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A Preliminary Pharmacognostical Study of Ten Nigerian Plants

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Since his earliest days, man, with the help of witch doctors or their equivalents, has used plants in sundry forms to attempt cures of various ailments. These "cures," especially if they succeeded, have become formalized, as it were, into tribal tradition, and have been used repeatedly over the centuries. Indeed, many times a cure is considered ineffective because the exact dosage has not been administered and the correct method of preparation has not been followed; even a minor variation is considered excuse enough to "exonerate" a witch doctor for a patient's death. Many of the early uses of plants have survived to the present day. For example, in Nigeria's northern provinces, the medicine men of some tribes still perform their ancient rituals.

The main source of their "cures" are plants of all types. These are pounded, powdered, or mixed with other plants or with water. Sometimes other ingredients are added. Among these are the intestines of jackals, sheep, and cows. Naturally, the ingredients and the manner of preparation vary with the ailment, but the significant point is that the patients become cured of their physical or psychological ills.

A preliminary pharmacognostical study of ten such drugs and the plants which yield them has been made and is reported upon in this paper.

Taxonomic Study

Descriptions of the plants. A taxonomic study was made of the ten species of plants from the Plateau Region of northern Nigeria. Pressed voucher specimens were employed in authenticating the material used in this work. The original findings were verified by using Hutchinson and Dalziel (1, 2) and Lely (3), and also by a study of specimens available at the Gray Herbarium of Harvard University.

ANNONACEAE

Annona senegalensis Pers.

A small woody shrub or tree attaining a height of 20 ft. It is found growing in the savanna forest, in stony soils, along stream banks, or near the sea. Its range extends from the Cape Verde Islands to Gambia, northern Nigeria, and the Sudan. The bark of the stem is smooth and gray, and the branches are usually pubescent. The leaves are broadly elliptical, approximately 5 in. long and 3 in. wide, and are lighter in color on the lower surface than on the upper. Close reticulate venation is evident on the lower surface. Young leaves are pubescent but become glabrous when they mature. From February to April, this shrub produces flowers which are axillary, softly pubescent on the outside, and green turning to yellow. The fruits, produced in June, are two inches in diameter when ripe. They are globose, smooth, and yellow. This plant sprouts very strongly from the stump and occasionally produces root suckers.

The root and the bark are used as a vermifuge, as an antidote for snake bites, as an insecticide, and as a treatment for sleeping sickness and dysentery. The powdered leaves are used for treating Guinea-worm sores.

BURSERACEAE

Boswellia odorata Hutch.

A small- to medium-sized tree found growing in the savanna forest extending from the Ivory Coast to the Cameroons and Ubangi-Shari. It has a pale papery back, which peels off in ragged strips. The bark yields

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a whitish gum-resin. The leaf is pinnately compound and consists of eight pairs of leaflets which are sub-alternate, linear lanceolate, and long acuminate. These leaflets are over 3½ in. long and 1 in. wide, and they have serrate margins.

The fragrant white flowers are produced before the leaves. Their petals are sometimes red-veined. The pear-shaped fruit is three-valved and is about ¾ in. long.

In Adamawa, the eating of the fresh bark causes vomiting within a few hours. This is said to relieve the symptoms of giddiness and palpitations. A mixture of the root and bark is used as an antidote for arrow poison. The gum has a dual use: as a stomachic; and as a treatment for syphilis.

Canarium schweinfurthii Engl.

A large timber tree attaining a height of 120 ft., found growing in evergreen and deciduous forests, from Senegal to Angola, the Sudan, and East Africa.

The bark of the trunk and of the branches is gray to greenish orange in color and peels off in small scales. The bark exudes a viscid, sulfur-yellow oleoresin which solidifies, and has a terebinthinate odor and an unpleasant taste. The branchlets have a "rusty" pubescence. The pinnately compound leaves occur in terminal whorls, with 8 to 15 pairs of leaflets making up each leaf. Each leaflet is oblong to oblong-lanceolate in outline and has an acuminate apex and a cordate base. The lateral veins on the lower surface of each leaflet have a velvety pubescence.

From March to May, this species produces creamy white flowers in axillary panicles over 12 in. in length. They have a persistent calyx and three petals which are slightly larger than the sepals.

