their narcotic snuff.

Fig. 5. Koribó-nafuni, the Paumarí snuff, being passed through a cloth seive.

the Karitiana Indians near Porto Velho, Brazil. The Karitiana use a tea made from the leaves, mixed with leaves of a Leguminosae, as a remedy for diarrhea. *Tanaecium* is called *Samedu-ap*, or *Pum-ap*, by the Karitiana (information from specimen *Nelson P21266*).

2. Kawabó

Ingredient: *Virola elongata* (Benth.) Warb. (Myristicaceae) *Campbell, Nelson et al. P21253, Prance, Kerr et al. 23404.*

There are many reports of *Virola* snuffs from the northwest part of Amazonia: for example, Schultes and Holmstedt (1968), Schultes (1969), Prance (1970), but so far as we are aware, there are no reports of its use from central Amazonia. The Paumarí prepare their *Virola* snuff by a method slightly different from that described for other tribes (see Prance, 1970).

The outer, dead bark is first scraped off a section of the tree trunk. The remaining inner bark is then rasped into shreds wi a machete. The shreds are toasted and drie on a fire, pulverized in the same way as Kor ó, in a Brazil nut shell, and then passed through a cloth. Thus, the entire living bark is used, not just the resin, as in the case of the Indians of northwestern Amazonia. The Indians described its effect as being the same as the effect of their other intoxicating snuff, Koribó. The material is collected from wild trees in the periodically flooded forest.

POISONS

1. Fish Poisons

Two different plants were collected as fish poisons commonly used among the Paumari. They were collected from the forest and are not cultivated (1) Flacourtiaceae: *Ryania speciosa* Vahl "Kapahasa" P21201, 23399. (2) Leguminosae: *Derris floribunda* (Benth.) Ducke "Ácuna" P21247, 23414.

The *Ryania* ("Kapahasa") is a well-known poison, but better known as a poison for

Fig. 6. Paumarí Indian preparing drink from Koribó [*Tanaecium nocturnum* (Barb. Rodr.) Bur.].

animals and humans than for fish (Monachino, 1949; Prance, 1972). The bark and leaves of the plant are macerated in a *Crescentia* gourd by the Paumaris, then mixed with water and used to poison the fish and caiman in small streams. The Indians are aware of the high toxicity of the plant and were concerned that we keep the plant

