THE FOREST OFFICERS' HANDBOOK OF THE GOLD COAST, ASHANTI AND THE NORTHERN TERRITORIES

BY

T. F. CHIPP, M.C., B.Sc., F.L.S.

Deputy Conservator of Forests.

Frank Hull

WEST AFRICA

Territory held by Great Britain under Mandate shown thus

Stanford's Geog! Estab^t, London

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T. F. CHIPP, M.C., B.Sc., F.L.S.

Deputy Conservator of Forests.

Chapters I to VI and VIII and IX approved as a thesis for the Degree of Doctor of Philosophy in the University of London.

PUBLISHED FOR THE GOVERNMENT OF THE GOLD COAST
BY THE CROWN AGENTS FOR THE COLONIES,
4, MILLBANK, LONDON, S.W. 1.

PRINTED BY
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INTRODUCTION.

UNTIL now only two reports have been published on the Gold Coast Forests. The first one the result of Mr. H. N. Thompson's tour in 1908, with his recommendations as to necessary forest legislation. This was published as a Colonial Office Miscellaneous Report and is now out of print. Secondly, Mr. N. C. McLeod's " Statement for the British Empire Forestry Conference," in 1920, which dealt with a brief review of the forest under certain specified headings. Only 150 copies of this report were printed, and these were circulated outside this country.

It may safely be said, therefore, that the majority of the people of this country, as well as those outside, who are interested in it from commercial or other reasons, have at the most only a vague idea of the forests of the country, their economic importance, and the part they play in the protection of the country generally. The present work, on which the writer has been engaged for some years, is the first attempt at a complete presentation of the present-day position of the forests with their problems and all available information bearing on them. Many of the facts have been understood for a long time, but this is the first endeavour to marshal these facts together, and, after an appreciative study of them, draw the conclusions to which the writer has come, and for which he is solely responsible. There is a considerable amount of original work now published for the first time, foremost among which is the intimate relation of the forests to the meteorological observations and physiography of the country, and the maps, graphs, and tables bearing on these. The Synopsis of Natural Orders and lists of Economic Plants are abstracted from the " List of Trees, Shrubs and Climbers," and " List of Herbaceous Plants and Undershrubs," published by the writer in 1912 and 1914 respectively.

This work had originally been intended as a handy reference book for Forest Officers appointed to the Colony, and African students who take up forestry locally, and it has, to a large extent, retained its original form to suit this purpose, Chapters VII and X, in particular, being included. At the same time, however, its scope has been extended

so that it may prove of service to all in the country interested in, or responsible for, the future welfare of the forests and the factors bearing on them. It is realised that the information given is very small, and later research will doubtless modify many of the conclusions here set out, but the need of some reference work on the Gold Coast forests has been increasingly felt of late, and it was therefore considered advisable not to delay any longer the publication of the present work which will serve as a basis for future research. By directing the study of Officers of the Department to what appear to be the main forestry problems of the country, and by these Officers' own observations, criticisms and records, a comprehensive and reliable work will be able to be compiled at a later date.

The forests have in this work been considered entirely from the point of their value and importance to this country.

There has been no opportunity to consider them with regard to Empire needs, and they, with those of Nigeria, form 14 per cent. of the Empire's forests.*

T. F. CHIPP.

COOMASSIE,
March, 1922.

ACKNOWLEDGMENT

To Lieut.-Col. R. H. Rowe, D.S.O., M.C., R.A., Surveyor-General, Gold Coast, I am indebted for permission to use the plate from which the maps of the Gold Coast have been prepared. His assistance in lending the plate and having the graphs prepared for reproduction is gratefully acknowledged.

T. F. C.

* "*Empire Forestry*," March, 1921.

THE FOREST OFFICERS' HANDBOOK

OF THE

Gold Coast, Ashanti and the Northern Territories.

Chapter I.

THE WEST AFRICAN FORESTS.

Before attempting a consideration of the forests of the Gold Coast itself it is necessary to obtain an idea of the forests in general of the West Coast of Africa. For information on this point we are chiefly indebted to the noted French explorer M. Auguste Chevalier, whose journeys through French West African Territory have been described in " La Géographie " and " Les Comptes Rendus."

Generally, the West Coast of Africa, which is now, on the whole, considered to be subject to elevation, consists of a vast periplane, divided north and south by the valleys of the larger rivers, and east and west by their tributaries. In the upper region of the Niger, including the hinterland of Sierra Leone, is a vast series of "massifs" sometimes attaining an altitude of 9,000 feet, and to them Chevalier attributes the orientation of the Coast, the hydrographic configuration, and an influence on the climate over the whole region from Portuguese Guinea to Cape Palmas. The part of the West Coast with which we are more intimately concerned is a considerable distance from these highlands and is consequently not so subject to their immediate influence, although the main divide of the country is a spur from these highlands. In fact, the two chief climatic factors that appear to control the distribution of forests in the Gold Coast and its adjoining territories are the " Harmattan," a dry, sand-laden wind which blows straight from the desert in the north-east for about two months of the year, and the prevalent south-west wind which brings the rain.

The forests of the West Coast of Africa show occasional connection with South America, rarely any relation to those of North Africa, but an intimate connection with the great equatorial belt of forest to the east. This is to be expected for they are bounded on the west and south by the sea, on the north by the Desert, and on the south-east by the southern deserts of Africa.

It is, however, the climatic factor of rainfall distribution across equatorial Africa that marks the limitations of the zone of vegetation

to which the forests of western tropical Africa belong. The forest vegetation of equatorial and West Africa constitutes, therefore, one flora, and to that extent exhibits the characteristics of an island flora. The extent of the flora, both internally as regards equatorial Africa and externally as regards connections north and south and with other countries, is ascertained from an examination of the distribution of genera, and in more circumscribed areas by the distribution of species. The reason for emphasizing this point is that at the present day there is not one equatorial belt of forest, but a western forest belt stretching from western Liberia to the middle of the Gold Coast and the equatorial belt stretching from the east of Lagos eastwards. The examination of genera and species shows that formerly this was undoubtedly one undivided belt, probably including Sierra Leone at least within its western boundary, and reaching as far north as the seventh parallel, and probably considerably farther.

A consideration of the types of vegetation found in West Africa shows that the Gold Coast groups are but portions of the main belt, for the political boundaries of the West African Colonies are not along natural lines. Consequently it is better to adopt the names and divisions of the zones of vegetation as defined by M. Chevalier in " Les Comptes Rendus," Tome 149, 1909.

Three distinct zones are indicated. First, the Sahélienne Zone, characterised by some of the scrubby desert species, and by many woody species of small height growth, the soil being almost always sandy and exposed. Secondly, the Sudanese Zone, the largest of the three, comprised generally of laterite plateaux, bare in the dry season, but becoming clothed with grass and leguminous plants in the rains ; the trees of various species and often reaching a fair size, but never forming thick or impenetrable forests, and rarely interlaced with lianes. Thirdly, the Guinea Zone, comprising the coastal regions and marshes, often cut up by estuaries and large stretches of mangrove ; in the interior often hilly and cut by the ravines of rivers and their tributaries, the forest dense and interlaced with giant creepers ; the water courses bordered by bamboos, *Elæis* and *Raphia*.

Of these three the Sahélienne Zone is not represented locally, but both the Sudanese and Guinea Zones are found in the Gold Coast and its dependencies.

As has been stated above, at the present day there is not one continuous forest belt throughout the West Coast, but a western portion and a central equatorial belt. M. Chevalier states that, left to itself, the forest of West Africa is able to gain ascendency over the grass and recover its former area, as in some cases, notably in the mountains to the north-west of the Ivory Coast, such advance of forest has actually been observed. But these are isolated cases and, on the whole, the

West African forest is steadily, and as time goes on, more rapidly, diminishing. There seems no doubt that the root cause of this is entirely due to the natives' system of shifting cultivation, by which forest land is cleared, cultivated, and after a few years abandoned, when further clearings are made. Forest again appears on the abandoned land, but it is an impoverished woodland, comprising but a few score species as opposed to the several hundred that are found in the virgin forest. With the cessation of internecine warfare, and the long period of peace that has now existed in West Africa, the population has turned its energies increasingly to agricultural pursuits, and consequently to meet these needs the destruction of forest has proceeded and is proceeding at an ever-increasing rate.

In this connection a summary of the views of the encroachment of the Sahara on the Sudan, with the first stage of which problem the Forest Authorities of the Gold Coast are confronted, is contained in Mr. Bovill's articles in the Journal of the African Society, Volume XX., Nos. LXXIX and LXXX. The situation is so well considered that it is felt necessary to quote the following somewhat extensive extracts.

" The evidence of increasing aridity in the Sudan, especially in Senegal and Nigeria, would seem to be sufficiently convincing. In an aggregate of years, rivers are found to be less subject to flood, lakes dry up, wells shrink and fail, farmers complain of decreasing yields, and finally there is a gradual movement of the people from the north southward. It is the conviction of those who are in intimate contact with the natives that this dislocation of the population is entirely due to the encroachment of the Sahara.

" The field geologist in so vast and imperfectly known a country as the northern half of Africa is required to range over great areas ; he seldom has an opportunity of becoming intimately acquainted with any single district, and the scarcely perceptible processes of nature such as the gradual shrinkage of wells, lakes, and even rivers, are not unlikely to escape his notice ; nor is he called upon to solve the problems arising out of the consequent dislocation of the population. Moreover, in his training, and in the exercise of his profession, mere decades, and perhaps centuries, are periods of time of no great significance. The local official, on the other hand, is usually required to serve for long periods in very limited areas, with which he becomes intimately acquainted, and with the inhabitants of which he is in constant and intimate contact. Under his eye the slight processes of nature, especially when connected with the vital question of water supply, are far less likely to escape observation. It is chiefly from this source that springs the ever-growing mass of evidence of increasing aridity.

" There seems to be a fairly general agreement that in the past there have been climatic oscillations in the northern half of Africa. It is further agreed that in former times conditions more arid than those of to-day prevailed over much of the Sudan. The division of opinion concerns the present climatic trend. Local observers maintain that the present tendency is for the Sahara to encroach on the Sudan. MM. Gautier, Chudeau and Dr. Falconer, on purely geological grounds, maintain that the contrary is the case. May it not be that the geologists, owing to the breadth of view with which they regard both space and time, have overlooked a minor oscillation, namely, the present widespread tendency towards increasing aridity ?

" M. Hubert (also a geologist) is in agreement with MM. Gautier and Chudeau regarding climatic oscillations in the past, but he denies their contention that the present tendency is towards increasing humidity. In this, however, he is in entire agreement with the experience of the natives and the opinion of local observers, whose conclusions are based on evidence which, although of very great value, appears not to have been properly appreciated by MM. Gautier and Chudeau. His valuable conclusions, which apply equally to the Northern Provinces of Nigeria and perhaps to many other parts of the Sudan, may be briefly summarised as follows :—

(1) At a remote epoch there was a period when the Senegal region was well watered, but to-day this region has become so arid that the livelihood of the natives has become precarious.

(2) The change from more humid conditions to the aridity of to-day has been marked by climatic fluctuations of dry and wet periods always with a total effect of ever-increasing aridity.

(3) During a very short period so rapidly has desiccation progressed that its effects have been noted by actual observers on the spot.

* * * * *

"The destructive hand of man is as active an agent of desiccation in the Nigerian Sudan as in the Sahara. The establishment of forest reserves has done something to limit his depredations, but the only real remedy for deforestation lies in the introduction of some system of permanent cultivation. To this end much may be done by the development of irrigation and rotation of crops, but at best so great a change in the native methods of agriculture must take a very long time to achieve."

These remarks, made with reference to Northern Nigeria, are equally applicable to the Sudanese Zone of the Gold Coast. Mr. Bovill considers the displacement of the Sudanese Zone: here in the Gold Coast we are confronted with an earlier stage, namely, the displacement of the Guinea Zone by the Sudanese.

More recent evidence supporting this theory is recorded in Mr. Migeod's experiences of his recent trip across the Equator.

"The most remarkable feature of the country between the north of the French territory and the coast, the Gaboon area, is that it is becoming a vast graveyard for the dying races of Central Africa. For some time the sands of the Sahara have been advancing southward, and there has been a steady trek of native tribes as if pushed by the sands, south and west, into the French territory. There they are held up by the more vigorous coastal races, and settle down.

"And they settle down as if determined to die out. It is, indeed, the most amazing case of racial suicide, on a huge scale, that the world has ever seen. I passed among tribes where the women refused to bear children, and in another generation, if present ideas prevail, they will simply die out. I heard of a tribe further north where the chief has absolutely forbidden marriage, with this same idea.

"So pronounced is this lack of the will to live, that many tribes have to be compelled by the French Authorities to grow enough food to keep themselves alive, and the arts of pottery and the making of agricultural implements have quite died out." (*Daily Chronicle*, 28th May, 1921.)

"A feature that brought itself very much to my notice on my overland journey was the constant succession of abandoned sites of both villages and plantations.

"They were especially striking in the forest region owing to the different type of vegetation that springs up on an abandoned site. I further passed villages and towns in all stages of antiquity or age, from newly built or building to falling into ruins, and either entirely abandoned or partly so. I gathered that the average life of a town might be five years. If the chief died, or there was some sickness, the move to a new site might take place earlier. In any case, at such time as the huts of bush material began to show signs of wear and tear, it was time to seek a new site. I have seen villages left abandoned long before the state of the houses merited it, even houses with plastered walls and superior construction being abandoned as well as the flimsiest shelter.

"There is, besides, another cause of a village shifting—it is perhaps the principal one. That is, the wearing out of the good soil; and it is useless to build houses of a nature to outlast this process.

"Good soil is one of the chief obsessions, if I may so describe it, of the Native African Agriculturist. If he understands a rotation of crops and proportional rest periods, he need not move at all. If he does not, however, and is above all a one-article-of-food man, *i.e.*, lives almost entirely on cassada, as many tribes do, he has to move on soon, as a few repeated crops of cassada will wear out any soil. He has no idea of manuring the soil." (*West Africa*, 8th October, 1921.)

Thus with man's assistance, aided by the great annual fires that sweep through the Sudanese Zone grassland, and the desiccating influence of the " Harmattan," the forest is steadily receding, and when, as in the case of the Gold Coast, it is being attacked not only from the north and east, but also from the south, where a wedge of dry country vegetation is ever widening, the regression is rapid.

The extent of the main zones of vegetation in the Gold Coast is as follows. The Northern Territories, northern and eastern Ashanti, the east of the Colony and a coastal wedge as far as Seccondee, belong to the Sudanese type. Only the west and centre of the Colony and the southern part of Ashanti belong, at the present day, to the Guinea Zone.

Both of these zones exhibit two sub-types of vegetation. The Sudanese Zone is subdivided into " Savannah " and " Savannah Forest." By " Savannah " is distinguished that part of the country which is clothed with a graminaceous vegetation, and in which trees and shrubs are only found isolated and at intervals. By " Savannah Forest " is distinguished the country in which the grassland predominates, and in which trees and shrubs occur isolated or in small patches of stunted forest along the watercourses, which may be actual rivers in the rainy season, or may not show any free water surface. The survey of the Sudanese Zone of the country has not yet been sufficient to furnish an idea of the respective areas of these sub-types. The Guinea Zone is subdivided into the " Deciduous Forest " and the " Evergreen Forest," the main differences being that in the " Deciduous Forest " the dominant trees do not form a closed canopy, and that many of the trees of the " Evergreen Forest " are absent. The " Deciduous Forest " appears as a triangular area in the north of the " Evergreen Forest " from a base line reaching from Sunyani through Mampon to Juaso, and with the apex as far south as Dunkwa. It approximately covers the area of west-central Ashanti bounded by the 60-inch rainfall curve (see Map, p. 13), and is the northern part of the present forest area where it is not protected by the Kwahu range. Undoubtedly this hill mass shelters the country to the south-east from the Harmattan, and also causes increased precipitation over that area, over which the prevailing rain-bearing south-west winds travel before striking the Kwahu high ground.

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Chapter II.

THE NATURAL FEATURES OF THE COUNTRY.

Situation.

The Gold Coast is situated on the Coast of Guinea, and lies between 1 degree East and 3 degrees West Longitude, and between the 5th and 11th parallel of North Latitude.

Area.

It comprises the Colony, Ashanti and the Northern Territories, the aggregate area of which is about 80,000 square miles, the Colony being 24,200 square miles, Ashanti 20,000 square miles, and the Northern Territories 35,800.

The western part of Togoland, for which the British have become a mandatory power, is not here considered, as the Forestry Department has not as yet been in a position to survey the country.

Physiography.

Orography.—The main feature of the country is the plateau of west central Ashanti, which is continued as a sharp escarpment in a south-easterly direction, terminating in the high ground north-east of Accra.

The country rises generally from the coast until it reaches this high ground, which has an average height of probably 800 feet, with isolated peaks and groups reaching up to 2,200 feet.

Northwards the basin of the Volta causes a general depression right across the country, at Yeji the height above sea level being only 250 feet.

The Northern Territories represent a periplane with the two basins of the Black and White Volta dividing it from north to south.

The Colony itself to the west of the Volta basin comprises a series of ridges running in a general direction from north-east to south-west from the Ashanti plateau and range, and forming the watershed of the river system of the Colony.

River System.—The Northern Territories and the northern and eastern part of Ashanti and the east of the Colony all form the drainage system of the Volta River and its tributaries. The Black Volta rising in the French Sudan to the north-west of the Northern Territories, and White Volta rising to the north, unite in north-eastern Ashanti and continue, as the Volta River, along the eastern boundary of the Colony to the coast at Addah, receiving in its course the Afram, which originates in the Ejura-Mampon basin.

The river system of the Colony consists of a series of rivers originating in the Ashanti plateau and range, and running in a south-westerly direction to the coast. From the west the principal rivers are the Bia, which early passes into the Ivory Coast; the Tano, which leaves the colony a short distance from the coast and flows into the Tendo lagoon in the Ivory Coast; the Ancobra; the Prah, formed by the Ofin, Adra, Anum, Prah and Birrim; the Nakwa; and the Densu.

Owing to rapids the biggest rivers only are partially navigable, and these only for small craft.

In the south-west and south-east of the Colony are large salt-water lagoons, due to the coastal current having deposited a bar of sand across the old river deltas.

In central Ashanti there is one freshwater lake, Bosumptwi, about 25 miles in circumference.

To the above general summary may be added the following notes of Mr. Kitson.*

" The coast-line varies very much in its character from west to east. Between Newton and Axim there are strips of beach sand, backed by swampy country, extending in places to about 20 miles from the coast. From Axim eastward to beyond Appam, the greater portion of the coast-line consists of massive rocky cliffs, some of them rising as sheer walls to upwards of 200 feet above sea-level. Where streams reach the ocean there are usually brackish or freshwater swamps or lagoons, separated from the sea by fringes of sea sand. From near Appam eastward to the limit of the colony there is an alternation of lagoon and coastal plain, with or without cliffs. The land is steadily encroaching on the sea. The coast-line is undoubtedly rising, a fact evidenced by the occurrence of several well-marked marine terraces or platforms, one of which is from 70 to 100 feet above present sea level, and at least two others of more recent age, of 20 feet and 8 to 10 feet above it. Three distinct marine terraces are visible in the Winnebah District. The last uplift of 8 feet was partly the cause of the occurrence of the fringing and landlocked lagoons to be seen now along many parts of the coast. In some places shells of existing marine species can be seen in the clay and mud of the banks of channels several feet above present sea-level. Owing to the uplift the shallow estuaries in indentations of the coast at the mouths of streams were converted into lagoons. The strong west-south-west Guinea current, and the prevailing south-west wind acting on the sea formed a great swell which persistently swept and is still sweeping along the coast, transporting landward large quantities of sand along the sea-floor. Continued action of this kind has resulted in the formation first of a shoal, then of a tidal

*Mr. A. E. Kitson, C.B.E., "The Gold Coast, Some Considerations of its Structure, People and Natural History."—*The Geographical Journal*, Nov., 1916.