Bluish black glabrous drupes appear in June. These fruits are narrowly oblong to ellipsoidal and about 1½ in. long. Each contains a hard, fluted "stone."

In Nigeria, the oleoresin is used at night by hunters as "bush candle" flares. In Liberia, the exudate is used as pitch or is burned black, and the carbon used in tattooing. In some areas, the fresh bark has its use for colic, hemorrhoids, and jaundice. In other areas, a decoction of the bark is used in treating dysentery, cough, chest pains, and chancres.

EUPHORBIACEAE

Jatropha curcas Linn.

A shrub or small tree reaching a height of 20 ft. and considered to be an American plant. It is widely spread in the tropics and is commonly grown for hedges and fences. It was brought to Africa and the East and was cultivated by the Portuguese. It often is an escape from cultivation in West Africa and extends as far as the Rhodesias.

This species has thick, glabrous branchlets and a sap which is viscid, sometimes becoming red and gummy.

The leaves are five-lobed, with undulate margins and very small stipules. In April and May, it produces yellowish green flowers. The black, ellipsoid fruits are about 1 in. long and scarcely lobed, each containing three seeds rich in oil.

Many uses are made of the leaves. An infusion mixed with lime juice is employed to reduce fever when taken internally and when used externally as a wash. The Bakwiri of the Cameroon mountains drink an infusion of the leaves with beer as a diuretic for rheumatism. In southern Nigeria, a decoction of the leaves is used rectally as a remedy for jaundice. Finally, for Guinea-worm sores, the leaves are crushed and mixed with hot water, or they are burned and their ashes are applied to the sores.

To cause purging in ascites, the seeds are crushed and boiled with cereal and are eaten.

LEGUMINOSAE

Daniellia oliveri Hutch. & Dalz.

A large timber tree reaching a height of 100 ft. It is branchless for some distance from the ground and has a triangular crown with a flat top. It is considered one of the outstanding trees of the savanna forest and is often gregarious. The species can grow in rocky soils, too. It ranges from Senegambia to Angola, the Congo, and the Sudan.

It has a light gray scaly bark. The leaves are pinnately compound, with six to eight pairs of leaflets which are pink when young. They are 6 in. in length and 3 in. in width, acuminate, and have rounded bases and entire margins. The upper surface of each leaflet is glabrous; but there is pubescence on the numerous prominent veins of the lower surface.

From December to February, the tree bears scented, creamy white flowers which occur in copious, rather flat panicles. There are ten long stamens, and the calyx is very glabrous.

The fruits are flat, horny, obliquely elliptical pods, 3 in. long and ½ in. wide. The pod is slightly veined and tends to curl up up on a 1-in. stalk. The usually single seed is purplish brown in color, nearly 1-in. long and exhibits a twisted funicle.

In Sierra Leone and Guinea, the bark is used in making bee hives. In other parts of Africa, the resin is used for polishing furniture. An infusion of the powdered bark and the buds is taken for headaches, migraines, and feverish pains. A decoction of the leaves and bark relieves colic and toothache. The Yorubas of western Nigeria use the gum for treating gonorrhea, chewing and swallowing it to produce a purgative action.

Dichrostachys nutans Chiov.

A thorny shrub attaining 20 ft. and growing in thickets. It is found in savanna and transition forest throughout tropical Africa, in the Rhodesias, and in parts of South Africa. The stems have a pale bark and axillary spines. The leaves are bipinnate, usually with ten opposite pairs of "pinnae" which have long rod-like glands between the members of each pair. The leaflets are numerous, linear-oblong, 8 mm long and 2.5 mm broad, and are slightly pubescent. From February to May, this species produces flowers which are faintly fragrant and very decorative. The lower, neuter, flowers are numerous and pink or pale mauve, while the upper, bisexual flowers are small and yellow in color. The dehiscent fruits are dark brown, glabrous, and twisted and occur in crowded heads. They are persistent on the tree.

In the Sudan, a decoction of the root is used to treat syphilis and leprosy. In Senegal and Guinea, the same decoction is employed as a purgative. In Sierra Leone, the bark has an application as a vermifuge in treating elephantiasis.

Peterocarpus erinaceus Pair.

A tree attaining a height of up to 50 ft., found growing in the savanna forest and in open country, extending from Senegal to Chad and Gaboon. It has a bark which is almost black, as well as being rough and scaly. The branchlets are densely pubescent. The sap dries to a red resin known as *kino,* a name of Mandingo origin.