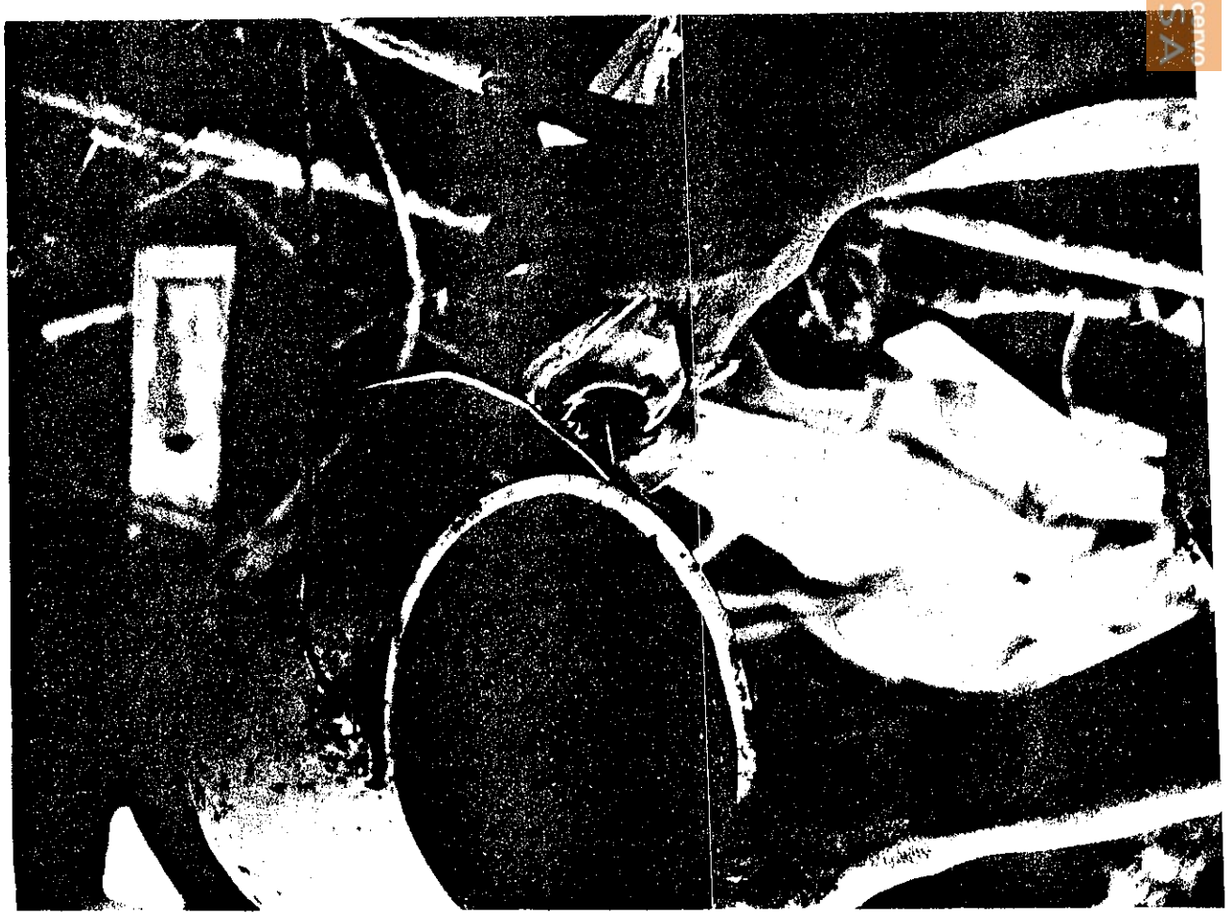

Fig. 7. Paumarí preparing drink from Koribó [*Tanaecium nocturnum* (Barb. Rodr.) Bur.].

specimens out of the reach of children. *Ryania speciosa* is called "Capansa" in Portuguese, an epithet possibly derived from the Paumarí name or from a similar name used by another Arawak tribe from a related language group. *Ryania* contains the alkaloid Ryanodine, a complex ester of pyrrole-2-carboxylic acid which has been r ich

Table 2. Paumarí medicinal plants collected.

Paumarí Name	Scientific Name	Family	Voucher No.	Use	Plant Part
Makaná		Cucurbitaceae	21200	Fevers	fruit
Kajádori		Rutaceae	21201, 23408	Internal pains	inner bark
Tupí		Euphorbiaceae	21203	Internal inflammation	inner bark
Odolokakana		Zingiberaceae	21204	Urinary infections	stem
Jupara		Myristicaceae	21212	Teething pains	bark resin
Darasá		Araceae	21216	Ant & Hymenoptera stings	sap
Okopí		?	21217	Skin fungi	root tea
Marupuá		Liliaceae	21218	Dysentery	bulb tea
Badnan		?	21221	Coughs	leaf
Bahémuruba		Leguminosae	21222	Skin lesions	stem sap
Guasa		Leguminosae	21223	Skin fungus	cotyledons
Buloshi		Leguminosae	21224	Impetigo, leishmaniasis lesions	cotyledons
Bakadoho'doho		?	21225	Fevers	leaf paste
Madébwa		Moraceae	21226	Rheumatics	latex
Viru-ka-ibanari		?	21227	Fevers	inner bark
Bahi'kai'hi'ai		?	21229	Fever, cold	bark tea
?		Bombacaceae	21230	Insect stings	bark pulp
Kasawari		Leguminosae	21233	Headache	bark snuff
?		Araceae	21251	Snake bites	juice from spathe
Foa (Port. = Lumbrigueira)		Leguminosae	23405	Worms especially Lumbricus	bark tea
Orana		Euphorbiaceae	23407	Dysentery	bark in cold water
Cachiruba		?	23410	Malaria	bark in water (very bitter
Paumadhâ	Couratari	Lecythidaceae	23427	Dysentery	tea from androphore
Mânaka		Bignoniaceae	23429	Cold and fevers	leaf and bark snuff
Budanikawafani	Peltomorphe	Piperaceae	23437	Inflammation	stem in cold water used to

studied chemically (Rogers et al., 1948; Mors, 1949; Weisner et al., 1967). A summary of the structure of Ryanodine and its derivatives as well as its insecticidal activity is given by Crosby (1971).