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sandbank, and finally of a shore-sand barrier. This work is being actively aided and hastened by the wind, which blows the dry sand inland. The constructive action of the two forces proceeds rapidly, and at such places the land is gaining at the expense of the sea; while at others, as at Accra, those portions of the cliffs that are composed of soft rocks are being rapidly broken down and the material washed away. Shore-sand barriers in most places prevent the waters of the impounded streams from flowing into the sea. In a few places, however, the streams are able to discharge during the rainy season floods, or at low tide, while several of the small streams and the large rivers have permanent outflows.

" The occurrence of earthquakes is evidence that the coast is not yet in a state of stable equilibrium. Small shocks, recorded by a seismometer at Accra, are by no means uncommon. Severe earthquakes have been experienced at various times during the last four centuries.

" The present river system of [the] two geographical divisions is comparatively of recent age. The main courses of all the streams are in shallow valleys, or rather channels, though most of them have grades high enough to admit of rapid corrosion. The largest rivers, the Volta, Prah, and Tano, have low falls and rapids near the coast; they approximate to the heights of the latest uplifts of the land.

" The prevailing colour of the soil is red of various shades over most of the country whether derived from crystalline, metamorphic, or sedimentary rocks. This is apparently owing to the oxidation of iron which is widely distributed in small or fair quantities through all these rocks. The more recently raised portion of the coast-line consists of pale grey sands with humus, while the lagoon deposits are dark blue to black mud.

" In the forest belt the thick vegetation prevents the washing away of the soil as it forms from the decay and disintegration of the underlying rocks. Thus is formed a thick cap of soil, ranging in some places to 30 feet in thickness. In other places, under certain conditions, this soil becomes cemented by iron oxide into a firm rock, broadly called ' laterite,' which occurs on the tops of flat ridges or irregularly upon flat expanses at high or low levels.

* * * *

" The Akwapim Range owes its orientation to its geological structure, for it consists of folded schists, quartzites, phyllites and sandstones, striking generally north-east to south-west. It is deeply dissected along the strike of these rocks, where several streams have eroded deep valleys with parallel ridges, and across the strike, where small streams have cut deep valleys even through quartzites and quartschists."

Altitudes.

The following data provide some idea of the general altitude of the country. Heights are given in feet above sea level :—

Seccondee—Coomassie Railway.

	Ft.		Ft.
Seccondee	19	Dunkwa	350
Tarquah	244	Obuasi	741
Kurantin	365	Akrokerri	806
Imbraim	486	Coomassie	858

Coomassie—Tamale. Main North Road.

	Ft.		Ft.
Coomassie Bank ..	911	Echen Hill	891
Mamponten	1,033	Ejura Rest House ..	761
Jamasi	1,023	Yeji (R. Volta) ..	255
Ninting Hill ..	1,602	Salaga	608
Mampon	1,342	Tamale	689
Afram Bridge ..	477		

Northern Territories.

	Ft.		Ft.
Nasia	457	Gambaga	1,320

Ashanti.

	Ft.		Ft.
Kete Kratchi ..	350	Kintampo	1,200
Tinte Hills	1,900		

Colony.

	Ft.		Ft
Kwahu Plateau ..	2,200	Kibbi..	950
Mpraeso	1,800	Akuse ..	below 50
Aburi..	1,500		

Geology.

The following account of the geology of the country is extracted from a paper by Mr. A. E. Kitson, C.B.E., Director of Geological Surveys, Gold Coast, published in the Royal Geographical Society's Journal for November, 1916 :—

* * * *

" A very brief outline of its geology may be given. Among the oldest rocks so far known in the country are series of highly or moderately altered sediments (mica-schists, quartz-schists, quartzites, phyllites, slates, marble, limestone, sandstones, grits, breccias and conglomerates) that occupy the middle and western portion of the

colony and Ashanti, and occur on the western side of the Northern Territories. From the coast they extend generally in a north-easterly direction inland from east of Accra to the mouth of the Ankobra River, west of Axim. They form the Akwapim, Atiawa, and Moinsi ranges and the hills of the western frontier, besides numerous ridges and hills in the intermediate geographical zone. These rocks strike generally north-east to south-west. They are widely folded in parts, but intensely folded, and to a less extent much contorted along numerous and well-defined zones parallel with their strike.

"In the eastern portion of the colony on the Krobo and Shai Plains, extending back from the coast from near Accra to beyond Prampram, is a great mass of gneisses, amphibolites, sheared pegmatites, etc., having the same general strike as that of the altered sediments. Their exact relation to these sediments has not yet been proved, but undoubtedly large parts of them are completely altered sediments which have undergone greater metamorphism than those specified. All of these rocks probably belong to periods ranging from early Palæozoic to Pre-Cambrian. Through these altered rocks are numerous intrusions of granite and diorite, porphyry, pegmatite, and other allied rocks throughout the country. In some places these intrusive rocks have shared in the great dynamic changes undergone by those they have intruded; in others they are of normal character.

"These altered sediments and igneous rocks are overlain over large areas by widespread and much younger sediments—flat-bedded, slightly inclined conglomerates, grits, sandstones, shales, mudstones and limestones, principally of shades of chocolate and red, but also of greyish-green and yellow. They occupy almost the whole of north-eastern and northern Ashanti, and the southern, eastern and middle portions of the Northern Territories. In addition, they occur along the coast from Elmina to near the mouth of the Prah River, and from the east of Sekondi to near the Butre River. All these rocks, except those on the coast-line, have so far proved barren of fossils, while the coastal group has yielded only a few of indeterminate character. The age, therefore, of these rocks is unknown.

"A series of clay-shales, mudstones and sandstones at Accra appears to belong to the same division. In the Beyin district, on the western portion of the coast-line, there are small outcrops of a yellow limestone with fragmentary fossils; it probably belongs to the Eocene period. Some of the marine terrace gravels and pebbles and bouldery clay along the coast-line may be of Pleistocene age, while the Recent deposits comprise river gravels and sands, alluvium, swamp and lagoon muds and beach sands and dunes forming at the present time.

"It should be borne in mind that very large portions of the country are still quite unknown to the geologist.

" In the sand and pisolite-gravel and cement resting on the great sandstone and shales series of Ashanti and the Northern Territories, and in those sandstones, vast quantities of rain-water are stored after the wet season. Where not issuing as springs or streams, this water can easily be obtained by digging small holes in suitable localities, and the wants of villages and towns supplied. This is a matter of great importance to the country with respect to the spread of settlement, since in the dry season there is no surface water over the greater portion of northern Ashanti and the Northern Territories. From the water-conservation point of view this series of rocks is of incalculable value to the country."

Seasons.

The year is divided generally into a dry season, during which the Harmattan blows, and which extends over December and January, and a rainy season culminating in June.

A period of small rains occurs in September and October, but is not very pronounced in the coast towns

Tornados occur occasionally throughout the year, but chiefly during April and May preceding the wet monsoon.

The Harmattan is a cool, desiccating wind, which blows from the north at intervals during December and January, lasting for a few days at a time. During these periods the air is cloudy, with fine dust generally regarded as sand blown down from the Sahara. Its influence on the vegetation in the areas of lesser rainfall is the determining factor in the extent and period of the great annual fires.

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Chapter III.

THE FORESTS OF THE GOLD COAST.

The Guinea Zone.

(a) *The Evergreen Forest.*

This subdivision from which the greater part of the forest vegetation of West Africa is derived is at the present day restricted to an area of some 18,000 square miles in the Gold Coast and Ashanti. It is, however, still lingering on as the "fringing forests" of the other subdivisions, that is, the strips of closely wooded country along the watercourses.

As a rule the soil has no great depth except when it has accumulated in valleys and depressions, and from these places it is constantly being removed seawards, and, at the same time, more is being brought down from the open and unprotected country to the north. The soil presents every variation from a coarse sand to a characteristic red clay, and is derived from the rock bed which is generally capped by laterite.

The country is well supplied with water owing to the extensive area to the north which rapidly drains into it.

The Evergreen Forest extends over the river system of the south-west of the Colony, an area gradually rising from the coast to the Ashanti plateau and Kwahu range, and intersected by the valleys of the main streams at right angles to the coast line and by those of their tributaries parallel to the coast. Inland and northwards these undulations become more gentle, but eastwards they resolve into two lines of hills running from north-east to south-west, one running from central Ashanti to the Tarquah-Prestea area, and one from the Kwahu District through Akim.

It is difficult at present in a forest comprising so many arboreal species to point to any individuals especially characteristic but *Lophira procera, Heritiera utilis, Pentadesma butyracea,* and *Cynometra sp.* (Ananta) have so far been noted as being peculiar to this type of forest. In the valleys and depressions, except in the perennial marshes, these trees thrive and regenerate abundantly; on the hill tops where it is drier and the soil scanty they are not so abundant, and outside the Evergreen Forest they are rarely recorded.

The forest in general consists of trees forming a closed canopy from 20 to 150 feet or more in height, and interlaced by innumerable woody lianes. Below, where the light is sufficient to permit it, is a mass of shrubs from a few inches to several feet high, bound together by the lesser woody lianes and herbaceous climbers and interspersed

with tall herbs. As a rule the smaller herbaceous flora is scanty, but varies considerably according to the amount of light that is permitted through the canopy. Often under a well-closed canopy there are no herbs at all, and the ground surface is clear. Of the aerial or epiphytic flora little is known, the felling of a tree or the chance breaking of a branch, affording the only material from which this flora may be examined, and from this there seems no doubt that there is a wealth of *Orchidaceæ, Filicineæ,* and similar herbs.

The tree canopy itself may be divided into three tiers, each characterised by its own species, whilst a fourth lower tier includes the smallest trees and biggest shrubs.

In the highest tier, which in the Evergreen Forest is a closed canopy, the most conspicuous tree, both by its size and the frequency of its occurrence, is the *Eriodendron anfractuosum* (Silk Cotton Tree). Second to it in size, and not quite so common, are the species of *Mimusops* (Baku), whilst other trees attaining the height of the topmost canopy are the *Meliaceæ* (*Khaya, Entandrophragma*).

In the main canopy, which comprises the second tier, is found the majority of the trees. The canopy is closed and so interlaced with the woody lianes that the felling of a tree is a difficulty. From the floristic composition given below it will be seen that the *Leguminosæ* contribute a large proportion of the species. With one or two exceptions all trees have a good height growth, often 80 feet to the first branch, and their trunks have fine form figures, the chief exceptions being *Afrormosia laxiflora,* the Jedua (*Ficus sp.*) and Freibli (a species of *Flacourtiaceæ*). Except in the case of marshy localities these trees extend continuously, irrespective of soil or altitude, within the limits of the Evergreen Forest.

The trees comprising the third tier of the arboreal flora are characteristic of it and do not appear to aspire to greater height growth even when given the opportunity. The most typical of these are *Pentadesma butyracea,* and *Allanblackia floribunda.* The height of these trees is generally from 30 to 40 feet, and their crowns can easily be seen from below, whereas the crowns of higher trees are hidden in the tangled mass of the canopy above.

The lowermost tier is occupied by species which may be considered as trees or shrubs according to their form and height growth which varies from 10 to 20 feet. These species range over the same areas as the above, and are generally found around farms and cleared patches, and are the first representatives in the formation of secondary forestry. *Musanga Smithii, Myrianthus arboreus* and *Conopharyngia spp.* are typical representatives.

The remainder of the flora, as a rule, consists of shrubs, which in some of their forms incline to an herbaceous habit. Its floristic com-

position seems easily influenced by the water content of the surface soil. Thus it may be displaced by an herbaceous flora and again regain its ascendancy within quite a small area.

The largest species of the herbaceous flora, and in fact the greater proportion of it, are monocotyledonous, and in many places occur in pure societies. The ground flora of the path, which is a few inches high only, contains abundantly species of *Cleome*, *Desmodium* and *Geophila obvallata*, with various *Filicineæ*, Fern Allies, and *Gramineæ*.

The following are some common examples of the various species that make up the different tiers :—

IN THE TWO HIGHEST TIERS :—

Afromosia laxiflora.
Afzelia spp.
Anopyxis ealœnsis.
Bombax spp.
Bussea occidentalis.
Calpocalyx sp.
Chlorophora excelsa.
Cynometra spp.
Entandrophragma spp.
Eriodendron anfractuosum.
Erythrophlœum guineense.
Heritiera utilis.
Khaya spp.
Lophira procera.
Mimusops sp.
Pentaclethra macrophylla
Piptadenia africana.
Pycnanthus Kombo.
Xylia sp.

THE THIRD TIER :—

Allanblackia floribunda.
Alstonia congensis.
Berlinia spp.
Cola spp.
Dialium guineense.
Macrolobium spp.
Pentadesma butyracea.
Ricinodendron africanum.
Tetrapleura Thoningii.

THE FOURTH OR LOWEST TIER :—

Callichilia spp.
Cola chlamydantha.
Conopharyngia spp.
Musanga Smithii.
Myrianthus spp.
Rauwolfia sp.

CLIMBERS :—

Bandeiræa simplifolia.
Carpodinus spp.
Duparquetia orchidacea.
Landolphia spp.
Pleioceras Barteri.

(b) *The Deciduous Forest.*

This is the north-western part of the closed forest in which the desiccating climatic influences show a marked effect. In the area covered by this type of forest the soil varies from clay to sand according to the bedrock from which it is derived. This, for the most part, in central Ashanti, is crystalline rocks of granitic and gneissic types frequently capped by laterite in which are found embedded lumps of

quartz. In the north there is a stretch of sandstone on which the laterite also occurs. The character and depth of soil do not appear to be responsible for any difference in the composition of this forest.

The area generally is well supplied with rivers and embraces the headwaters of the Bia and Tano rivers and the tributaries of the Prah. Along its northern fringe the Sudanese Zone has made deep inroads, but it still holds out in varying degree as fringes of forest along the beds of the rivers and streams. The country as a whole is higher than that to the south, and whilst generally averaging a height of 500 feet, there are ranges and isolated peaks that attain to a height of 2,000 feet. It would appear that these hill masses exert as much influence on the retaining of the forest as do the rivers and watercourses. When the prevailing south-west rain-bearing wind strikes these ranges which, as they run in a general direction from north-west to south-east, lie right across it, increased precipitation results. As a result of this it is noticed that the south-west half of Ashanti is still under forest (farmed areas excepted), whereas the north-eastern half is Savannah Forest. On a large scale this retaining influence is exercised over the forest to the south-west of the Kwahu range where even specimens of *Lophira procera*, exceptionally characteristic of the Evergreen Forest, still linger on in heavy forest. This influence is also seen in frequent isolated instances outside the Guinea Zone proper, such as the thickly-wooded area to the south of the Ejura and Kintampo scarps in striking contrast to the open Savannah Forest immediately to the north of them. Throughout these isolated remnants of forest and the fringing forests, the low canopy of small trees and the herbaceous flora are of the same floristic composition as that of the Evergreen Forest, for the air currents away from the ground affect the vegetation far more than the lesser ones on the surface.

From an economic point of view the Deciduous Forest is exceedingly rich in the best-known timber species, and has been considered by more than one authority to be the richest timber forest in West Africa. Its preservation hitherto has depended on its inaccessibility to exploitation, and for the moment this still holds, but the destruction due to increased shifting cultivation with the opening up of the country by motor roads in recent years is very evident. In addition to timber, rubber-producing trees are also much in evidence: these include *Funtumia sp, Cholorophora excelsa, Irvingia sp,* and *Antiaris toxicaria*; whilst of other trees of economic importance that find a home in this type of forest *Cola acuminata* (*C. nitida* ?), from which the "Kola Nut" of commerce is obtained, occurs commonly, and is cultivated in naturally regenerated forest farms.

From a survey of these forests certain outstanding dominant species appear as characteristic of it, either by their extraordinary common

occurrence, such as *Triplochiton Johnsonii*, or the striking proportions reached by individuals such as *Entandrophragma utile*. The area over which the Deciduous Forest is found is subjected to a lesser rainfall than those parts covered by the Evergreen Forest. This, and the fact that the Deciduous Forest comes directly under the desiccating influence of the "Harmattan," from which it itself protects the Evergreen Forest to the south, would appear to account for its position and character In the field the distinguishing factor of the Deciduous Forest, as a whole, is that the closed canopy is formed by the lower trees, and that the dominant trees have fully developed and almost isolated crowns. From this fact, when any of the dominant trees shed their leaves a noticeable gap amongst the huge crowns is very marked and hence the name " Deciduous Forest " has arisen.

The lianes as a whole are found trailing over the canopy formed by the smaller trees, and when they do ascend the bigger trees they are not able to bind them together as they do in the Evergreen Forest owing to the distance the crowns are apart. The largest of the lianes often attain a girth of one foot, and are, as a rule, *Apocynaceous*. The lesser lianes and climbers are provided by the *Combretaceæ* and *Leguminosæ*, of which *Acacia pennata* is probably the commonest.

The arboreal species are the same as those of the Evergreen Forest, but with the exception of some of the Evergreen Forest dominant trees. This causes other species which are occasionally met with in the Evergreen Forest to appear more commonly. An example is that of the Wawa (*Triplochiton Johnsoni*), only occasionally seen in the Evergreen Forest, but one of the commonest and most characteristic trees of the Deciduous Forest.

The Sudanese Zone.

Comparatively no botanical or forestry survey work has so far been carried out in this country on the vegetation of the Sudanese Zone, and consequently it is not possible at the present stage to define the limits of the subdivisions into Savannah Forest and Savannah. The controlling factor over this zone, apart from its proximity to the more arid conditions of the north, is the annual grass fires, which, sweeping over an ever-extending area of country for many decades must now be considered in the light of a natural factor. As has already been stated, strips of the original closed forest are still found in its southern edges along watercourses and on the south side of the hill masses. Beyond that Savannah Forest and Savannah stretch away to the north, the forest patches or isolated trees ever becoming fewer.

In the west all the country north of 7° 30′ belongs to this Zone. As one proceeds eastwards the limits bear towards the south, but

keep to the north of the Mampon, Agogo, Kwahu and Akwapim ranges of hills. In the east of the Colony it has supplanted the Guinea Vegetation right down to the sea front. It is now steadily progressing along the sea front in the shape of a wedge, ever widening behind, and at the same time extending its thin end westwards. In this manner it has progressed as far as Seccondee. Westwards of Seccondee it cannot yet be said to be established, although many of its characteristic denizens such as *Borassus*, *Phœnix* and *Sanseveria* are found as far as Half Assinie along the sea front, and the latter two right to the western frontier of the Colony. The extension of corn and groundnut farms between Seccondee and Half Assinie is causing the tall forest to contract inland rapidly and so preparing for the conversion of this country to the Sudanese Vegetation.

As in the case of the Guinea Zone the soil may be sand or clay, but there seems little doubt that the majority of the country has a sandy soil covering. In many places, however, owing to the destruction of the vegetation, the soil is completely removed, and there the bare rock surface is exposed. This occurs sometimes as stretches of flat rock over which it is extremely trying to walk during the heat of the day, sometimes as prominent jagged rocks and scarps. Where the vegetation exists there is found a black soil to the depth of a few inches only, formed by the collection of vegetable ash from the annual fires, and often described as "a rich black soil suitable for the growth of cotton and similar agricultural crops." The removal of the vegetation, however, quickly causes its dispersal by wind and rain.