The leaves are pinnately compound, oblong-elliptical with six pairs of leaflets, 4 in. in length and 2 in. in width, alternating on the rachis. The lower surface of each leaflet is pubescent and has numerous parallel lateral veins. From August to January, it produces bright yellow flowers, which are more vivid when the tree is leafless. During December and January, it bears a papery fruit, which is 3 in. in diameter and is persistent. Its seeds are covered with prickles and are surrounded by a membranous wing.

A decoction of the bark and resin makes a good astringent for use in severe diarrhea and dysentery; while a decoction from the leafy stem tops is used in the Ivory Coast for fever.

PALMAE

Phoenix dactylifera Linn.

A medium sized tree occasionally planted in compounds. It is found growing widely in the tropics and subtropics. The pale green leaves are nearly ten feet long. The leaflets are linear lanceolate and acuminate with the middle ones longest. The flowers are unisexual and occur in panicles. The ellipsoid fruits are 2 in. long and are fleshy with a thick sweet pericarp.

A unique use is made of the fruit by mixing it with *capsicum* pepper, and adding this to beer to make it less intoxicating. In Morocco, the plant is used for tanning. The growing apical part of the tree is used for "stuffing pads" and for cleaning pots.

RUBIACEAE

Crossopteryx febrifuga Benth.

A shrub or small tree attaining a height of 20 ft. It is widely distributed in tropical Africa from Senegal to the Sudan, and from East Africa to the Rhodesias.

The dark rough bark is slightly scaly. Its leaves are elliptical to suborbicular, with rounded to shortly acuminate apices. They are 3 in. in length and 2 in. in width, and show pubescence on the lower surface. From March to May, white, cream, or pink flowers are produced. In January, June, and Octo-

ber, it bears a reddish black, globose fruit, 1/8 in. in diameter, persistent, and dehiscent from the tip. The seeds are flat, each with a jagged wing.

In Sierra Leone, the bark is used as a cough medicine, whereas, in northern Nigeria, it is used against gonorrhea and worms. In Guinea, after being pulverized and mixed with rice, it is used as an astringent in treating diarrhea, dysentery, and fever.

Sarcocephalus esculentus Afzelius

A shrub or small tree reaching a height of 20 ft. and found growing throughout the savanna woodlands, in coastal scrub and grasslands, as well as in places along the coastal strip.

The glabrous, membraneous leaves are opposite in arrangement and ovate to nearly orbicular in outline. The lower surface of the leaves is lighter than the upper surface, showing conspicuous reticulate venation and lateral veins which are mostly alternate along the midrib. Interpetiolar stipules are also present. The inflorescence is capitate and consists of many small pentamerous flowers. The multiple brown fruits are globose and fleshy, and 1½ in. in diameter. They contain small seeds.

An infusion of leaves and roots is given internally to children with fever. In Liberia, the leaves are mixed with Guinea grains and taken for diarrhea and dysentery. In Sierra Leone, a decoction of the leaves is used for constipation.

Descriptions of Crude Drugs.

ANNONACEAE

Annona senegalensis Pers.

This crude drug consists of extremely tough and woody roots with portions of bases of lateral roots attached. The wood portion of the main roots is light in color and very dense in structure. The bark portion is relatively thin, reddish brown, and devoid of scales. The segments of roots measure up to 1 inch in diameter and have a short splintery fracture.

BURSERACEAE

Boswellia odorata Hutch.

The part used is the bark, which is about 7 mm thick and has light gray scales covering the outer surface. The inner surface is light brown to tan and has fine longitudinal striations. Small amounts of yellow wood are found adhering to the inner surface of the bark. The fracture is weak, short, and somewhat fibrous, and the fractured surface is pink.

Canarium schweinfurthii Engl.

This bark is heavy and thick—20 mm in thickness—and has patches of dead outer periderm remaining. The underlying younger periderm is light reddish brown and is extensively developed. The phloem is much lighter in color than the periderm and tends to be fibrous and splintery. The inner surface of the bark is smooth.

EUPHORBIACEAE

Jatropha curcas Linn.