The *Derris*, or Acuna, is another well-known fish poison which is found throughout Amazonia (Krukoff and Smith, 1937; Prance, 1972). The roots and leaves are crushed and thrown into the water of small streams to asphyxiate the fish. The chemistry of the rotenone which is the active constituent of *Derris* is summarized by Fukami and Nakajima (1971).

2. Arrow Poisons

The Paumarí no longer use poison arrows, but some of the older Indians remember the plant ingredients. The poison is a type of curare, since the principal ingredient is *Strychnos solimoesana* called "*Jadadakaikapihai*" by the Paumarí (Herbarium material P21206, 21207, 23403).

MEDICINES

Medicinal plants are important in the culture of the Paumarí Indians. They brought us many different plants, which they claimed to use regularly. Table 2 summarizes the details of the use of these plants. None of them was tested by us.

BIRTH CONTROL

The Paumarí do not have any contraceptive plants, but abortion is quite common. The women claim that their abortive plants are very effective. It was difficult to obtain much information on this subject, however, since the women were reluctant to discuss it. Mechanical abortion is apparently more common than plant-induced abortion. Missionary Shirley Chapman has observed and treated many women hemorrhaging because of plant-induced abortions. The tribe does not have need for birth control, since numbers have fallen from 2,500 to 250 in the last 70 years, due to the atrocities of the rubber-boom era and to western diseases.

The following abortion-inducing plants were collected: (1) Mabí diri 'da-di (water snake head) Piperaceae (*Piper* sp.) 23231. The leaves are rubbed on the abdomen to kill the fetus. (2) Koaka-makha 'da-di 21232. The leaves are rubbed on the abdomen to kill the fetus. (3) Mabi diri da-di Compositae 21252. The leaves are rubbed on the abdomen and vagina.

CONCLUSIONS

The Paumarí Indians, although very close to Western civilization on the River Purús, have maintained much of their plant knowledge. Some of this knowledge is rapidly being lost, because only the few older Indians were able to give it to us. Their use of *Tanaecium nocturnum* is particularly interesting, because it has not been found in other tribes in the region. It is, however, used by Indians as an aphrodisiac in Chocó, Colombia (Gentry, 1973).

ACKNOWLEDGMENTS

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and third editions, however, shows that most of the book remains unchanged. Changes are limited to the introduction of a few niceties such as literature citations by author and date rather than by superscript numerals, redrawing of some figures, change to the metric system from the English system, and publication by the photo-offset technique which incidentally does not do justice to the half-tone illustrations). Fewer than 30 pages of new information, by my calculations, have been added in 18 years! As stated by the author in the preface, "the most striking changes are in the manufacturing process."

There is no question that this is still a readable, authoritative, and very useful book. Even so, one wonders whether a superficial "face-lifting" and a very modest updating of factual information justify a new edition and an outlay of $29.50. In these times of tightened budgets, readers will want to think very carefully before recommending acquisition of this most recent edition if earlier ones exist in the library.

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Nitrogen Fixation by Free-living Microorganisms. Edited by W. D. P. Stewart. 471 pp. illus. Cambridge University Press, Cambridge, 1975. $37.50.

The United States took part in the International Biological Program (IBP) from 1967 to 1974. That effort was expected to "revolutionize ecology and usher in a new age of 'Big Biology.' " The official evaluation of the effectiveness of our participation in that $57 million program—the overall theme of which was "The Biological Basis of Productivity and Human Welfare"—has only recently become publicized (see Science 193:866. 1976).

Nitrogen Fixation by Free-living Microorganisms, volume 6 of the IBP series, provides some clues to the question of whether or not it was all worth it. The fact is that the work, although well edited and nicely produced, is already hopelessly out of date (many of the contributions were presented in September, 1973, in Edinburgh!) and prohibitively expensive. Moreover, the overall quality of the 29 individual contributions is highly variable. In most cases, the material presented is often readily available in publications by the same authors elsewhere. Most of the contributions are downright parochial —with a few notable exceptions.

The volume is partitioned into four more or less equal sections. Nitrogen fixation by free-living bacteria and by free-living blue-green algae comprises nearly half the volume. The acetylene-reduction technique, which is now the assay of choice both in field and laboratory for determining nitrogen fixation, and the biochemistry of nitrogen fixation make up the rest. Not nearly enough attention is paid to agricultural research. This is peculiar, indeed, in view of the "biological productivity" theme of the entire project.

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