The principal rock of this part of the country is sandstone. Where this has been eroded, as on the hill tops, granite with quartz appears, and the effect of the erosion is seen in the sandy accumulations in the depressions and low valleys. Where this zone of vegetation occurs in the south-east of the country detached outcrops of clay ironstone occur, and here and elsewhere further north are occasionally found schists and shales.

The general rise of the country which has been indicated previously does not appear to be continued, and maximum heights of the majority of the isolated hills are not recorded as being greater than those of the principal divides of the country. It seems reasonable to suppose that the northern part which embraces the Northern Territories and Northern Ashanti is a land surface reduced to a low relief by erosion. This explains the exposed granite on the hill tops and the alluvium in the depressions, the latter being constantly moved on to the sea.

Whereas the part of the Guinea Zone within the Gold Coast is that of the rivers of the south and south-west, the part of the Sudanese

Zone is the basin of the Volta River and its tributaries flowing in a south-easterly direction. The area of this Zone within the Gold Coast territories therefore presents the features of a periplane drained by the Volta River.

The chief characteristic of the Sudanese Zone is an open growth of trees, or their entire absence, with a universal covering of grass broken only by the exposures of bare rock. Trees and bushes are generally of the same genera as those found in the Guinea Zone, the fires making tree growth slow and erratic and producing a gnarled and stunted type of tree whose crown is kept low by the wind after it has raised itself above the influence of the fire. The arboreal and fruticose vegetation generally may be considered as one, as it is only when the marsh and aquatic formations are encountered that shrubs appear which are floristically distinct from the trees; similarly with the herbaceous vegetation which in the drier areas attains a height of three to four feet, or in isolated instances such as the *Amorphophallus* a little more, but which in the marsh formation may reach 12 or 15 feet in height. The general type of Sudanese vegetation is found on the crests and slopes of the undulations.

As in the case of the Deciduous Forest some species are identical with those of the Evergreen Forest, such as *Afzelia africana*; others are found which in the field appear distinct but in the herbarium are difficult to separate. One instance of many is that of *Lophira alata* of this Zone and *Lophira procera* of the Guinea Zone. From field work one feels justified in considering the xerophytic *alata* as being directly derived from the hygrophilous *procera* by being subjected to a prolonged period of fire conditions. This "species" now seems adapted to Sudanese environments, and has assumed a predominance in the Sudanese Zone comparable to the *Triplochiton Johnsoni* in the Deciduous Forest.

Economically the forest patches of the Sudanese Zone are valuable as a timber and firewood supply to the inhabitants of the country. Apart from this the most valuable product is the Shea Butter obtained from the fruits of *Butyrospermum Parkii*.

The following arboreal species have so far been definitely recorded from the Savannah Forest.

ARALIACEÆ.
Cussonia longissima.
BIGNONIACEÆ.
Markhamia tomentoso.
Spathodea campanulata.
CELASTRACEÆ.
Gymnosporia sp.
COMBRETACEÆ.
Anogeissus leiocarpa.
EUPHORBIACEÆ.
Antidesma venosum.
Bridelia micrantha.
Hymenocardia acida.
Uapaca Heudelotii

FLACOURTIACEÆ.
Smeathmannia pubescens.

LEGUMINOSÆ.
Afrormosia sp.
Albizzia coriaria.
Bauhinia reticulata.
Burkea africana.
Detarium senegalensis.
Entada abyssinica.
Erythrophlœum guineense.
Lonchocarpus sericeus.
Mucuna urens.
Parkia filicoidea.
Prosopis oblonga.

LOGANIACEÆ.
Strychnos sp.

MELIACEÆ.
Khaya sp.
Pseudocedrela Kotschyi.

MORACEÆ.
Ficus capensis.
Ficus Vallis-choudæ.

OCHNACEÆ.
Lophira alata.

PALMACEÆ.
Borassus flabellifer.

ROSACEÆ.
Parinarium sp.

RUBIACEÆ.
Crossopteryx febrifuga.
Gardenia Jovis-tonantis.
Psychotria Vogeliana.
Sarcocephalus Russegeri

SAPOTACEÆ.
Butyrospermum Parkii

STERCULIACEÆ.
Cola caricifolia.
Cola cordifolia.
Sterculia tomentosa.

TILIACEÆ.
Grewia mollis.

URTICACEÆ.
Trema guineensis.

VERBENACEÆ.
Vitex Cienkowskii.

VITACEÆ.
Cissus populnea.

Special Types of Vegetation.

The following brief accounts of special types of vegetation are included to indicate the commonest species and their relationship. There has been hitherto no record of the plant life found in the main œcological groupings in this country.

Strand Plants.—Along a narrow strip of beach stretching to as much as twenty yards from high-tide mark, and with practically no humus, is found a group of plants peculiar to the conditions of proximity to the edge of the sea, instability of the sand except when they fix it, and constant exposure to salt spray. Chief amongst them are *Phœnix reclinata, Cocos nucifera,* and the herbs *Phyllanthus amarus, Canavalia obtusifolia, Hydrocotyle bonariensis, Ipomœa asarifolia.*

Plants of the Fixed Sand Dunes.—Immediately behind the narrow strip of beach on which the strand plants occur, is a zone varying to a mile in depth according to the protection from the wind afforded by

the configuration of the ground. Dwarf trees and shrubs, whose height and form are controlled by the sea breeze, are characteristic of this stretch. The species here encountered are of the forest next inland, and vary according to its composition. Common amongst them are *Elæis guineensis, Cocos nucifera, Phœnix reclinata, Pandanus candelabrum, Conopharyngia spp, Alchornea cordifolia, Voacanga africana, Ixora laxifolia, Octhocosmus Chippii,* and *Ipomea involucrata.* There is but little soil in the area except where humus has collected from the vegetation. When the sand is exposed it is fixed, but generally a laterite cap forms the ground surface.

A Peculiar Grouping on a Sand Spit.—On the neck of land between the large lagoons and the sea in the south-west corner of the Colony is found an unusual grouping of plants. The area is somewhat protected by the flora of the beach. The soil is pure sand except where a certain amount of humus has collected from fallen leaves. With the exception of a few *Palmaceæ* there is practically no bush or shrub undergrowth, and the tall forest is composed of remarkably few species, the *Meliaceæ* and *Sapotaceæ* being conspicuously absent. The commonest trees are *Lophira procera, Erythrophlœum micranthum,* and one at present unidentified species known locally as Freibli (*Flacourtiaceæ*). These are very prolific and well represented in all stages of growth. Other trees are *Chlorophora excelsa,* occasionally *Detarium sp.,* and *Pycnanthus Kombo.*

Mangrove.—A general description of this formation will be found in works dealing with "Plant Geography." Apart from the usual constituents, such as *Rhizophora sp, Avicennia sp, Laguncularia racemosa* and *Hibiscus tiliaceus, Parkia biglobosa* is also recorded in this association. The mangrove forests of the Gold Coast are not of any great extent.

Transition from the Sea Shore Vegetation to the Evergreen Forest.—In this zone the farms made by the coast villagers are a principal feature. Tall trees occur occasionally, but are more in the nature of landmarks. The forest that is seen is that of a small tree type and not that of a tall tree type which has become dwarfed owing to its habitat, as is found near the beach. It suggests that in all this zone the existing forest is of recent secondary growth.

From a point of view of forest produce this belt is valueless, the trees serving only as a protection to the ground. It is essentially an agricultural area from the requirements of its considerable population. East of Dixcove this zone passes into or is represented by a pure stretch of *Elæis guineensis,* and north of Chama this pure forest is of considerable extent. This area is, however, well within the wedge of Savannah Forest that is encroaching from the east, following on the

shifting system of farming. The following are the commonest trees found in this farm belt :—

Alchornea cordifolia.
Bombax sp.
Conopharyngia Jollyana.
Elæis guineensis.
Musanga Smithii.
Myrianthus arboreus.
Pandanus candelabrum.
Pentaclethra macrophylla.
Piptadenia africana.
Pycnanthus Kombo.
Terminalia sp.
Triplochiton Johnsoni.

Fresh Water Marshes.—Wherever any depressions exist sufficient to retain the surface water or wherever the presence of an abundant supply of water in the subsoil is evident, a marshy flora occurs which, except in the case of some of the herbs, is distinct from the true aquatic flora. The soil is chiefly sand or mud washed down by the rain and accumulated often to a considerable depth.

As a rule big trees are at intervals, and consequently there is no canopy of trees ; the smaller trees also, such as *Mitragyne macrophylla*, and the species of *Macrolobium*, occur isolated. The characteristic species of the formation are the *Palmaceæ*, both arboreal and scandent, and they are to be seen at their optimum. The armed species of *Calamus* and *Ancistrophyllum* throw their loops over everything, binding the shrub vegetation together and making travelling through the bush very difficult. Around the edges of these marshes, but included within them are also found the massive loops of the *Landolphia* lianes and akin genera, which here seem also to reach their optimum. In the wettest localities the majority of arboreal species are characterised by pneumatophores, which may be anything up to two feet in height.

Of the herbaceous climbers and flora the *Araceæ* and *Scitamineæ* form the greater part and frequently dominate the community to the absence even of the *Palmaceæ*, and in these cases pure societies of a single species are a characteristic feature.

Along the river banks the same formation occurs. Here, however, there is often in addition a fringe of an aquatic formation, but this, except in the case of a few *Cyperaceæ*, is distinct. Even where partial submersion occurs during the rains the vegetation is quite distinct from the aquatic formation which exists only in free water.

In this group also are the societies of herbs which form so distinctive a character of this type of marsh. Of these the commonest are of the *Araceæ, Anchomanes dubius, Anubias Afzelii*, and *Cyrtosperma senegalense :* of the *Scitamineæ, Amomum Granum-Paradisii*, and a species near *A. Melegueta, Calathea conferta, Clinogyne flexuosa*, and *Phrynium brachystachyum.*

The River Banks.—Where the influence of the water of the river is appreciable in the subsoil of its banks a marsh type of flora is very

noticeable. Scandent *Palmaceæ* are the characteristic species climbing over all trees and shrubs. White-flowered *Berlinia*, yellow-flowered *Pterocarpus esculentus* and *Bussea occidentalis*, and purple-flowered *Lonchocarpus sericeus*, are prominently noticeable. Of the shrubs the commonest is *Alchornea cordifolia*, which fringes the banks for considerable distances. In one locality, namely, on the Tano River at Canal Mouth, there is a dense fringe of the probably exogenous *Cassia alata*, which extends for about two miles along the south bank. Of the herbs, *Gramineæ* and *Cyperaceæ* provide the greater part, whilst *Pistia stratiotes* covers all the free water of the creeks. Where high and steep banks occur this marsh group may be absent, the local association continuing right up to the river banks. In some places, such as the upper reaches of the Ofin and Adra rivers, these marshes are rich in *Meliaceæ*, especially *Khaya ivorensis*, and it is quite likely that the marshes lower down also bore these trees, but now they have long since been cut out by the timber exploiter.

Arboreal Palmaceæ.—This group inhabits those marshes in which free water accumulates and remains on the surface for a considerable portion of the year. Examples are seen along the Seccondee-Coomassie Railway where the excavations along the side of the railway to provide material for the embankments have caused series of large pits to be formed, and here there is an almost pure growth of *Raphia*. Associated with it are the many *Filicineæ* growing in the depressions of the leaf bases themselves, many climbing *Araceæ*, and also many semi-aquatic herbaceous *Araceæ*. *Elæis guineensis*, whilst occurring noticeably in the drier parts of these areas, can here hardly be considered in its optimum, which is rather in the tall forest. The commonest species in this grouping are the following :—

Alchornea cordifolia.
Alstonia congensis.
Ancistrophyllum spp.
Berlinia sp.
Calamus sp.
Chlorophora excelsa.
Crinum spp.
Macrolobium spp.
Mitragyne africana.
Nymphæa sp.
Raphia spp.
and many *Araceæ.*

Grass Fresh Water Swamps.—These occur chiefly in the south-west of the Colony, and within a mile or so of the sea. They are large grassy stretches a mile or two across and resembling the patches of Savannah grass country between Seccondee and Chama. They differ, however, in being for the most part submerged to a few inches in the rainy season, and in the absence of arboreal *Palmaceæ*, scandent *Palmaceæ* also occurring only occasionally. Their formation is on pure sand without any humus. Their flora differs from that of the beach owing to their being protected from the sea breeze, and to the accumulation of fresh water during the rainy season.

Secondary Forest.—Where the original forest has been wholly or partially cleared for farming or fuel supplies and the land subsequently abandoned, a new forest growth is found differing not only in the absence of a high canopy but in the paucity of species. Timber or rubber trees are generally absent and aliens such as *Mangifera indica* and *Artocarpus integrifolia* often occur. Of the original forest trees the commonest species surviving are *Eriodendron anfractuosum, Triplochiton Johnsoni, Ricinodendron africanum, Chlorophora excelsa* (large trees generally spared from the original clearing), *Terminalia superba, Petersia viridiflora, Albizzia sp, Piptadenia africana, Pycnanthus Kombo, Elæis guineensis* and *Musanga Smithii.* The last named is often to be seen in pure stands, and in these cases its reproduction is entirely vegetative. Its rapid and close growth is effected by means of stilt roots, similar to a " runner " of an herbaceous plant, which constantly roots, forming new trees. It seems unique in this respect amongst West African trees.*

* T. F. Chipp, " The Reproduction of *Musanga Smithii.*"—*Kew Bulletin* No. 2, 1913.

Chapter IV.

THE FORESTS OF THE GOLD COAST—(*continued*).

Area.

The limits of the area within which the dense forest is to be found have been approximately determined from the information collected by Forest Officers during their tours, and are indicated on the map showing the distribution of the forest, page 13.

The system of shifting cultivation which has been in vogue from time immemorial, and is still practised, makes it impossible to calculate with any degree of accuracy the inroads made into the dense forest, or to state how much is agricultural land, as any area may be converted into farm land by the natives no matter with what type of vegetation covered. For the purpose of this calculation the word "forest" is regarded as synonymous with "Guinea Zone," as the amount of "Fringing Forest," "Savannah Forest," and "Transition Forest" has not, so far, been ascertained. The amount is certainly considerable, but too little is known of its extent at present.

The proportion of the area of the country under forest, and the extent of the requirements imposed on the forested area, as given below, have been arrived at by an approximation somewhat similar to that employed by Mr. N. C. McLeod in his "Statement for the Empire Forestry Conference, 1920," but based on the 1921 Census.

The data are obtained from a consideration of, (*a*) the area of the Colony, Ashanti and the Northern Territories, (*b*) their population respectively according to the Census of 1921, and, (*c*) knowledge that, as a rule, a fresh area of land is kept under a rotation of crops for three years, and that a return may be made to it after a rest of up to 10 years. This return to an area for agricultural purposes, after a period of 10 years, is not always adhered to, as the natives find it easier, where there is plenty of high forest available, to make a clearing of the undergrowth and trees in the sapling and pole stage, rather than to undertake the clearing of dense secondary growth.

The total area of the country is 80,000 square miles, of which, approximately, 28,000 square miles may be said to be under forest of some kind, and the remaining 52,000 square miles under open Sudanese vegetation.

The population of the country in 1921 is given as 2,078,043. From detailed examination of the figures in respect of the area within and without the forest zone it may be assumed that roughly 894,000 are living within the forest area.

Allowing one acre per person for food crops the area in any one year within the forest zone required for domestic agriculture is, say, 900,000 acres, or, approximately, 1,406 square miles. Assuming that a return is made to an area previously farmed after a rest averaging seven years, and that the same area is kept under food crops for an average of three years, 5,624 square miles of forest country is required for food crops for the inhabitants within the forest zone.

It is very difficult to form any idea of the area under cocoa, but from a consideration of the average number of pounds of beans produced by a tree, the usual number of trees to the acre, and the export of beans during the past few years, a total of 800 square miles is considered well within the figure.

Adding, therefore, the area required for food farms, namely, 5,624 square miles, to that required for cocoa, a total of 6,424 square miles is arrived at, required for agricultural purposes within the forest zone. In addition, there is the area under kola and oil palm within the forest zone, and also the food farms which supply large centres such as Accra and Cape Coast, which are themselves outside the forest. No estimate can be given of these, but as they must be taken into consideration, the total of 6,424 square miles may safely be increased to 7,000 square miles.

Here must also be considered the question of forest fuel supply to the mines and railways, both services of pre-eminent importance to the country, and therefore to be assisted in every way. The factor governing the extent of the country which these industries require to tap is the price of imported coal as opposed to local fuel, a most difficult point on which to arrive at any conclusion. It is necessary, however, to hazard an opinion, but this is best expressed by assigning for fuel exploitation for these two services the maximum area which it is considered likely to be exploited. The figures below provide therefore some sort of guide. Involved in this question is the manner in which the forest policy of the country is affected, for these areas, when worked out, are practically clear cut. With the exception of the northern part of the railway lines and the Obuasi and Bebianeha mining areas, the areas of possible exploitation all lie within the Evergreen Forest, and when worked out and abandoned should re-afforest themselves naturally, or provide easily cleared agricultural areas to the saving of good forest. It does not appear, therefore, that any reservations need be made in respect to these areas which are not expected to exceed the figures given below, and their denudation of forest should not therefore cause any harm, except on steep hill slopes.

The case of the northern part of the railway lines and the Obuasi and Bebianeha mining areas, is different, for they lie within the

Deciduous Forest, which is in an unstable state compared to the Evergreen; and any extensive area cleared in one place may lead to invasion by the Sudanese flora. These areas will therefore require watching.

The maximum areas likely to be affected for the supply of fuel to the railways and mines are:—

Mines.

	Square Miles.
Tarquah and Prestea area	150
Obuasi area	100
Bebianeha, Kanyanko and other mining areas	100

Railways.

10 mile strip on each side of the Seccondee-Coomassie line		3,340
10 mile strip on each side of the Accra-Coomassie line ..		3,760
		7,450
Less length of railways passing through mining areas already considered, say	1,600	
Less length of railways passing through timberless areas, say	1,800	
		3,400
Total		4,050

Say, 4,000 square miles.

In considering, therefore, any policy of forest conservation, it is necessary to regard 4,000 square miles of the total afforested area as alienated for the supply of fuel to the mines and railways.

A consideration of the above leaves a balance of 17,000 square miles of forest country not likely to be required for any purposes other than forestry. But in this area an approximation of 5,600 square miles* must be allowed as swamp forest, forests on steep hill slopes, and all other forests of no immediate merchantable value.

This leaves a final balance of 11,400 square miles of merchantable forest, out of a country of 80,000 square miles.

From these figures it will be gathered that the question of forest reservation to protect the existing forests is a serious and urgent necessity

* Mr. N. C. McLeod, from impressions gained during extensive travelling, estimates that approximately one-third of the forest should be included in this figure.—"Statement, Empire Forestry Conference, 1920."

TABLE I.

DISTRIBUTION WITHIN THE GUINEA ZONE.

	Agricultural Land.	Forest		Fuel Supply to Mines and Railways	Other Land (*a*)
		Merchantable	Unprofitable or Inaccessible		
Square Miles ...	7,000	11,400	5,600	4,000	52,000

(*a*) This is the area under open vegetation (Sudanese Zone); it is capable of being cultivated, or grazed, and provides certain minor forest products such as Shea Butter.

As an attempt to forecast the total area likely to be exploited for fuel for the mines and railways has been made above, it is of interest to see if any forecast can be made with respect to the ultimate forest area likely to be required for cocoa. H.E. the Governor, in his speech to the Legislative Council in February, 1922, stated that investigations into the cocoa industry had revealed the fact that the total export the Gold Coast was likely to attain, having regard to all factors bearing on the subject, was at the most conservative estimate an annual output of 200,000 tons of beans.