This crude drug is made up of fragments of root striped longitudinally. Most of the segments consist of bark attached to the wood, while the other fragments are separate pieces of bark and wood. The fracture of the wood is complete and weak, with a puff of dust appearing as the fracture is made. The bark is about 2 mm thick and has outer grayish layers which exhibit abundant exfoliation. In the areas where exfoliation has occurred, there is irregular longitudinal wrinkling. The fracture of this root is short.

In a few instances, there are fragments of stem bases admixed with this root material. These are characterized by a chambered pith. The root has a very pungent odor.

LEGUMINOSAE

Daniellia oliveri Hutch. and Dalz.

The part used is the bark, which occurs in large, flat, extremely hard pieces, and is varying shades of brown externally. Most pieces show heavy, well developed periderm. The inner surface is dull brown and has patches of dried resinous material. The removal of tangential shavings from the inner surface results in the appearance of transverse rows of dark, lenticular specks alternating with lighter areas. These specks represent the phloem rays. This bark has a tough, irregular, non-fibrous fracture.

Dichrostachys nutans Chiov.

This bark occurs in stringy, fibrous strips, approximately 2–3 mm thick. The periderm is light gray and somewhat fissured. The inner part is whitish to light yellow and peels off in ribbon-like layers. The fracture of this bark is tough and very fibrous.

Pterocarpus erinaceus Pair.

This crude drug consists of straight and curved segments of root up to 7 mm in diameter. The wood of the root is hard and distinctly yellow. It is surrounded by bark which is light brown and 1 mm thick. Externally, this bark is longitudinally and irregularly ridged and exhibits bases of lateral roots. This root has a short, non-fibrous fracture and a peppery, sternutatory odor.

PALMAE

Phoenix dactylifera Linn.

The part used is the root—wiry and tapering from a more or less rounded crown. This crown consists of buds closely clustered around a shortened stem portion. The root is dark grayish brown and does not exceed 7 mm in diameter. Its maximum length is up to 15 mm. It has a slightly aromatic odor and a fibrous fracture. The wood of this root separates in strands as the drug is twisted, while the bark chips off in irregular pieces.

RUBIACEAE

Crossopteryx febrifuga Benth.

This bark occurs in thin, curled pieces or quills up to 2 mm thick. Some fragments show portions of wood attached to the inner surface. Externally the young bark is smooth and its color varies from light to dark brown with longitudinal stripes. The inner surface tends to be longitudinally striated. The pieces of older bark are scaly and dark brown externally. The fracture is short and non-fibrous.

Sarcocephalus esculentus Afzelius

This crude drug consists of broken segments of root up to 3 in. in length. The bark, 2 mm thick, has an outer surface which is grayish brown and is irregularly mottled. The scraped surface, however, is uniformly gray.

The wood region is oddly formed. There is a woody central core which is evident in transverse section, and an outer region which is arranged as "C"-shaped lignified zone separated by a narrow ring of soft tissue. These segments have a tough fracture and a wintergreen odor.

Experimental

The method followed in screening the plants was a modification of that described by Wall et al. (6). From each plant, an alcoholic extract was prepared by refluxing 2g of the powdered sample with 25 ml of 80% ethanol. The plant material was removed by filtration and was washed with sufficient 80% ethanol to bring the filtrate to 25 ml. The extracts obtained in this fashion were used in all of the following screenings:

Alkaloids. Ten ml of each extract was evaporated to dryness, dissolved in hot acidified water, and filtered. The alkaloids were removed by the usual treatment with alkali and chloroform. The chloroform solution of alkaloidal material was extracted with dilute hydrochloric acid (2%), divided into three portions, and tested with Mayer's reagent,

TABLE 1
VERNACULAR NAMES

Scientific Name	*Anaguta Name*	*Hausa Name*	*Part Used*
A. senegalensis	oosamahgoo	gwandar daji	root
B. odorata	oogamaneeng	ararrabi	bark
C. schweinfurthii	oopar	atile	bark
J. curcas	oojehmbay	bi'nidazugu	root
D. oliveri	ookadum	maje	bark
D. nutans	oopuhzhee	'dun du	bark
P. erinaceus	ookwangangeenee	mai jini	root
P. dactylifera	oodavedno	dabino	root
C. febrifuga	oobeengbeeng	shajini	bark
S. esculentus	oodehlay	tafashiya	root