From the following data supplied by local eminent agriculturists an approximation may be arrived at. Given the data that a tree produces $1\frac{3}{4}$ lbs. as an average per annum, and that 400 trees occur on an average acre; that, say, 20 per cent. of the area under cocoa is unproductive, abandoned, or out of reach of a market, the total area likely to be under cocoa is $\frac{2,240}{1\frac{3}{4} \times 400} \times (200,000 + \frac{1}{5} \text{ of } 200,000)$ acres, or 1,200 square miles. In Table I. above, only 800 square miles is allowed for cocoa at the present time.

ANNUAL INCREMENT.

So far as is known there are no statistics from which the annual increment of the West African Forests can be obtained. Mr. McLeod, in his "Statement for the Empire Forestry Conference, 1920," approximates the figure to 5,000 cubic feet per acre, but states that this figure is suggested only from eye estimates actually made in the forest. He considers the large trees average 20 to 30 per acre, and provide from 100 to 200 cubic feet per tree, whilst at least 1,000 cubic feet of timber per acre is provided by the other trees.

Neither are there any data of sufficient standing to assist in estimating the rate of tree growth. Mr. McLeod, from his experience of Nigerian and Gold Coast Forests, considers that the majority of species attain maturity in 100 years.

One definite calculation of the rate of growth of tropical forests in a part of the world with climatic conditions approximating to those of our Evergreen Forest has been published by Mr. I. H. Burkill, Director of the Botanic Gardens, Straits Settlements, in " The Gardens Bulletin," Vol. II., page 145. An opportunity was taken of studying a piece of jungle of a known age, and the conclusions arrived at by Mr. Burkill are that it takes at least 100 years from the upspringing of the first growth of secondary jungle on a cleared area before the giant forest trees are established as they are found in the virgin forest. The piece of jungle examined, which was 30 years old, gave the following number of plants :—

378 trees of 18 feet or more.
2,728 woody plants of 2 to 18 feet.
27,342 smaller plants, mostly small, woody seedlings.

30,448 in all, or 96,660 plants to the acre.

Assuming these figures, which are the only ones which provide any kind of basis for calculations, the annual increment per acre must be regarded as approximating to 50 cubic feet in the forest (Guinea Zone) area. In Table I. it will be seen that only an area of 11,400 square miles can be considered as available for timber and minor forest products. With regard to column 6, Table II, " Loss; Waste, Decay, etc.," as the crop is very mixed, it is little subject to the ravages of entomological and mycological pests, and the area under consideration, *i.e.*, the Guinea Zone, is not at present affected by the fire factor. Under these circumstances it appears that an estimate of 5 per cent. of the total increment may be allowed for loss.

The above statements appear as follows when put into tabular form :—

TABLE II.

ANNUAL INCREMENT WITHIN THE GUINEA ZONE IN CUBIC FEET.

1.	2.	3.	4.	5	6	7	8.
	Area sq. miles	Estimated Increment per sq. mile	Total Gross Increment	Loss			Net Increment
				Fire	Waste, Decay, etc.	Total	
Under State Control*	Nil	—	—	—	—	—	Nil
Other ..	11,400	32,000	364,800,000	Nil	18,240,000	18,240,000	346,560,000
Total ..	11,400	32,000	364,800,000	Nil	18,240,000	18,240,000	346,560,000

*Although there are various areas in Ashanti which have been declared " Forest Reserves," the Department has not yet had sufficient staff to attend to them and, consequently, no distinction has been made by the natives between them and other forests. There is, therefore, no forest actually under State Control.

Utilisation.

The following table gives an idea of the quantities of timber and fuel required annually.

TABLE III.

Export. (*a*)	Mines consumption of fuel.	Mines consumption of timber.	Railway consumption of fuel	P.W.D. and private firms' timber. (*b*)	Natives. For domestic and agricultural purposes. (*c*)
Cub. feet.	Tons.	Cub. feet.	Tons.	Cub. feet.	
1,383,500	165,500	315,500	14,500	200,000	?

(*a*)—Average for ten years.

(*b*)—Very approximate.

(*c*)—The consumption of timber and fuel by the Natives is not known, and may be left out of account as the area of forest allocated to agriculture, etc., is sufficient to meet their wants.

Ownership of the Forests.

There are no forests belonging to the State. All land in the country is owned by communities, and is known as "Communal" or "Stool" lands, or by families, when it is known as "Family Land"; individual ownership is also recognised.

A member of a community who makes a farm on Communal land enjoys his right of tenure so long as he fulfils the political and social duties which devolve upon him as a member of the community, and even a person belonging to some other community may make a farm and enjoy the same privileges as a member if he first obtains the permission of the "Stool" and pays the annual tribute which native custom demands.

All forests are "Communal" or "Stool" property with the exception of farmed areas in them. The right to grant concessions for mining purposes, for the taking of timber, and for agricultural and arboricultural purposes, is vested in the owners of the land, and is controlled by the "Concessions Ordinances."

Notes on Timber Trees.

It will be useful to give a general idea of the kind of tree a forest officer coming to the Gold Coast will have to deal with. Practically all the big trees in the Guinea Zone are "buttressed." These buttresses appear as large triangular plank-like growths at the base of the tree varying in thickness and size according to the depth of the soil, for their purpose undoubtedly is to support the trunk in the absence of a deep tap root which is not found in these forests. A

suggestion has been made by the writer, and the few observations so far carried out by him tend to support it, that the shape of the buttress is constant for the species. That is to say, in the same species the buttresses have the same relation of height to base, and the hypotenuse is straight, depressed or curved for the same species, regardless of the actual size of the buttress, which is dependent on telluric conditions. Some species, such as *Chlorophora excelsa* and a species of *Daniella* have practically no buttresses ; others such as *Eriodendron anfractuosum* have buttresses to a height of thirty feet, and between these is every gradation.

When cutting a tree that is buttressed a platform is erected so that it may be cut above the convergence of the buttresses. Stumps often twelve feet high result with much waste of good wood but saving of time to the exploiter. Above the buttresses the trunk runs away a long clean bole often 80 feet high to the first branch, after which it is broken up into the crown of the tree.

The following measurements are the average taken in 1912 from a considerable number of " mahogany " trees, *Khaya ivorensis*. At the present time the average content of an exported log is nearer 80 cubic feet and that of a tree 200 cubic feet. This would appear to be accounted for from the pressure of competition and the 1921 high selling prices of mahogany when almost any log was accepted on the local market. Before the War, as a rule, only the largest and the best trees were selected to be cut, whereas nowadays every tree over the prescribed minimum girth is likely to be felled.

AVERAGE MEASUREMENTS OF 100 MATURE " MAHOGANY TREES."

Height of stump left owing to buttresses.	Girth at Convergence of buttresses.	Length of bole from top of stump to first branch.	Girth just below first branch.	Number of logs extracted from each tree.
8 ft. 6in.	13 ft.	55 ft.	10 ft.	2·5

From the above figures it is seen that the bole of the ordinary " Mahogany Tree," *Khaya ivorensis*, on the Gold Coast, has a taper of nearly 6½ inches in girth for every 10 feet in length, and that the number of cubic feet of timber which was extracted from each of these trees was approximately 453, which gave an average of 181 cubic feet per log.

It should be mentioned that there is an enormous amount of waste in not extracting the top and branch logs. It is hoped that in the near future this will not be neglected.

Synopsis of Natural Orders.

The object in giving this synopsis when we are only at the beginning of the study of our flora is to give prospective Forest Officers an idea of the principal Natural Orders with which they will have to deal. Experience has shown that it is very difficult for forest students to form an idea of the flora of their prospective countries, and to study the flora of the tropics as a whole requires far more time than the ordinary student can devote to this subject. This synopsis will naturally be considerably amplified as time goes on and material accumulates, but at present it serves its purpose by indicating the relative proportion of the Natural Orders and the frequency of their occurrence.

Of the Natural Orders mentioned the following may be considered as the more important from a Forest Officer's point of view. The principal local genera are :—

APOCYNACEÆ.—Alstonia, Carpodinus, Funtumia, Landolphia, Strophanthus.

BOMBACEÆ.—Bombax, Eriodendron, Adansonia.

COMBRETACEÆ.—Terminalia.

EUPHORBIACEÆ.—Ricinodendron.

GUTTIFERAÆ.—Allanblackia, Garcinia, Pentadesma.

LEGUMINOSÆ.—Afrormosia, Afzelia, Bauhinia, Berlinia, Burkea, Bussea, Calpocalyx, Cylicodiscus, Cynometra, Daniellia, Dialium, Erythrophlœum, Lonchocarpus, Macrolobium, Parkia, Pentaclethra, Piptadenia, Pithecolobium, Pterocarpus, Tetrapleura, Xylia.

MELIACEÆ.—Carapa, Entandrophragma, Khaya, Lovoa, Pseudocedrela.

MORACEÆ.—Myrianthus.

OCHNACEÆ.—Lophira.

PALMACEÆ.—Borassus, Calamus, Cocos, Elæis, Raphia.

RHIZOPHORACEÆ.—Anopyxis, Rhizophora.

RUBIACEÆ.—Morinda, Sarcocephalus.

SAPOTACEÆ.—Butyrospermum, Mimusops.

STERCULIACEÆ. -Cola, Heritiera, Sterculia, Triplochiton.

URTICACEÆ.—Antiaris, Chlorophora, Ficus, Musanga.

The relatively small number of species compared to genera recorded in the following table is what would be expected in the initial stages of the botanical survey of a country.

SYNOPSIS.

Natural Order.	Genera.	Species.	Natural Order.	Genera.	Species.
DICOTYLEDONS.			*Nympheaceæ*	1	1
Acanthaceæ	16	20	*Ochnaceæ*	2	7
Amarantaceæ ..	8	11	*Olacaceæ*	8	9
Ampelideæ	4	7	*Onagraceæ*	1	1
Anacardiaceæ	6	6	*Papaveraceæ*	1	1
Anonaceæ	4	5	*Passifloraceæ*	4	4
Apocynaceæ	20	38	*Pedalineæ*	1	1
Asclepiadaceæ ..	9	10	*Phytolaccaceæ*	2	2
Balanophoraceæ ..	1	1	*Piperaceæ*	1	4
Begoniaceæ	1	3	*Polygalaceæ*	3	3
Bignoniaceæ	5	5	*Polygonaceæ*	2	2
Bixaceæ	6	8	*Proteaceæ*	1	1
Bombaceæ	3	4	*Rhamnaceæ*	3	4
Boraginaceæ	3	4	*Rhizophoraceæ* ..	2	2
Campanulaceæ ..	2	2	*Rosaceæ*	2	2
Capparidaceæ ..	5	5	*Rubiaceæ*	34	52
Caryophyllaceæ ..	1	1	*Rutaceæ*	1	2
Casuarinaceæ	1	1	*Samydaceæ*	1	1
Celastraceæ	2	3	*Sapindaceæ*	10	11
Chenopodiaceæ ..	1	1	*Sapotaceæ*	6	8
Combretaceæ	7	16	*Scrophulariaceæ* ..	1	1
Compositæ	17	20	*Scytopetalaceæ* ..	1	1
Connaraceæ	4	6	*Simarubaceæ* ..	4	4
Convolvulaceæ ..	4	8	*Solanaceæ*	1	2
Crassulaceæ	2	2	*Sterculiaceæ*	8	20
Cucurbitaceæ	5	7	*Thymelaceæ*	1	2
Dilleniaceæ	1	2	*Tiliaceæ*	6	10
Ebenaceæ	2	2	*Ulmaceæ*	1	1
Euphorbiaceæ	35	66	*Umbelliferæ*	1	1
Ficoideæ	1	1	*Urticaceæ*	9	20
Geraniaceæ	1	1	*Verbenaceæ*	5	14
Goodeniaceæ	1	1	*Violaceæ*	2	3
Guttiferæ	5	6			
Hernandiaceæ ..	1	1	Total .. 85	427	658
Hippocrateaceæ ..	2	2			
Hydrophyllaceæ ..	1	1	*MONOCOTYLEDONS.*		
Hyperiaceæ	2	2	*Amaryllidaceæ* ..	3	4
Labiatæ	5	6	*Araceæ*	7	10
Lauraceæ	2	2	*Commelinaceæ* ..	7	11
Leguminosæ	63	102	*Cyperaceæ*	10	23
Linaceæ	3	5	*Dioscoreaceæ*	1	4
Loganiaceæ	3	4	*Flagellariaceæ* ..	1	1
Loranthaceæ	2	5	*Gramineæ*	21	26
Lythraceæ	1	1	*Liliaceæ*	7	14
Malpighiaceæ	2	3	*Orchidaceæ*	7	9
Malvaceæ	7	13	*Palmaceæ*	7	8
Melastomataceæ ..	3	5	*Pandanaceæ* ..	1	1
Meliaceæ	9	19	*Scitamineæ*	10	16
Melianthaceæ ..	1	1	*Taccaceæ*	1	1
Menispermaceæ ..	1	1			
Moraceæ	2	2	*Total* 13	83	128
Myristicaceæ	1	1			
Myrtaceæ	4	8	*GYMNOSPERMÆ.*		
Nyctaginaceæ ..	3	4	*Cycadaceæ*	1	1

SUMMARY.

	No.	Genera.	Species.
DICOTYLEDONS	85	427	658
MONOCOTYLEDONS ..	13	83	128
GYMNOSPERMÆ	1	1	1
TOTAL	99	511	787

Chapter V.

THE CLIMATE AND ITS RELATION TO FOREST DISTRIBUTION.

The meteorological records available that have been able to be considered for this purpose are, Rainfall records for forty-six stations, and Temperature and Relative Humidity records for thirteen stations. For these thirteen stations, all three kinds of records have been obtained and the result arrived at from a consideration of fifteen years' data. For the other Rainfall record stations, data for periods of two to fifteen years have been consulted, as available.

The distribution of these thirteen stations is as follows:—Five in the coastal Sudanese Zone, two in the Evergreen Forest, two in the Deciduous Forest, two in the inland Sudanese Zone, and two in transition areas.

There are unfortunately no records of cloud observations or wind velocity.

Also there are no records of periodic phenomena such as leaf-fall, growth, or sexual periods. It is not expected that sufficient data will be available for some years on these subjects. The forests in the Sudanese Zone are chiefly controlled in these factors by the Harmattan, fires, and rainfall periods and show marked seasonal reactions to these. The Deciduous Forest is less affected, and, in the case of the Evergreen Forest the rainfall factor alone appears to exercise any determination of periodic phenomena.

Rainfall.

The general trend of the rainfall is a maximum fall in June, a second increase, though to a lesser extent, in September to October, whilst the driest period is in January, with an abatement of rain also in August.

The heaviest annual fall occurs on the coast in the south-west of the colony where Half Assinie has an average of 88·05 inches a year for 114 wet days, and Axim 82·74 inches for 100 wet days. The Evergreen Forest inland generally shows a smaller return, averaging 71·61 inches for 130 wet days.

The smallest falls are recorded from the coast towns in the Sudanese Zone in the east of the Colony, Quittah showing the lowest annual average with 25·42 inches for 47 wet days, and the whole of this area only an average of 36·50 inches for 58 wet days.

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The inland Sudanese Zone shows a slightly higher fall than the area covered by the same type of vegetation on the coast, the average being 47·45 inches for 75 wet days. The area occupied by the Deciduous Forest, as would be expected. shows a transition between the Evergreen Forest and inland Sudanese, namely 51·78 inches for 108 wet days.

In considering the records for individual months, the heaviest fall is recorded from Half Assinie, which averages 25·82 inches for 15 days in June, whilst on the other hand at Navarro in the extreme north no rain is recorded for November, December, January and February.

Although the greatest fall is recorded in the month of June for all stations except those in the inland Sudanese Zone, the distribution of the rain is greater through the temporary abatement in August and the smaller rains in September and October, only declining in November. Thus in the Evergreen Forest the June average is 11·53 inches for 16 days, whereas October and November show 6·57 inches for 15 days and 7·64 inches for 15 days respectively. In the inland Sudanese Zone the secondary season in September actually shows a greater fall than the first season in June, whilst the contrary obtains in the coastal Sudanese Zone where the secondary season rains in September and October amount to 3 or 5 inches only.

From a study of a chart obtained by plotting the number of inches recorded for each station annually against the number of wet days for the same period, it is seen that the stations fall into the same four groups as those under which the country has been considered from the view of the distribution of its forests. The order from zero being, coastal Sudanese, inland Sudanese, Deciduous Forest, and Evergreen Forest areas. An additional interest is provided however, in that stations which are now situated distinctly in the Deciduous Forest, such as Obuasi and Dunkwa, or even on the outskirts of the Deciduous Forest such as Ejura and Kintampo appear within the group containing the whole of the stations of the Evergreen Forest. It is not too much to assume, therefore, that the natural limits of the heavy Evergreen Forest originally included Kintampo and Ejura, and an examination of the floristic composition of the fringing forests around these stations actually supports this assumption. In considering, therefore, any schemes for re-afforesting parts of the country, as undoubtedly such schemes will have to be considered in the future, activities should, in the first instance, be confined to areas whose rainfall records show that the conditions required for the Evergreen Forest obtain, and by the same token, removal of the fire factors will undoubtedly allow any district showing these rainfall records to re-afforest itself naturally.

Again, the high forest may be considered in a state of unstable equilibrium in the Deciduous Forest areas, where a slight disturbance of the natural conditions, such as the clear felling of forests for farms along the Coomassie-Jumasie road, or the introduction of grass fires, as at Mampon, will immediately destroy the forest without hope of re-afforestation except at a great price. Consequently, areas whose records coincide with those obtained for Coomassie, Aburi, Sunyani, and Assuantsi require to be watched with care and protective belts established.

With regard to the inland and coastal Sudanese Zone, it is very doubtful if areas showing these records are worth while considering from a production forest point of view. Work in such areas should be confined to providing for the needs of the local populations.

A general summary of this study shows that the rainfall along the Coast decreases steadily from west to east. Inland the higher curves run out in a north-easterly direction to include the main divide of the country, but in central and western Ashanti retreat rapidly westward showing the Afram basin and the area covered by the Deciduous Forest to be of a lesser rainfall. In northern Ashanti the higher curves run out eastward again and include the western part of the Northern Territories before finally passing into the areas of definite diminution of rainfall to the north. This is graphically illustrated on the map, page 36. A comparison of this map with that showing the physiography of the country on page 8 brings out the important fact that the majority of the rivers of the country rise in an area of small rainfall.

Relative Humidity.

The amount of humidity in the air away from the seashore is entirely dependent on the existence of vegetation. This is illustrated very markedly by a study of the records of the relative humidity taken at the thirteen stations in the country. In the Guinea Zone, the relative humidity in the Evergreen Forest varies between 84 and 87, in the Deciduous Forest between 80 and 89. In the Sudanese Zone inland the variation is between 34 and 80, whilst the maritime strip of Sudanese vegetation is affected by the sea and shows a variation between 75 and 81. In the Evergreen Forest the variation throughout the year is only 3 points, in the Deciduous Forest 9 points, but in the inland Sudanese Zone 46 points.

As has been previously mentioned the three main crops on which the agricultural wealth of the country depends, namely, cocoa, oil-palm, and cola, are, apart from the fringing forests, confined to the forest area, and there is no doubt that it is the necessity for a certain constant humidity that prevents their cultivation outside. This humidity, expressed in relative terms, may be said to be between 80

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Summary of Climate according to Zones of Vegetation.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Average Mean.
Sudanese Zone.													
1.—*Coast Savannah.*													
Mean Shade Temperature*	80·08	80·62	81·86	82·32	81·57	78·81	77·21	74·65	77·20	82·72	76·56	80·15	—
Relative Humidity ..	78·24	76·97	75·67	76·38	78·30	79·19	80·17	79·93	79·65	78·00	75·77	77·33	—
Rainfall in Inches ..	0·78	0·75	2·16	3·29	7·55	8·02	3·05	1·07	1·29	2·03	1·94	0·72	36·50
Number of Wet Days ..	1·5	1·5	3·9	5·2	8·9	10·3	5·8	3·4	4·8	5·3	3·4	1·8	58·7
2.—Guinea Zone.													
(*a*) *Evergreen Forest.*													
Mean Shade Temperature*	79·76	79·94	81·15	80·25	79·44	81·90	77·06	80·34	77·03	78·05	77·54	79·02	—
Relative Humidity ..	85·41	84·03	84·12	84·59	86·32	86·72	85·59	86·55	86·87	86·77	86·00	84·63	—
Rainfall in Inches ..	2·66	2·16	6·05	6·60	8·32	11·53	7·57	3·68	6·57	7·64	5·54	2·59	71·61
Number of Wet Days ..	2·9	4·7	10·1	9·4	12·2	16·6	14·3	10·9	15·8	15·4	11·5	5·1	130·8
(*b*) *Deciduous Forest*													
Mean Shade Temperature*	77·32	79·84	82·04	81·11	79·61	78·10	76·51	76·33	77·75	77·08	77·08	76·75	—
Relative Humidity ..	80·73	83·99	85·48	84·73	86·17	86·15	88·94	88·49	88·02	87·88	85·29	84·51	—
Rainfall in Inches ..	1·00	1·95	4·06	5·92	6·17	7·85	4·71	4·49	5·32	5·76	3·60	1·63	51·78
Number of Wet Days ..	2·2	4·3	7·7	9·1	11·2	13·5	12·2	9·6	12·1	12·5	8·7	4·1	108·8
Sudanese Zone.													
3.—*Inland Savannah.*													
Mean Shade Temperature*	79·61	85·26	84·55	85·16	82·78	78·15	76·49	76·12	76·46	80·97	81·43	80·25	—
Relative Humidity ..	34·55	41·59	45·70	54·42	61·35	67·65	75·68	79·12	76·94	68·31	56·36	40·50	—
Rainfall in Inches ..	0·53	0·95	2·67	4·45	4·74	6·58	5·88	6·45	7·89	4·07	2·42	0·90	47·45
Number of Wet Days ..	0·8	1·8	4·7	7·0	8·4	9·2	9·6	10·1	12·6	8·5	3·8	1·3	75·0

* Degrees Fahrenheit.

Distribution of Rainfall in Percentages.

	Coast Savannah.	Guinea Zone.		Inland Savannah.
		Evergreen Forest.	Deciduous Forest.	
Rainfall in Percentages ..	18	34	25	23

Rainfall and Number of Wet Days,

Guinea Zone.

Evergreen Forest.

	Stations.									
	Axim.		Half-Assinie.		Jemma.		Akwan-tambra.		Tarquah.	
	Rain in Ins.	No. of Wet Days.	Rain in Ins.	No. of Wet Days.	Rain in Ins.	No. of Wet Days.	Rain in Ins.	No. of Wet Days.	Rain in Ins.	No. of Wet Days.
January ..	2·24	3·8	3·11	6·2	2·16	4·6	0·65	2·2	1·95	4·8
February ..	2·55	3·3	1·56	5·1	3·25	7·3	2·84	5·7	3·33	6·6
March ..	4·33	6·4	4·82	8·5	5·01	10·7	5·95	11·0	7·64	11·9
April ..	6·62	8·1	6·98	10·1	7·18	11·6	7·62	13·2	6·87	10·5
May ..	14·18	13·8	11·78	1·7	8·51	18·1	9·44	16·4	8·52	16·0
June ..	21·12	16·7	25·82	15·1	15·46	20·8	9·38	18·8	10·23	17·0
July ..	9·82	10·6	6·97	10·8	6·04	17·5	8·06	17·8	7·03	13·8
August ..	2·18	4·8	1·89	7·7	2·87	13·1	5·14	14·6	3·37	11·8
September ..	2·47	7·1	2·53	10·6	5·35	18·1	5·66	18·1	4·38	14·1
October ..	5·34	1·0	5·65	10·8	7·16	20·6	9·47	17·5	8·82	19·8
November ..	8·43	9·8	8·65	14·1	6·99	17·1	3·86	10·1	5·70	13·0
December ..	3·88	5·6	3·97	7·3	2·87	8·8	1·83	4·1	4·07	7·8
Average Total	82·74	100	88·05	114	73·84	171	67·81	141	72·82	150

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Rainfall and Number of Wet Days.

Sudanese Zone.

	Coastal.								Inland.							
	Cape Coast.		Accra.		Addah.		Quittah.		Salaga.		Tamale.		Gambaga.		Navarro.	
January	1·00	1·8	0·63	1·3	0·54	0·8	0·49	0·8	0·04	0·2	0·19	0·2	0·08	0·02	Nil.	—
February	0·76	1·7	0·76	1·2	1·07	1·3	0·90	1·5	0·28	1·4	0·22	1·0	0·01	0·05	Nil.	—
March	2·34	5·0	1·93	3·0	2·91	3·0	1·69	3·1	2·27	5·6	2·58	3·2	0·77	2·10	0·82	4·5
April	3·01	5·3	3·06	4·5	4·20	5·2	2·79	5·5	5·60	8·0	2·10	5·4	2·37	5·6	2·64	6·5
May	6·99	9·8	5·06	6·4	7·85	7·5	9·33	8·6	4·84	10·4	5·25	8·1	5·17	8·3	4·68	7·5
June	7·50	12·1	9·23	9·5	10·26	8·5	6·93	10·0	6·37	8·0	6·09	9·4	5·91	10·3	7·17	10·0
July	3·55	7·3	2·21	3·8	2·49	2·7	2·09	4·0	4·52	10·6	5·84	9·2	7·16	11·7	9·48	14·5
August	0·86	4·6	0·62	1·7	0·77	1·4	0·73	1·7	8·08	11·0	8·19	13·0	10·68	13·3	9·47	15·5
September ..	1·48	6·0	0·83	2·9	0·97	2·5	0·97	2·8	10·11	16·4	8·44	15·0	9·88	16·5	6·83	15·5
October	1·67	6·0	1·55	3·8	2·23	4·0	2·41	5·1	5·47	10·4	3·32	7·9	3·23	8·7	1·73	8·0
November	2·54	0·4	1·52	2·1	1·68	2·8	1·58	3·1	1·23	3·6	6·27	1·6	0·51	1·2	Nil.	—
December ..	1·21	2·1	0·74	1·6	0·48	1·0	0·29	0·9	0·15	0·4	0·21	0·6	0·25	0·3	Nil.	—
Average Total	34·22	65	28·34	44	36·20	42	25·42	47	49·28	88	44·10	77	47·29	84	42·51	65

Rainfall and Number of Wet Days.

Guinea Zone.

Deciduous Forest.

	Aburi.		Assuantsi.		Sunyani.		Coomassie.	
January	1·00	1·8	1·60	4·2	0·84	1·7	0·70	1·1
February ..	1·62	5·6	2·56	4·8	1·88	3·8	1·96	4·3
March	3·86	6·6	3·57	7·8	4·61	7·7	4·88	5·2
April	5·15	7·6	5·72	6·6	7·19	11·3	6·17	8·3
May	5·45	9·6	6·76	14·2	5·04	10·3	7·33	8·5
June	7·28	10·7	8·55	16·2	6·41	13·9	8·25	10·5
July	4·29	10·3	5·03	15·8	4·43	11·3	4·88	9·3
August	2·29	8·4	3·36	10·4	4·06	10·5	4·10	8·5
September ..	3·70	10·1	3·07	11·4	7·63	14·8	7·29	11·7
October	4·40	10·5	4·05	11·0	7·11	15·2	7·33	11·6
November ..	4·67	9·5	3·43	9·8	2·85	7·0	2·55	5·7
December ..	1·83	5·8	2·68	6·0	0·47	1·5	1·16	2·0
Average Total	48·92	101	50·88	120	50·52	106	50·74	75

and 89, that is the range of humidity in the forest zone. When the humidity has a greater variation than 9 points and a minimum below 75 points these crops do not thrive. The desiccation following on the destruction of the high forest is, therefore, a conclusive factor in the inhibition of these main agricultural crops of the country. Minor crops such as bananas, pawpaws, plantains, and coco-yams, of great local importance, also conform to these restrictions.

In considering the stations in detail, it will be noticed that Axim, on the coast and in the Evergreen Forest, has the highest relative humidity, from June to November, the records showing over 90. Seccondee presents an anomaly, as, although on the sea-coast and at the present termination of the Sudanese coastal wedge, its relative humidity is considerably below that of any other coastal town, but rather higher than the inland towns in the Sudanese Zone. Kintampo shows an intermediate stage between the Guinea Zone records and the inland Sudanese, Aburi conforms to the Deciduous Forest average on the whole.

Relative Humidity.
Guinea Zone.

	Deciduous Forest.			Evergreen Forest.		Transition Guinea to Sudanese.
	Aburi.	Sunyani.	Coomassie.	Axim.	Tarquah.	Kintampo.
January ..	84·14	82·43	79·03	88·83	82·00	52·17
February ..	78·44	84·25	83·74	88·11	79·95	53·02
March ..	85·62	87·64	83·33	87·46	80·78	57·60
April	85·72	85·19	84·27	88·13	81·05	66·50
May	86·18	86·12	86·22	89·52	83·13	69·19
June	87·44	86·38	85·93	90·08	83·37	76·18
July	89·34	89·78	88·10	90·86	80·33	77·78
August ..	89·45	89·41	87·57	92·53	80·58	78·83
September ..	88·67	88·27	87·78	92·72	81·02	63·01
October ..	88·77	87·81	87·95	92·72	80·83	72·86
November ..	87·73	83·82	86·76	91·81	80·20	68·22
December ..	87·95	83·84	85·18	89·14	80·12	62·46

Relative Humidity.
Sudanese Zone.

	Coastal.					Inland.	
	Cape Coast	Accra.	Addah.	Quittah.	Seccondee	Tamale.	Gambaga
January ..	83·67	80·78	86·84	77·71	62·24	34·30	34·81
February ..	81·59	81·86	85·82	77·06	58·55	47·61	35·58
March ..	81·12	77·87	86·08	75·94	57·36	51·17	40·24
April ..	82·00	78·56	86·89	77·13	57·32	54·99	53·85
May ..	83·61	88·07	82·71	78·10	59·02	58·49	64·22
June ..	86·11	83·12	83·99	81·74	61·01	59·94	75·37
July ..	87·90	82·30	87·98	80·73	61·85	71·34	80·03
August ..	86·23	82·16	88·47	80·85	61·97	75·96	82·28
September	87·81	81·07	88·36	78·24	62·78	74·35	79·54
October ..	84·01	80·40	85·59	79·53	61·49	63·04	73·58
November..	82·27	80·08	81·54	76·09	58·88	51·93	60·80
December	82·91	82·08	85·83	77·71	58·14	43·10	37·90

Temperature.

Shade Temperatures.—The maximum shade temperatures are recorded for Tamale and Gambaga, where, towards the end of the dry weather in February and March, the average is over 100° F. The lowest average record is from Tamale during the Harmattan month of January, when the shade temperature falls just below 60° F. Both greater and lesser individual temperatures are commonly recorded.

The shade temperature within the Guinea Zone is very equable, varying only some 20° in the coast towns, 23° in the Evergreen Forest, and some 28° in the Deciduous Forest areas, between a maximum of 92° and a minimum of 64°. In the inland Sudanese Zone, however, the variation is considerably more, from an average maximum of over 100° to an average minimum of 64°, a difference of 36°.

This comparatively even temperature under the modifying influences of proximity to the sea and the presence of the forest and a greater variation away from these influences and further inland naturally follows.

The stations are not sufficient, or sufficiently distributed, at present to warrant setting these results down on an isothermic map.

Maximum Solar Radiation.—The following data are obtained from the records published under this heading in the meteorological statistics of the country. The actual results must be accepted with reservation, but the comparative results serve as a useful indication of the radiation to be expected.

The chief point noticed is that the results show two culminating points for maximum solar radiation for both subdivisions of the Guinea Zone and those of the Sudanese Zone. The chief culminating point is in March and April, that is, during the tornado season towards the end of the dry weather and before the heavy rains begin. The second and lesser culmination is reached in October when the lesser rains are falling off and before the Harmattan begins.

The records for the Coast Savannah, Evergreen Forest and Deciduous Forest lie between a minimum of 135° F. and a maximum of 150° F., a range of 15°. The Inland Savannah, whilst also extending over a range of 15°, is in a considerably higher plane with a minimum of 142° F., but a maximum of 157° F. The graphs illustrating this result in connection with the monthly averages frequently intersect in the cases of the Coast Savannah, Evergreen Forest and Deciduous Forest, but that of the inland Savannah is entirely free and superior to all three.

The extreme range is between 161° F. at Gambaga, the most northerly station in the Inland Savannah, and at a height of 1,300 ft. above sea level, and 123° F. at Saltpond at sea level in the Coast Savannah.

Minimum Terrestrial Temperatures.—The records are not considered sufficiently reliable to reproduce and discuss in this connection.

Mean Maximum Shade Temperatures (Degrees Fahrenheit).

		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Coast Savannah		86·77	87·88	88·72	90·39	87·32	84·92	83·10	79·17	83·14	85·53	86·11	86·55
Guinea Zone.	Evergreen Forest ..	88·17	88·94	90·59	89·53	88·71	85·50	76·50	83·84	84·67	86·19	88·08	88·29
	Deciduous Forest ..	88·94	91·22	92·64	92·35	89·52	86·79	83·90	83·28	85·92	87·39	88·86	88·67
Inland Savannah		93·93	100·53	100·45	98·14	94·53	89·59	86·06	85·12	86·58	95·61	95·17	95·56

Mean Minimum Shade Temperatures (Degrees Fahrenheit).

		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Coast Savannah		73·42	73·32	75·01	74·25	75·82	72·71	71·33	70·13	71·26	72·19	73·87	73·72
Guinea Zone.	Evergreen Forest ..	71·35	70·95	71·72	70·97	70·18	78·31	77·62	76·84	69·40	69·92	67·02	69·76
	Deciduous Forest ..	65·70	68·46	71·45	69·87	69·71	69·42	69·13	69·39	69·58	66·77	66·30	64·83
Inland Savannah		65·29	69·99	68·65	72·19	71·04	66·72	66·93	67·12	66·34	66·34	67·69	64·95

Mean Maximum Shade Temperature (Degrees Fahrenheit).

Guinea Zone.

	Deciduous Forest.			Evergreen Forest.	
	Aburi.	Sunyani.	Coomassie.	Axim.	Tarquah.
January	78·62	90·08	87·81	85·55	90·79
February	86·17	92·30	90·15	86·62	91·26
March	87·58	94·62	90·67	87·14	94·05
April	87·03	93·26	91·45	86·95	92·11
May	85·29	91·31	87·74	85·55	91·87
June	82·60	88·69	84·89	82·88	88·13
July	81·25	84·56	83·25	81·71	71·30
August	76·11	83·32	83·25	81·51	86·18
September	82·45	86·01	85·84	82·53	86·81
October	84·71	88·89	85·89	82·81	89·58
November	79·35	90·06	87·66	84·52	91·64
December	84·09	89·67	87·67	85·58	91·01

Sudanese Zone (Degrees Fahrenheit).

	Coastal.					Inland.	
	Cape Coast.	Accra.	Addah.	Quittah.	Seccondee	Gambaga	Tamale.
January ..	85·73	86·81	85·43	88·42	87·57	92·38	95·48
February ..	87·19	86·56	86·25	90·02	89·38	100·05	101·02
March ..	88·32	87·58	86·53	90·63	90·57	99·79	101·11
April ..	97·55	87·46	85·95	90·86	90·15	97·86	98·43
May ..	86·64	86·33	85·76	89·08	88·79	93·02	96·04
June ..	84·40	84·26	83·19	87·19	85·58	87·47	91·72
July ..	83·17	82·56	80·12	86·49	83·17	83·70	88·42
August ..	83·67	81·10	79·04	70·00	82·08	82·75	87·48
September	82·46	84·55	79·59	86·30	82·82	83·90	89·27
October ..	85·20	85·05	82·82	88·78	85·83	97·28	93·95
November	86·68	84·97	84·57	88·93	88·42	93·03	97·31
December..	85·91	83·02	86·27	88·77	88·78	94·05	97·08

Mean Minimum Shade Temperature (Degrees Fahrenheit).

Guinea Zone.

	Deciduous Forest.			Evergreen Forest.		Transition, Guinea-Sudanese.
	1,500 ft. A.S.L. Aburi.	Sunyani.	900 ft. A.S.L. Coomassie.	S.L. Axim.	300 ft. A.S.L. Tarquah.	Kintampo.
January ..	69·60	64·23	67·17	68·68	74·02	66·87
February ..	65·48	68·36	68·56	69·95	71·96	68·93
March ..	64·38	69·21	73·69	71·27	72·18	71·91
April	69·33	68·03	71·72	70·69	71·25	71·49
May	69·61	67·98	71·44	69·50	70·86	71·71
June	74·69	67·20	71·64	68·63	68·00	69·55
July	66·64	68·92	69·35	68·88	86·36	66·86
August ..	66·65	68·99	69·79	67·17	86·51	68·58
September ..	67·49	69·21	62·76	67·84	70·96	67·20
October ..	68·38	69·93	63·62	68·12	71·72	67·72
November ..	69·35	69·12	63·48	65·27	68·77	68·60
December ..	67·23	66·13	63·54	69·31	70·21	65·38

Sudanese Zone (Degrees Fahrenheit).

	Coastal.					Inland.	
	S.L. Coast. Cape	S.L. Accra.	S.L. Addah.	S.L. Quittah.	S.L. Seccondee	1,300 ft. A.S.L. Gambaga.	690 ft. A.S.L. Tamale.
January ..	73·59	70·08	76·07	75·54	71·84	70·74	59·84
February	69·57	70·30	77·81	75·96	72·99	73·91	66·08
March ..	73·98	72·10	78·73	76·89	73·37	76·92	60·39
April ..	73·64	71·48	77·52	75·62	73·02	76·32	68·07
May ..	74·38	69·91	77·20	74·67	72·97	74·56	67·53
June ..	72·64	69·37	75·97	73·41	72·18	69·20	64·25
July ..	71·76	69·06	73·69	73·40	70·76	70·70	63·16
August ..	69·93	68·47	70·74	71·55	69·48	70·45	63·94
September	71·04	69·03	72·88	72·72	70·66	70·17	62·52
October ..	72·24	70·71	71·52	74·76	71·76	71·36	61·32
November	73·64	72·22	76·13	75·01	72·39	72·33	63·06
December	74·05	71·25	75·69	74·90	72·74	70·91	58·99

S.L.=sea level.

Maximum Solar Radiation (Degrees Fahrenheit).

		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Coast Savannah		138	140	144	145	141	138	138	139	142	142	143	140
Guinea Zone.	Evergreen Forest ..	135	138	142	140	142	139	137	136	137	145	139	135
	Deciduous Forest ..	136	139	150	147	144	142	136	136	142	147	145	137
Inland Savannah		147	151	157	154	150	145	143	142	146	152	150	148

	Sudanese Zone (Degrees Fahrenheit).									Guinea Zone (Degrees Fahrenheit).				
	Coastal.							Inland.		Evergreen Forest.		Deciduous Forest.		
	Quittah.	Addah.	Accra.	Winnebah.	Saltpond.	Cape Coast	Secondee.	Gambaga.	Tamale.	Axim.	Tarquah	Aburi.	Coomassie.	Sunyani
January ..	138	146	141	141	130	138	134	150	145	133	137	139	138	131
February ..	142	147	144	147	127	142	138	150	153	133	143	146	133	139
March ..	147	147	147	149	129	145	144	158	156	131	154	159	149	143
April	148	150	147	151	128	146	147	156	153	133	148	150	148	145
May	147	130	149	146	127	145	144	153	148	135	149	142	150	141
June	144	141	144	137	126	140	139	148	142	129	149	141	149	136
July	139	134	141	136	130	140	148	147	140	132	142	137	142	130
August ..	141	140	142	139	127	138	148	145	140	133	140	141	141	128
September ..	146	144	147	145	128	142	142	150	143	131	143	144	146	135
October ..	140	143	147	148	132	142	144	154	151	143	147	150	149	142
November ..	145	146	147	149	130	144	143	148	152	131	147	148	149	139
December ..	141	146	144	139	130	142	139	150	147	128	142	141	135	135

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Chapter VI.

CONSIDERATIONS OF A FOREST POLICY.

In considering the forest policy required for the country, undoubtedly the outstanding factor to be kept in view is the gradual but ever-increasing advance on the forest of the Sudanese vegetation and the comparatively arid conditions obtaining where this vegetation is established. There can be no doubt that ultimately, if unchecked, the whole of the forests of the Gold Coast will disappear as they have already done in Sierra Leone and Togoland. Apart from the loss in forest wealth to the country that would be entailed, it would also mean the practical disappearance of the cocoa, kola, and oil palm industries as commercial ventures.

It will of course be a long period before such a state of things comes to pass, but at the same time it is the duty of a forester to look further ahead than anyone else, and it can never be too soon to start such counter measures as are considered necessary to prevent such a calamitous state of affairs in the distant future. The rate of the destruction of the forest will naturally increase with the population and its turning more and more to pacific methods of livelihood, such as agriculture. Hence the destruction, important as it is in the present generation, will increase in greater proportion in each subsequent period.

It is not proposed to discuss the details of any policy here, but the outstanding feature must undoubtedly be the reservation of sufficient stretches of the main divide of the country and other hill masses to the north, as the chief barrier to the advance of the Sudanese conditions and a protection to the existing forest. At the same time, reservation of sufficient areas as production forests within the present forest area must be made to ensure that succeeding generations shall enjoy the same benefits, direct and indirect, from their forests as the present generation has inherited.

The urgency and seriousness of the forestry problem to the country can be estimated from a consideration of the following points which have been referred to in this work and verified by the personal observations of the writer :

(1) The rivers of the country, apart from the Black and White Volta, rise from the Ashanti plateau and its continuation, which is the main divide running south eastwards into the Colony.

(2) This plateau and watershed are subjected to a lesser rainfall than the country to the north and south, and are either deforested or rapidly becoming so, with the consequent exposure of the sources of the rivers. (See Chapter V.)

(3) The northern edge of the forest zone bordering this country is heavily farmed and supports a comparatively dense population,

which is annually increasing by settlement of people from the north. In consequence the forest is being rapidly cut for farming.

(4) Savannah vegetation, energetically assisted by the annual fires that sweep through the northern country, is constantly making further inroads into this farmed northern edge of the forest and, once established, remains in possession with the constant retreat southwards and westwards of the remaining forest.

(5) Once the forest has been completely driven off this high ground, the regression will be rapid and result in rolling back on to the Ivory Coast throughout the whole of the area now covered by the Deciduous Forest. With the consequent concentration of farming in the remains of the forest the forest itself will entirely disappear.

(6) The eastern part of the forest area is being rapidly separated from the remainder by the clearing of a belt up to 20 miles wide along the railway from Seccondee to Coomassie, and along the main north road from Coomassie to Ejura. In a few years' time, if unattended, this belt will be continuous throughout the forest zone, and with the completion of the Coomassie-Accra railway the remaining forests in the Central and Eastern Provinces of the Colony will be completely encircled. The construction of the proposed railway through the Central Province of the Colony will so open up this eastern portion to exploitation and agriculture that the whole of these forests will be wiped out in a few years, and no forests will then exist in the country east of the Seccondee-Coomassie railway.

An attempt may here be made to reply to two questions that are often asked and which bear on this part of the subject: " At what period did the destruction of the forests begin ? " The first step in the destruction of the forests was undoubtedly, as Mr. Rattray suggests, when the original races gave up their primitive hunting habits and began to cultivate imported foods such as cassava, yams, etc., and this, Mr. Rattray considers, was at no very distant period. The rapid destruction of the forests, however, began at the time when local wars and fightings ceased, a time which approximately coincided with the introduction and initial stages of the cocoa industry.

" How much longer can this country be considered as a virgin country for forest exploitation and agricultural purposes ? " From a general survey of the progress already made in the development of the country, and a knowledge of the extensive proposed development of railways and roads, one is forced to the conclusion that the virgin forests of this country, if unprotected, will all have been exploited and agriculture, within the forest zone, have reached its optimum, within the coming generation.

An appreciation of these facts clearly indicates the forest policy required and the urgency for its immediate prosecution. (Contrast maps at pages 8, 13, and 36.)

Chapter VII.

THE GOLD COAST FORESTRY DEPARTMENT.

History of the Department.

The following Notes are extracted and amplified from Mr. McLeod's "Statement for the British Empire Forestry Conference, 1920."

It was during the Governorship of the late Sir John Pickersgill Roger, K.C.M.G., that the idea of having a Forest Department in the Gold Coast Colony was first conceived, and accordingly, in 1908, Mr. H. N. Thompson, Conservator of Forests, Southern Nigeria, was invited to inspect and report on the forests of this Colony and Ashanti, and to advise as to the best means of regulating the haphazard methods of exploiting mahogany. His report was duly printed as a Parliamentary Paper (Cd. 4993), and in 1909 Mr. N. C. McLeod, who was then Mr. Thompson's deputy in Southern Nigeria, was appointed Conservator of Forests, Gold Coast.

His attempt to start forestry on proper lines by the early introduction of suitable legislation was frustrated by the strong opposition of the "Aborigines' Rights Protection Society" at Cape Coast to the proposed Forestry Ordinance.

A local enquiry into the reasons for this opposition was made by Sir H. Belfield, and in 1912 the West African Lands Committee, under the Chairmanship of Sir Kenelm E. Digby, G.C.B., K.C., which sat in London, "to consider the laws in force in the West African Colonies and Protectorates (other than Northern Nigeria) regulating the conditions under which rights over land or the produce thereof may be transferred, and to report whether any, and, if so, what, amendment of the laws is required, either on the lines of the Northern Nigeria Land Proclamation or otherwise," considered the provisions of the Forestry Ordinances in the various dependencies and expressed their views thereon, although they recognised that they were strictly outside the terms of reference. In Section 287 of their draft report, "African (West) (No. 1046) Confidential," printed in April, 1917, their views are recorded in favour of State control in forest administration, as this is vital to the general interests.

From October, 1909, to the end of 1914, the Conservator of Forests and his European Assistants, who gradually rose to the number of four, made an inspection of the forests of the Colony and Ashanti, earmarking areas suitable for reservation against the time when authority

would be given to constitute such areas " Reserved Forest." The preliminary study of the flora of the country was also undertaken, the result of such study being embodied in two booklets, " A List of Trees, Shrubs and Climbers of the Gold Coast, Ashanti, and the Northern Territories " and " A List of the Herbaceous Plants and Undershrubs," both by Mr. T. F. Chipp, B.Sc., F.L.S., Assistant Conservator of Forests.

Forest Officers were also employed in detecting and prosecuting offenders under " The Timber Protection Ordinance," No. 20 of 1907, in so far as mahogany for export was concerned.

In 1915 two Assistants left for military service and the Conservator was absent on leave for more than six months. From the 1st January 1916, the Forest Department was entirely in abeyance up to November 1919, when Mr. McLeod again arrived in the Colony to resume his appointment as Conservator of Forests on the invitation of the Governor Brigadier-General Sir Gordon Guggisberg, R.E., K.C.M.G., D.S.O.

During 1920 and 1921 a small staff of Forest Officers has been gradually built up, the services of most of the original members also have been secured. The present world-wide financial crisis which has been reflected locally has so far prevented the Department from being recruited up to strength.

The following table gives the 1921 Establishment of the Department :–

1 Conservator :
£1,200 plus £240.

1 Deputy Conservator :
£960 plus £96.

3 Provincial Forest Officers :
£480–30–720–40–920 plus £72.

13 Assistant Conservators :
£480–30–720–40–920 plus £72.

9 European Foresters:
£440–12–500.

1 Mill Foreman : £500.

Clerks.

Native Subordinate Service.

Qualifying Tests for Passing Efficiency Bars.

(VII.) Forestry.

£600 Bar.

A certificate from the Conservator of Forests that the officer concerned has a fair working knowledge of the forests and flora of the Colony, of the system of keeping the Government accounts, of general orders and of such Ordinances and Regulations as particularly apply to the Forestry Department and that his energy, ability, and conduct justify the grant of the higher salary

£720 Bar.

A certificate from the Conservator of Forests that the officer has a sound and complete knowledge of the forests and flora and has made himself well acquainted with the other subjects and that his energy, ability and conduct are such as to justify the grant of the higher salary.

Chapter VIII.

ECONOMIC NOTES.

Natural Forestry Resources and Exports.

The following tables taken from the Customs returns provide an indication of the chief natural products of commercial importance exported from the country. There is a considerable export of cola nuts overland northwards which is not included in these figures. Also there are many incipient industries which have not at the present actually assumed commercial importance, but which promise to take their place in the market as the country develops. Amongst these may be considered the shea butter, obtained from the fruits of *Butyrospermum Parkii*, a common tree in the Savannah country. There are other sources of natural wealth which must exist in the forests but which cannot be brought to light until investigations have been undertaken by trained research officers. Such materials may provide scope for the following industries :—Acetone from wood, pulp from wood, match making, cooperage material, lumber as opposed to the mahogany and cedar which alone is shipped at present, railway sleepers, silk cotton, gums, fats and oils from fruits such as those of the *Mimusops* and *Lophira*, medicaments and rattans. In conjunction with this it must also be borne in mind that the nearest part of the Empire to Great Britain which contains vast tropical forests is the Gold Coast. Apart from the above there are also the agricultural possibilities of the country, which are so intimately bound up with the preservation of the forests.

Value and quantity of the principal vegetable products obtained from forestry sources, exported from the Colony during the last 12 years :—

Year.	Cola-Nuts.		Gum Copal.		Lumber (Native Timber).		Palm Kernels.	
	Lbs.	Value.	Lbs.	Value.	Superficial Ft.	Value.	Tons.	Value.
		£		£		£		£
1910	5,156,500	77,716	53,847	647	14,935,935	148,077	14,182	185,058
1911	5,791,931	93,099	80,042	1,110	13,973,396	138,821	13,254	175,891
1912	7,133,165	134,231	67,133	1,077	23,573,651	228,745	14,628	205,365
1913	7,024,868	144,705	38,205	555	37,391,848	366,094	9,744	159,128
1914	7,862,414	142,190	18,549	265	24,587,217	240,878	5,633	88,671
1915	8,267,100	139,163	28,888	405	9,217,622	90,661	4,064	50,512
1916	6,742,898	130,571	12,594	132	10,334,793	93,981	5,857	85,899
1917	11,984,645	239,134	2,306	24	7,481,468	69,128	4,768	74,911
1918	13,254,538	262,144	1,963	38	14,680,823	137,648	8,933	152,922
1919	16,319,972	350,249	13,748	174	10,432,250	103,238	9,892	253,243
1920	16,203,851	452,245	84,136	2,779	21,620,513	342,115	7,664	222,468
1921	13,693,412	463,596	8,002	124	16,669,476	206,512	1,599	30,117

Value and quantity of the principal vegetable products obtained from forestry sources, exported from the Colony during the last 12 years :—

Year.	Palm Oil.		Rubber.		Copra.	
	Gallons.	Value.	Lbs.	Value.	Tons.	Value.
		£		£		£
1910 ..	2,044,945	161,388	3,223,265	358,876	755	13,032
1911 ..	1,610,209	128,916	2,668,667	219,447	779	13,259
1912 ..	1,444,432	112,885	1,990,699	168,729	620	11,841
1913 ..	860,155	65,652	1,317,369	87,915	629	14,292
1914 ..	495,763	37,646	654,133	21,631	656	11,825
1915 ..	330,990	25,769	647,982	25,167	770	12,821
1916 ..	450,360	38,302	2,215,973	78,865	633	14,386
1917 ..	198,900	24,770	2,961,204	110,272	736	19,916
1918 ..	670,867	83,689	1,391,097	57,006	99	2,772
1919 ..	938,595	140,163	721,588	33,637	983	30,091
1920 ..	629,612	114,084	299,180	27,331	427	17,561
1921 ..	67,447	7,718	102,780	6,741	442	10,488

Census.

The returns for the 1921 Census are also given under this section. The comparative density of the population is a factor that must be taken into account in considering the destruction of the forests to provide suitable land for agricultural needs, and also in considering the timber and fuel required by the general population, the mines and railways.

By reference to maps p. 7 and p. 13, the distribution of population and its relation to the area under forest can be seen at a glance.

(A—Wholly within the Forest Zone. B—Entirely outside the Forest Zone. C—Partly within and partly without the Forest Zone.)

Gold Coast Colony.

Eastern Province :—				
Accra	B	99,598		
Addah and Quittah	B	177,704		
Akwapim	B	79,917		
Akim Abuakwa	C	58,118		
Kwahu	C	41,693		
Volta River	B	176,396		
				633,326*
Central Province :—				
Cape Coast	C	93,618		
Saltpond	C	77,366		
Winnebah	C	96,398		
Western Akim	C	32,164		
				299,546

* These figures are quoted from the "Gold Coast Gazette," No. 3 of 1922, dated 14th January.

Western Province :—			
Ankobra	A	33,053	
Axim	A	40,759	
Seccondee	C	59,261	
Tarquah	A	44,525	
Aowin	A	6,751	
Sefwi	A	26,008	
			210,177
TOTAL COLONY ..			1,143,049
ASHANTI.			
Eastern Province :—			
Coomassie Town	A	20,001	
Coomassie District	A	121,420	
Mampon	C	44,432	
Ashanti Akim	C	41,787	
Obuasi	A	61,837	
British Kratchi	B	2,654	
			292,131
Western Province :—			
Sunyani	C	36,667	
Ahafo	A	9,269	
Wenchi	B	39,038	
Kintampo	B	29,975	
			114,949
TOTAL ASHANTI ..			407,080
NORTHERN TERRITORIES.			
Southern Province :—			
Western Dagomba (Tamale) ..	B	93,944	
Eastern Gonja (Salaga and Yeji)	B	18,152	
Western Gonja (Bole)	B	8,490	
			120,586
Northern Province :—			
Wa	B	43,168	
Lorha-Tumu	B	84,264	
Southern Mamprussi (Gambaga)	B	21,947	
Northern Mamprussi (Navarro, Bawku, Zuaragu) ..	B	257,949	
			407,328
TOTAL NORTHERN TERRITORIES ..			527,914

Comparison 1911 and 1921.

Colony :—

	1911	1921
Western Province ..	164,413	210,177
Central Province ..	247,121	299,546
Eastern Province ..	442,232	633,326
Total Colony ..	853,766	1,143,049
Total Ashanti ..	287,814	407,080
Total Northern Territories	361,806	527,914
Total ..	1,503,386	2,078,043

The population of the following chief towns is given in order to assist in arriving at an idea of the areas required for agricultural and domestic purposes, such as fuel supplies, where the population is densest.

Colony.

Western Province.		*Central Province.*		*Eastern Province.*	
Abbontiakoon (Mines) ..	2,230	Abodum ..	2,831	Abetifi	3,874
Abosso (Mines)	2,604	Akim Swedru ..	2,802	Aburi ..	2,080
Abura Village	5,293	Akyease ..	2,757	Accra	38,044
Axim ..	3,781	Anamabu ..	2,457	Addah ..	5,907
Chama ..	2,378	Appam ..	2,925	Akuse ..	4,145
Dunkwa ..	2,005	Berracoe ..	2,467	Anum ..	2,888
Half Assinie ..	2,457	Bissardzi ..	3,700	Anyako ..	4,013
Prestea (Mines)	4,026	Cape Coast ..	14,921	Asamangkese	5,413
Seccondee ..	9,500	Commendah ..	2,786	Begoro ..	3,706
Tarquah (Mines)	2,671	Elmina ..	5,252	Bepong ..	2,001
Wioso ..	1,003	Kwanyako ..	2,427	Dsode ..	5,621
		Nsaba	2,343	Koforidua ..	5,363
		Nsuaem ..	2,932	Kpong ..	3,285
		Nyakrome ..	6,257	Kukurantumi	3,431
		Saltpond ..	6,342	Labadi ..	3,075
		Swedru ..	2,552	Larte ..	4,128
		Winnebah ..	6,980	Mangoase ..	2,961
				Mpraeso ..	1,220
				Nkwatia ..	3,084
				Nsawam ..	6,143
				Nungua ..	4,369
				Obo	3,800
				Quittah ..	9,839
				Tafo (Old) ..	3,260
				Teshie ..	7,604

Ashanti.		Northern Territories.			
Eastern Province.		*Southern Province.*		*Northern Province.*	
Agogo ..	2,037	Bole	670	Bawku ..	7,708
Coomassie Town	20,268	Kurubunya ..	2,784	Binduri ..	6,028
Ejura.. ..	2,446	Salaga ..	3,207	Gambaga ..	1,330
Mampon ..	2,272	Tamale ..	3,901	Lorha ..	1,372
Obuasi (and Mines)	7,765			Navarro ..	14,798
				Sandama ..	10,908
				Tongo ..	13,832
				Wa	2,810
				Zuaragu ..	7,259

List of Trees and Plants of Economic Importance.

The following list is an extract from data collected by the writer of the principal trees and plants that have hitherto been recorded in the country as possessing economic importance.

African Mahogany ..	(See Mahogany).
Ago Beam	*Borassus flabellifer, var æthiopum*, Warb.
Bamboo	A few of the largest species are found in clumps in marshy localities.
Bamboo Palm	*Raphia spp.*
Basins and Stools, Trees used for	*Alstonia congensis.* Engl.
Camwood	*Baphia nitida*, Afz.
Canoes, Trees used for	*Bombax.* *Eriodendron anfractuosum*, D.C. *Khaya.* *Triplochiton Johnsoni*, C.H.W.
Cedar	*Entandrophragma.*
Chewstick Trees ..	Natives do not seem to confine themselves to any particular species.
Coconut	*Cocos nucifera.*
Copal, Gum	*Daniellia.*
Corkwood	*Eriodendron anfractuosum*, D.C. *Musanga Smithii*, P. Br.
Cotton Tree	*Bombax.* *Eriodendron anfractuosum*, D.C.
Cotton	Apart from that obtained from the introduced species, the natives use the cotton from species of *Bombax* and *Eriodendron*
Crawcraw Plant ..	*Cassia alata*, Linn.
Date Palm	*Phœnix.*

Dyes are obtained from	*Baphia nitida,* Afz. *Bridelia micrantha,* Baill. *Bombax brevicuspe,* Sprague. *Cochlospermum tinctorium,* Pers. *Dracæna Manii,* Baker. *Haronga madagascariensis,* Chois. *Indigofera hirsuta,* Linn. *Khaya ivorensis,* Chev. *Mangrove.* *Randia maculata,* D.C.
Edible Fruits are borne by	*Amomum Granum-paradisii,* Linn. *Blighia sapida,* Koenig. *Butyrospermum Parkii,* Kotschy. *Borassus flabellifer, var, æthiopum,* Warb. *Chrysobalanus ellipticus,* Soland. *Cocos nucifera,* Linn. *Cola acuminata,* R. Br. *Coula edulis,* Bail. *Dolichos Lablab,* Linn. *Ficus spp.* *Myrianthus arboreus,* P. Beauv. *Napoleona imperialis,* P. Beauv. *Parkia biglobosa,* Benth. *Phœnix sp.* *Psidium Guajava,* Linn. *Pterocarpus esculentus,* Schum et Thonn. *Sarcocephalus esculentus,* Afz. *Spondias lutea,* Linn. *Tetrapleura Thonningii,* Benth. *Treculia africana,* Decne. *Vitis Bombycina,* Baker. *Zizyphus Spina-Christi,* Willd.
Fan Palm	*Borassus flabellifer, var, æthiopum,* Warb.
Fetish Tree	There does not seem to be any particular species of tree having this distinction. The big fetish trees of Coomassie were *Eriodendron anfractuosum* and *Ficus,* but any kind of tree may be so regarded, such as *Chlorophora excelsa, Baphia nitida, etc.* Native Names :—*Abusamdua* (*T.*), *Musamdua* (*F.*).

Fibres are obtained from	*Bauhinia reticulata*, D.C.
	Cochlospermum tinctorium, Pers.
	Crotalaria falcata, Vahl.
	Crotalaria striata, Al. Br.
	Dombeya Buettneri, K. Schum.
	Elæis guineensis, Jacq.
	Hibiscus Abelmoschus, Linn.
	Hibiscus tiliaceus, Linn.
	Honckenya ficifolia, Willd.
	Raphia spp.
	Sansevieria sp.
	Sesbania aculeata, Pers.
	Sida carpinifolia, Linn.
	Sida rhombifolia, Linn.
	Sterculia tragacantha, Lindl.
	Urena lobata, Linn.
	Wissadula rostrata, Planch.
Fishing, Plants used in	*Ophiocaulon cissampeloides*, Mast.
	Tephrosia Vogelii, Hook. f.
Fodder, Plants used for	*Cenchrus catharticus*, Del.
	Digitaria horizontalis, Willd.
	Eleusine indica, Gaertn.
	Eragrostis ciliaris, Link.
	Mikania scandens, Willd.
	Pennisetum purpureum, Schum.
	Pistia stratiotes, Linn.
	Portulaca oleracea, Linn.
Fuel Wood is obtained from	*Anopyxis ealaensis*, Sprague.
	Dialium guineense, Willd.
	Lophira procera, Pierre.
	Pentaclethra macrophylla, Benth.
	Sarcocephalus esculentus, Afz.
	Triplochiton Johnsoni, C. H. Wright.
	And timber trees generally.
Gourds are obtained from	*Lagenaria vulgaris*, Ser.
Greenheart	*Cylicodiscus gabunensis*, Harms.
	Piptadenia africana, Hook. f.
Guava	*Psidium Guajava*, Linn.
Gum Copal	*Daniellia*
Gums and Resins are obtained from ..	*Anogeissus leiocarpa*, Guill. et Perr.
	Burkea africana, Hook.

Gums and Resins, etc.—*continued.*	*Daniellia sp.*
	Dialium guineense, Willd.
	Sterculia tragacantha, Linn.
Hog Plum	*Spondias lutea*, Linn.
Ironwood Tree.. ..	*Lophira procera*, Pierre.
Kola	*Cola acuminata*, R. Br.
Mahogany	Species of the following genera are recorded as having been exported under this name : *Khaya, Entandrophragma, Minusops, Lovoa* and *Heritiera.*
	The real African Mahogany and the bulk of what is exported are species of *Khaya.*
Mangrove	The natives do not distinguish between the different species in this Association.
	Native Names :—Asopro (F., young trees), Ajuro (K.), Atra (Q), Abin (Ax., F.). Mangrove bark, which is used for dyeing fishing nets. Kweijabra (F., old trees), Ngateka (A.)
Mats, Leaves used for	*Pandanus.*
Medicinal purposes, Species used for ..	*Ageratum conyzoides*, Linn.
	Argemone mexicana, Linn.
	Alchornea cordifolia, Muell. Arg.
	Aspilia latifolia, Oliv. et Hiern.
	Blighia sapida, Koenig.
	Boerhavia repens, Linn.
	Bridelia ferruginea, Benth.
	Cardiospermum Halicacabum, Linn.
	Cassia alata, Linn.
	Cassia Absus, Linn.
	Cissampelos Pareira, Linn.
	Clitoria Ternatea, Linn.
	Conopharyngia.
	Eclipta alba, Hassk.
	Euphorbia Poissoni, Pax (an arrow poison).
	Garcinia guineensis, Willd.
	Gynandropsis pentaphylla, D.C.
	Haronga madagascariensis, Chois.
	Hibiscus tiliaceus, Linn.
	Hura crepitans, Linn.
	Kalanchoe crenata, Haw.
	Lonchocarpus sericeus, H.B.K.

Medicinal purposes, etc.—*continued.*	*Morinda citrifolia*, Linn.
	Neuboldia lævis, Seem.
	Piper guineense, Sch. et Thonn. (Ashanti Pepper Oil).
	Sapium Grahami, Prain.
	Sesbania punctata, D.C.
	Sida carpinifolia, Linn.
	Sparganophorus Vaillantii, Crantz.
	Stachytarpheta indica, Vahl.
	Sterculia tragancatha, Lindl.
	Strophanthus hispidus, D.C.
	Strophanthus sarmentosus, D.C.
	Uvaria picta, Desv.
	Vernonia nigritiana, Oliv. et Hiern.
	Xanthoxylum senegalense, D.C.
Monkey Kola	*Carapa guyanensis*, Aubl.
Oils and Fats are obtained from the fruits of	*Butyrospermum Parkii*, Kotschy.
	Carapa guyanensis, Aubl.
	Elæis guineensis, Jacq.
	Jatropha Curcas, Linn.
	Lophira procera, Pierre.
	Lophira alata, Banks.
	Mimusops.
	Pentaclethra macrophylla, Benth.
	Pentadesma butyracea, Don.
	Pycnanthus Kombo, Warb.
	Ricinodendron africanum. Muell. Arg.
Oil Bean Tree	*Pentacethra macrophylla*, Benth.
Oil Palm	*Elaeis guineensis*, Jacq.
Palm Oil is obtained from	*Elaeis guineensis*, Jacq.
Palm Wine is obtained from	*Borassus flabellifer, var. æthiopum*, Warb.
	Elaeis guineensis, Jacq.
	Phœnix sp.
	Raphia.
Red Ironwood Tree ..	*Lophia procera*, Pierre.
Rottan	*Calamus deeratus*, Mann et Wendl. and scandent Palmaceæ in general.
Rubber	The best indigenous rubber is collected from the trees *Funtumia elastica*, Stapf., and species of *Ficus* and from species of *Landolphia*, the Rubber Vine. The latex of most laticiferous trees and climbers is used for adulterating purposes.
	Raphionacme Brownii, Sct. Ell.

Rubber coagulants are obtained from ..	*Bauhinia reticulata*, D.C
	Strophanthus Barteri, Franch.
Rubber, inferior and rubber adulterants are obtained from..	*Alstonia congensis*, Engl.
	Antiaris sp.
	Carpodinus hirsutus, Hua.
	Chlorophora excelsa, Benth.
	Conopharyngia spp.
	Ficus spp.
	Funtumia africana, Stapf.
	Irvingia sp.
	Landolphia spp.
Rubber Vine	*Landolphia.*
Sand binders	*Canavalia obtusifolia*, D.C.
	Ipomœa biloba, Forsk. (I. *Pes-Capræ*, Roth.) which gives its name to the " *Pes-Capræ* " formation, and all other maritime *Ipomoeæ*.
	Philoxerus vermiculatus, R. Br.
Sandpaper Leave Tree	*Ficus asperifolia*, Miq.
Screw Pine	*Pandanus.*
Shea Butter Tree ..	*Butyrospermum Parkii*, Kotschy
Shingles, Trees used for	*Cordia Irvingii*, Baker.
	Mansonia altissima, A. Chev.
	Musanga Smithii, P. Beauv.
	Pycnanthus Kombo, Warb.
	Terminalia superba, Engl. et Diels.
	Termialia sp.
Shinglewood Tree ..	*Terminalia superba*, Engl. et Diels.
Silk Cotton Tree ..	*Eriodendron anfractuosum*, D.C.
Stools and Basins, Trees used for	*Alstonia congensis*, Engl.
	Funtumia spp.
Thatch, Leaves used for	*Borassus flabellifer, var. æthiopum*, Warb.
	Cola sp. (near *C. cordifolia*, R. Br.).
	Elæis guineensis, Jacq.
	Raphia.
	And many herbs.

Chapter IX.

THE NATIVE NAMES OF THE PRINCIPAL TREES.

Language or Dialect.	*Abbrev.*	*Language or Dialect.*	*Abbrev.*
Appolonian	A.	Grunchi	G.
Accra or Ga	Ac.	Hausa	H.
Akwapim	Ak.	Krepi	K.
Aowin	Ao.	Quittah	Q.
Ashanti	Ash.	Twi	T.
Axim or Ahanta ..	Ax.	Wassaw	W.
Fanti	F.	Western Ashanti ..	W. Ash.

Botanical—Native Name Index.

Afrormosia laxiflora, Harms. Duabai (A.), Duaanyan (F.), Duakobin (F.), Ehuranvian (Ao.).

Afzelia africana, Smith.—Papoa (Ash.), Opapao (Ak.).

Allanblackia floribunda, Oliv.—Suein (A.), Anane (Ax.).

Alstonia congensis, Engl.—Nimeribaka (A.), Bakunin (Ax.), Niamidua (T.), Sindru (W. Ash.).

Anopyxis ealænsis, Sprague.—Abari (A., Ao.), Anchi (F.), Kokoti (F., W.).

Antiaris sp.—Chenchen (T.).

Berlinia spp.—Ajemera (East. A.), Ajamara (Ao.), Kolo (G.), Wupa (Q.), Samanta (W.), Tetekojemera (W.), Kotoprepre (W.).

Bombax sp.—Ekuba (A.), Akronkron (Ac.), Ekur (Ao.), Kafro (G.), Agutesi (K.), Eku (T.), Akonkordei (W.), Akata (Denkira).

Borassus flabellifer, var. æthiopum, Warb.—Agogo (Ac., K., Q.), Malaukwi (A.), Makube (Ash., F.).

Bussea occidentalis, Hutchinson.—Tarkroa (T.), Bonaminta (W.), Kotoprepre (W.).

Butyrospermum Parkii, Kotschy.—Ngu (A.), Nku (F., Ak.), Iakuni (K., Q.), Kanku (Ash.).

Calpocalyx.—Kotoprepre (W.), Samanta (W.).

Carapa guyanensis, Aubl.—Asokom (A.), Osuabise (Ak.), Asoroa (Ao.).

Chlorophora excelsa, Benth.—Eluni (A.), Erui (Ao.), Odum (T.).

Cocos nucifera, Linn.—Kukwi (A., Ax.), Ajuri (Ao.), Kube (F.), Eavune (K.), Ene (Q.).

Cola acuminata, R. Br.—Esseri (A.), Ewasi (Ao.), Bessi (Ash., K.), Bawsi (F.), Gwe (G.), Evi (Q.), Guru (H.).

Cylicodiscus gabunensis, Harms.—Denya (Ash., F.), Odenya (F.), Adadua (W. Ash., W.).

Cynometra sp.—Ajunnkobi (W. Ash.), Ananta (A. F. W.), Awonia (W.).

Daniellia sp. —Eyere (A.), Siadua (F. W.), Eyedua (T.)

Elæis guineensis, Jacq.—Abe (F.), and many local names.

Entandrophragma spp.—Tiama-tiama (A., Ao.), Penkwa (A. W.), Pepedom (A.), Mpengwa (Ao.), Efrubrodiju (Ash.), Kwabohoro (Ash.), Effuokonkonti (Ash.), Dukuma (A., Ao.).

Eriodendron anfractuosum, D.C.—Enyenga (A.), Enyena (Ash., F., W.), Enya (Ao.), Gung (G.), Rimi (H.), Ofwho (Q., K.).

Erythrophlæum micranthum, Harms.—Potrodom (A., Ash., F., W.), Etsa (K.).

Ficus spp.—Adoma (A., F., Ao.), Shedua (Ao., Ash., T.), Manshedua (F.), Kapro (G.), Kinganga (H.), Amanshedua (W Ash.), Ani (K.), Dupain (Ao.).

Funtumia spp.—Efunmundon (A., Ao.), Fruntum (Ash.), Ofruntum (Ash., F.), Puni (K.).

**Heritiera utilis*, Sprague.—Niangwune (A.), Niangwen (Ao.), Niankom (T.).

Khaya spp.—Dubini (A., F., W.), Odubin (Ash.), Dukuma (A., Ao.), Kwabohoro (Ash.), Dumanami (W. Ash.), Krubna (W., W Ash.), Mpengwa (Ao.), Tiama-tiama (A., Ao.).

Landolphia spp.—Amale (A.), Faia (Ao.), Opauia (Ash.), Enge (K., Q.), Paui (T.), Jama (W. Ash.), Kwantama (W.).

Lophira procera, Pierre.—Azobe (A.), Assore (Ao.), Jacha (K.), Kaku (Q., T.).

Macrolobium spp.—Ajemereibli (A.), Ndukoon (A.), Ofam (Ash.), Tetiwon (F.), Wulfram (F.), Kotopapa (K.), Kussipapa (W.), Tetekojemera (W.).

Mimusops sp.—Makure (A.), Makwe (Ao.), Abaku (Ac., W.), Baku (Ash., T.).

Musanga Smithii, P. Br.—Eguni (A.), Eguen (Ao.), Ajama (F., K., W. Ash), Ojamba (W. Ash.), Juma (W.).

Parkia biglobosa, Benth.—Asoma (A., Ao., F., W.), Ancho (Ac.), Ewo (K.), Ewa (Q.).

Parkia filicoidea, Welw.—Sung (G.), Dorro (H.), Dowadowa (H.).

Pentaclethra macrophylla, Benth.—Ataba (A.), Ata (Ao., F., W.), Atawa (T.), Ekuana (F.), Eklo (K.).

Pentadesma butyracea, Sabine.—Ehukei (A.), Pæja (A.), Asuaindokun (Ao.), Brombabine (Ax.), Pija (F., W.), Swenchi (W.).

Piptadenia africana, Hook. f.—Dahoma (A., F., W.), Dubma (A.), Dabima (Ao.), Odahoma (F.), Dani (W. Ash.), Odani (W. Ash.).

* In Kew Bulletin 1916, p. 85, Mr. Sprague states that the examination of more complete material shows that this tree should be placed in the genus *Tarrietia* under the name of *Tarrietia utilis*.

Raphia spp.—Doka (A., Ax., Ao., F.), Adube (F.), Alati (K., Q.), Eduiri (A.).

Ricinodendron africanum, Muel. Arg.—Awuma (A., T.), Ngwama (A.), Epui (Ao.), Owama (F., W.), Wama (Ash., W., F.), Ekpedi (K.).

Sarcocephalus esculentus, Afz.—Kissia (A.), Kusia, Kusiaba, Kishia (T.), Ekusawa (F.).

Terminalia superba, Engl and Diels.—Frani (A.), Faraen (Ao.), Frangor (K.), Fram, Ofram, Oframo (T.).

Terminalia sp.—Emeri (A., Ash., W.), Emrel (Ash.), Frameri (Ao.), Evfei (K.), Emil (W. Ash.).

Triplochiton Johnsoni, C. H. Wright.—Wawa (A., Ash., T., Ao., K.), Owawa (Ash.).

Xylia sp.—Kotoprepre (W.), Samanta (W.).

Native-Botanical Names Index.

Abaku (Ac., W.)	*Mimusops.*
Abari (A., Ao.)	*Anopyxis ealænsis*, Sprague.
Abe (F.)	*Elæis guineensis*, Jacq.
Abebetia (A.)	*Elæis guineensis*, Jacq.
Abedua (F.)	*Elæis guineensis*, Jacq.
Abin (Ax., F.)	See "*Mangrove.*"
Abontire (T.)	*Landolphia owariensis*, Wild.
Abusamdua (T.)	Fetish Tree.
Adadua (W. Ash., W.)	*Cylicodiscus gabunensis*, Harms.
Adoma (A., F., Ao.)	*Ficus.*
Adube (F.)	*Raphia spp.*
Aere (A.)	*Elæis guineensis*, Jacq.
Ago (Ac., K., Q.)	*Borassus flabellifer, var. æthiopum*, Warb.
Agutesi (K.)	*Bombax.*
Ai (Ao.)	*Elæis guineensis*, Jacq.
Ajama (F., K., W. Ash.)	*Musanga Smithii*, R. Br.
Ajamara (Ao.)	*Berlinia.*
Ajemera (East A.)	*Berlinia.*
Ajemereibli (A.)	*Macrolobium.*
Ajui (Ao.)	*Cocos nucifera* Linn
Ajuro (K.)	*Mangrove.*
Akata (Denkira) (Ash.)	*Bombax.*
Akonkordei (W. Ash.)	*Bombax.*
Alati (K., Q.)	*Raphia spp.*
Amale (A.)	*Landolphia.*
Ananta (A., F., W.)	*Cynometra.*

Anchi (F.) .. .. .. *Anopyxis ealænsis*, Sprague.
Ancho (Ac.) .. .. .. *Parkia biglobosa*, Benth.
Ani (K.) .. .. .. *Ficus*.
Asokoru (A.) .. .. .. *Carapa guyanensis*, Aubl
Asoma (A., Ao., F., W.) .. *Parkia biglobosa*, Benth.
Asopro (F.) .. .. .. *Mangrove* (young trees).
Asoroa (Ao.) .. .. .. *Carapa guyanensis*, Aubl.
Assore (Ao.) .. .. .. *Lophira procera*, Pierre.
Asuaindokun (Ao.) .. .. *Pentadesma butyracea*, Sabine.
Ata (Ao., F., W.) .. .. *Pentaclethra macrophylla*, Benth.
Ataba (A.) .. .. .. *Pentaclethra macrophylla*, Benth.
Atawa (T.) .. .. .. *Pentaclethra macrophylla*, Benth.
Atra (Q.) .. .. .. *Mangrove*.
Awonia (W.) .. .. .. *Cynometra*.
Awuma (A., T.) .. .. *Ricinodendron africanum*, Mull. Arg.
Azobe (A.) .. .. .. *Lophira procera*, Pierre
Baku (Ash., T.) .. .. *Mimusops*.
Bakunin (Ax.) .. .. *Alstonia congensis*, Engl.
Bawsi (F.) .. .. .. *Cola acuminata*, R. Br.
Bentene (A.) .. .. .. *Elæis guineensis*, Jacq.
Bessi (Ash., K.) .. .. *Cola acuminata*, R. Br.
Beteng (Ao.) .. .. .. *Elæis guineensis*, Jacq.
Bonaminta (W.) .. .. *Bussea occidentalis*, Hutchinson.
Brombabine (Ax.) .. .. *Pentadesma butyracea*, Dow.
Chenchen (T.) .. .. *Antiaris sp.*
Dabima (Ao.) .. .. .. *Piptadenia africana*, Hook. f.
Dahoma (A., F., W.) . *Piptadenia africana*, Hook. f.
Dani (W. Ash.) .. .. *Piptadenia africana*, Hook, f.
Denya (Ash., F.) .. .. *Cylicodiscus gabunensis*, Harms.
Doka (A., Ax., Ao., F.) .. *Raphia spp.*
Doro (H.) .. .. .. *Parkia filicoidea*, Welw.
Dowadowa (H.) .. .. *Parkia filicoidea*, Welw.
Duaanyan (F.) .. .. *Afrormosia laxiflora*, Harms.
Duabai (A., Ash.) .. .. *Afrormosia laxiflora*, Harms.
Duakobin (F.) .. .. .. *Afrormosia laxiflora*, Harms.
Dubini (A., F., W.) .. .. *Khaya*.
Dubma (A.) .. .. .. *Piptadenia africana*, Hook. f.
Dukuma (A., Ao.) .. .. *Khaya*.
Dukuma (A., Ao.) .. .. *Entandrophragma*.
Dumanami (W. Ash.) .. *Khaya*.
Dupain (Ao.) .. .. .. *Ficus*.
Eavune (K.) .. .. .. *Cocos nucifera*, Linn.
Eberi (Ash.) .. .. .. *Elæis guineensis*, Jacq.
Ede (K., Q.) .. .. .. *Elæis guineensis*, Jacq.

Eduiri (A.) .. .. .. *Raphia sp.* (or dwarf forms).
Efunmundom (A., Ao.) .. *Funtumia.*
Efrubrodiju (Ash.) .. .. *Entandrophragma.*
Efuokonkonti (Ash.) .. .. *Entandrophragma.*
Eguen (Ao.) .. .. .. *Musanga Smithii*, R. Br.
Eguni (A.) .. .. .. *Musanga Smithii*, R. Br.
Ehukei (A.) .. .. .. *Pentadesma butyracea*, Sabine.
Ehuranvian (Ao.) .. .. *Aformosia laxiflora*, Harms.
Eklo (K.) .. .. .. *Pentaclethra macrophylla*, Benth.
Ekpedi (K.) .. .. .. *Ricinodendron africanum*, Mull. Arg.
Eku (T.) .. .. .. *Bombax.*
Ekuana (F.) .. .. .. *Pentaclethra macrophylla*, Benth.
Ekuba (A.) .. .. .. *Bombax.*
Ekur (Ao.) .. .. .. *Bombax.*
Ekusa (F.) .. .. .. *Sarcocephalus esculentus*, Afz.
Eluni (A.) .. .. .. *Chlorophora excelsa*, Benth.
Emeri (A., Ash., W.) .. *Terminalia sp.*
Emil (W. Ash.) .. .. *Terminalia sp.*
Emrel (Ash.) .. .. .. *Terminalia sp.*
Ene (Q.) .. .. .. *Cocos nucifera*, Linn.
Enge (K., Q.) .. .. .. *Landolphia.*
Enya (Ao.) .. .. .. *Eriodendron anfractuosum*, D.C.
Enyena (Ash., F., W.) .. *Eriodendron anfractuosum*, D.C.
Enyenga (A.) .. .. .. *Eriodendron anfractuosum*, D.C.
Epui (Ao.) .. .. .. *Ricinodendron africanum*, Mull. Arg.
Erui (Ao.) .. .. .. *Chlorophora excelsa*, Benth.
Esseri (A.) .. .. .. *Cola acuminata*, R. Br.
Etsa (K.) .. .. .. *Erythroploeum micranthum*, Harms.
Eyedua (T.) .. .. .. *Daniellia sp.*
Eyere (A.) .. .. .. *Daniellia sp.*
Evi (Q.) .. .. .. *Cola acuminata*, R. Br.
Ewa (Q.) .. .. .. *Parkia biglobosa*, Benth.
Ewasi (Ao.) .. .. .. *Cola acuminata*, R. Br.
Ewo (K.) .. .. .. *Parkia biglobosa*, Benth.
Faia (Ao.) .. .. .. *Landolphia.*
Faraen (Ao.) .. .. .. *Terminalia superba*, Engl. et Diels.
Fram (Ash.) .. .. .. *Terminalia superba*, Engl. et Diels.
Frameri (Ao.) .. .. .. *Terminalia sp.*
Frangor (K.) .. .. .. *Terminalia superba*, Engl. et Diels.
Frani (A.) .. .. .. *Terminalia superba*, Engl. et Diels.
Fruntum (Ash.) .. .. *Funtumia.*
Gung (G.) .. .. .. *Eriodendron anfractuosum, D.C.*
Guru (H.) .. .. .. *Cola acuminata*, R. Br.
Gwe (G.) .. .. .. *Cola acuminata*, R. Br.

Iacha (K.)	*Lophira procera*, Pierre.
Iakuni (K., Q.)	*Butyrospermum Parkii*, Kotschy.
Jama (W. Ash.)	*Landolphia.*
Juma (W.)	*Musanga Smithii*, R. Br.
Kafro (G.)	*Bombax.*
Kaku (Q., T.)	*Lophira procera*, Pierre.
Kapro (G.)	*Ficus.*
Kiakia (Ac.)	*Landolphia owariensis*, Beauv.
Kingkanga (H.)	*Ficus.*
Kishia (T.)	*Sarcocephalus esculentus*, Afz.
Kissia (A.)	*Sarcocephalus esculentus*, Afz.
Kokoti (F., W.)	*Anopyxis ealænsis*, Sprague.
Kolo (G.)	*Berlinia.*
Kotopapa (K.)	*Macrolobium.*
Kotoprepre (W.)	*Berlinia.*
Kotoprepre (W.)	*Bussea occidentalis*, Hutchinson.
Kotoprepre (W.)	*Calpocalyx.*
Kotoprepre (W.)	*Xylia.*
Krubna (W.)	*Khaya.*
Kube (F.)	*Cocos nucifera*, Linn.
Kukwi (A., Ax.)	*Cocos nucifera*, Linn.
Kusia (T.)	*Sarcocephalus esculentus*, Afz.
Kusiaba (T.)	*Sarcocephalus esculentus*, Afz.
Kussipapa (W.)	*Macrolobium.*
Kwabohoro (Ash.)	*Entandrophragma.*
Kwabohoro (Ash.)	*Khaya.*
Kwantama (W.)	*Landolphia.*
Kweijabra (F.)	*Mangrove*, old trees.
Lafo (Q.)	*Raphia*, The inner part of the leaf rachis.
Lati (Q.)	*Raphia.*
Limi (H.)	*Eriodendron anfractuosum*, D.C.
Makube (Ash., F.)	*Borassus flabellifer, var æthiopum* Warb.
Makure (A.)	*Mimusops.*
Malaukwi (A.)	*Borassus flabellifer, var æthiopum* Warb.
Manshedua (F.)	*Ficus.*
Mbwei (Ac.)	*Elæis guineensis*, Jacq.
Mpengwa (Ao.)	*Entandrophragma.*
Mpengwa (Ao.)	*Khaya.*
Musamdua (F.)	Fetish tree.
Ndukwon (A.)	*Macrolobium.*
Ngateka (A.)	*Mangrove.*

Ngu (A.) .. .. .. *Butyrospermum Parkii*, Kotschy.
Ngwama (A.) .. .. *Ricinodendron africanum*, Mull, Arg.
Niamidua (T.) .. .. *Alstonia congensis*, Engl.
Niameribaka (A.) .. .. *Alstonia congensis*, Engl.
Niangwen (Ao.) .. .. *Heritiera utilis*, Sprague.
Niangwune (A.) .. .. *Heritiera utilis*, Sprague.
Niankom (T.) .. .. .. *Heritiera utilis*, Sprague.
Nku (F., Ak.) .. .. .. *Butyrospermum Parkii*, Kotschy.
Odahoma (F.) .. .. *Piptadenia africana*, Hook, f.
Odani (W. Ash.) .. .. *Piptadenia africana*, Hook. f.
Odenya (F.) .. .. .. *Cylicodiscus gabunensis*, Harms.
Odubin (Ash.) .. .. .. *Khaya*.
Odum (T.) .. .. .. *Chlorophora excelsa*, Benth.
Ofanu (Ash.) .. .. .. *Macrolobium*.
Ofram (T.) .. .. .. *Terminalia superba*, Engl. et Diels.
Oframo (T.) .. .. .. *Terminalia superba*, Engl. et Diels.
Ofruntum (Ash., F.) .. .. *Funtumia*.
Ofwho (Q., K.) .. .. *Eriodendron afractuosum*, D.C.
Ojamba (W. Ash.) .. .. *Musanga Smithii*, R. Br.
Opapao (Ak.) .. .. .. *Afzelia africana*, Smith.
Opauia (Ash.) .. .. *Landolphia*.
Osuabise (Akw.) .. .. *Carapa guyanensis*, Aubl.
Owama (W.) .. .. .. *Ricinodendron africanum*, Mull. Arg.
Owawa (Ash., F.) .. .. *Triplochiton Johnsoni*, C. H. Wright
Paeja (A.) .. .. .. *Pentadesma butyracea*, Sabine
Papro (Ash.) .. .. .. *Afzelia africana*, Smith.
Paui (T.) .. .. .. *Landolphia*.
Pauia (Ash.) .. .. .. *Landolphia owariensis*, Beauv.
Penkwa (A., W.) .. .. *Entandrophragma*.
Pepedom (A.) .. .. .. *Entandrophragma*.
Pija (F., W.) .. .. .. *Pentadesma butyracea*, Sabine.
Potrodom (A., Ash., F., W.) *Erythrophlœum micranthum*, Harms.
Pumpune (A.) .. .. .. *Landolphia owariensis*, Beauv.
Puni (K.) .. .. .. *Funtumia*.
Samanta (W.) .. .. *Berlinia*.
Samanta (W.) .. .. *Calpocalyx*.
Samanta (W.) .. .. *Xylia*.
Shedua (Ao., Ash., T.) .. *Ficus*.
Siadua (F., W.) .. .. *Daniellia sp.*
Sindru (W. Ash.) .. .. *Alstonia congensis*, Engl.
Sung (G.) .. .. .. *Parkia filicoidea*, Welw.
Swenchi (W.) .. .. .. *Pentadesma butyracea*, Sabine.
Tarkroa (T.) .. .. .. *Bussea occidentalis*, Hutchinson.
Tetekojemera (W.) .. .. *Berlinia*.

Tetekojemera (W.)	*Macrolobium.*
Tetiwon (F.)	*Macrolobium.*
Tiama-tiama (A., Ao.) ..	*Entandrophragma*
Tiama-tiama (A., Ao.) ..	*Khaya.*
Timer (T.)	Native pronounciation of English word " timber," and applied, as a rule, to the *Meliaceæ.*
Wama (F., W.)	*Ricinodendron africanum,* Mull. Arg.
Wawa (A., Ash., T., Ao., K.)	*Triplochiton Johnsoni,* C. H. Wright.
Weiberi (Ash.)	*Cola sp.*
Wulfran (F.)	*Macrolobium.*
Wupa (Q.)	*Berlinia.*

Chapter X.

THE ORDINANCES AND RULES AFFECTING FORESTRY.

The following are, up to date, the Ordinances and Rules which affect the Forestry of the country.

A Forest Ordinance on similar lines to those in operation in other British Tropical Dependencies was passed as Ordinance No. 15 of 1911. Owing, however, to the strong native opposition in view of the peculiar nature of the land tenure system of the Colony, the proclamation of this Ordinance has been withheld.

In some instances only the paragraphs directly affecting forestry are quoted. These extracts are only as a guide and must, of course, be read in connection with the whole of the Ordinance concerned.

Misprints in the spelling of botanical names in the original texts of the Ordinances have been corrected in the following extracts.

The Colony.

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* Not repeated here as it has been recently circulated to Officers of the Department in pamphlet form, " Selected Ordinances of the Gold Coast, etc."

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FOREST CONSERVATION AND TIMBER PROTECTION.

THE GOLD COAST COLONY.

CHAP. 96.—TIMBER PROTECTION.

An Ordinance to prevent the cutting of immature timber.

[*30th, December*, 1907.

WHEREAS it is expedient to make provision for the protection of timber by prohibiting the cutting of immature trees :

Be it therefore, enacted by the Governor of the Gold Coast Colony, with the advice and consent of the Legislative Council thereof, as follows :—

1. This Ordinance may be cited as " The Timber Protection Ordinance."

2. In this Ordinance, " timber tree " means a tree which is included in the Schedule to this Ordinance, or which may hereafter be added thereto, by whatsoever name such tree may be known in the Colony.

3. (1) No person shall without the permission in writing of a District Commissioner cut or fell any growing timber tree the girth of which is smaller than the following dimensions :—

(*a*) In the case of timber trees in Part I of the Schedule to this Ordinance a girth of nine feet at a point one foot above the convergence of the buttress roots, if any, or at the base where there are no such roots.

(*b*) In the case of timber trees in Part II. of the Schedule to this Ordinance a girth of four feet six inches, at a point one foot above the convergence of the buttress roots, if any, or at the base where there are no such roots.

(*c*) In the case of timber trees in Part III. of the Schedule to this Ordinance a girth of three feet at a point one foot above the base.

(2) Any person contravening the provision of this section shall be liable on conviction for a first offence to a fine not exceeding fifty pounds and for a second and subsequent offence to imprisonment with or without hard labour for a period not exceeding six months.

4. (1) It shall be lawful for the Governor in Council from time to time to add to the trees specified in the Schedule hereto the name of any other tree ; provided that no such addition shall be deemed to be part of the said Schedule until the expiration of one month from the publication thereof in the Gazette.

(2) It shall be lawful for the Governor in Council from time to time to exclude any timber trees from the operation of this Ordinance, either permanently or temporarily and to amend the name or description of any timber tree in the said Schedule as he shall think fit.

5. It shall be lawful for the Governor in Council to make, alter and revoke rules for marking timber trees which may be cut and generally for the purpose of carrying into effect the provisions of this Ordinance and to attach a penalty not exceeding ten pounds for the breach of any such rule.

THE SCHEDULE.

PART I.

Mahogany or Dubini (*Khaya senegalensis*).
Opapao (*Afzelia africana*).
Baku (*Mimusops* species *Djava*).
Odum (*Chlorophora excelsa*).
Kokote (*Kokote alata*).
Hyedua (Gum Copal Tree)
Cedar
Kwabohol (Genus and species unknown).
Penkwa (,, ,,).
Yankum (,, ,,).

PART II.

Odan (*Piptadenia africana*).
Epro (Genus and species unknown).
Osuabise (*Carapa guineensis*).
Kaku (*Fillacopsis Kaku*).
Bompaja (*Paranarium robustum*).

PART III.

Kube (*Borassus æthiopum*).

CHAP. 96.—TIMBER PROTECTION.

Rules under section 5 of the Timber Protection Ordinance.

1. No person shall buy, sell, export or be in possession of timber which has been cut from a tree below the girths prescribed in section

3 (1) of the Timber Protection Ordinance; namely, a girth of nine feet at a point one foot above the convergence of the buttress roots, if any, or at the base where there are no such roots.

The onus of proof that the timber in question has not been obtained from a tree below the prescribed girth shall be on any person charged with a breach of this rule.

2. Any person contravening the above rule shall be liable on conviction to a fine not exceeding ten pounds and the timber cut in contravention thereof shall be liable to forfeiture.

(*Made 5th August,* 1910.)

GOLD COAST COLONY.

RULE.

No. 13 OF 1921.

RULES UNDER THE TIMBER PROTECTION ORDINANCE, 1907.

Under sections 4 and 5 of the above-mentioned Ordinance, I, Frederick Gordon Guggisberg, Governor and Commander-in-Chief of the Gold Coast Colony, with the advice of the Executive Council, do hereby make the following rules :—

1. These rules may be cited as " The Timber Protection Rules, 1921."

2. Nothing in these rules shall apply to a native cutting mahogany with the consent of the Chief and Councillors of the Stool within whose jurisdiction such mahogany is grown and otherwise than for export or to any mahogany so cut.

3. The Conservator of Forests shall divide such parts of the Colony as he shall deem necessary into such areas as he shall think fit and shall allot to each of such areas a distinctive mark to be known as a " Locality mark " ; and shall keep at his office at Coomassie a record of such division and of the locality marks allotted, which shall be open to public inspection, free of charge during ordinary office hours.

4. No person shall cut or fell any growing mahogany tree unless and until he shall have registered a property mark at the office of the Conservator of Forests, Coomassie.

5. No person shall purchase or possess any log, being part of a mahogany tree cut or felled in the Colony, unless and until he shall have registered a property mark at the office of the Conservator of Forests, Coomassie.

6. Applications for registration of a property mark shall be made in writing to the Conservator of Forests, Coomassie, and shall be in Form A in the Schedule hereto.

7. Should the Conservator of Forests consider the proposed property mark in any way unsuitable, he may refuse to register the same.

8. If the Conservator of Forests approves the proposed property mark he shall cause the same to be registered free of charge in a book to be kept in his office and called " The Register of Property Marks " and shall cause the applicant to be given a certificate of registration.

9. The Register of Property Marks shall be in Form B in the Schedule hereto and a Certificate of Registration shall be in Form C in the said Schedule.

10. (1) Every person who shall cut or fell a growing mahogany tree shall, as soon as possible,

(*a*) mark the stump thereof with his registered property mark and with a number (called the " stump number ") ;

(*b*) mark each of the logs therefrom with the locality mark of the area in which the tree is situate, his registered property mark, the number of the tree and the log number.

(2) Stump numbers shall run consecutively from number 1 upwards, number 1 being applicable to the first mahogany tree felled by any person after he has registered his property mark

(3) Log numbers shall run consecutively from number 1 upwards, the butt log always being numbered 1

Example :— A. has registered the following property mark [A]

Since doing so he has felled and duly marked 26 mahogany trees. On felling the 27th from which he obtains (say) 4 logs and which is situate in an area of which the locality mark is [L.5] he must :—

mark the stump thus	[A]	27	
mark the butt log thus	[L5]	[A]	27.1
mark the other logs respectively thus ...	[L5]	[A]	27.2
	[L5]	[A]	27.3
	[L5]	[A]	27.4

11. Every person who shall purchase or come into possession of any log, being part of a mahogany tree cut or felled in the Colony or Ashanti, shall as soon as possible mark such log with his property mark.

12. Any person felling or cutting any growing mahogany tree or purchasing or being in possession of any mahogany being part of a mahogany tree cut or felled in the Colony or Ashanti, shall on demand produce the certificate of registration of his property mark to any Administrative, Police or Forest Officer.

13. No person shall buy, sell, export or be in possession of any mahogany log which is not duly marked in accordance with the provisions of these rules.

14. Every person having a registered property mark shall on demand show to any Administrative or Forest Officer the stump of any mahogany tree felled by him or give such Officer such information as will enable him to find such stump without difficulty.

15. The following amendments are hereby made in the names and descriptions of timber trees in the Schedule to the Timber Protection Ordinance 1907 :—

PART I.

For *Khaya senegalensis* substitute *Khaya caudata, Khaya ivorensis.*

For KWABOHOL (genus and species unknown) substitute KWABOHORA (*Khaya* species).

For PENKWA (genus and species unknown) substitute PENKWA, ODUPON (*Entandrophragma* species).

For YANKUMA (genus and species unknown) substitute NIANKUM (*Heritiera utilis*).

16. The following timber trees are hereby excluded from the operation of the Timber Protection Ordinance, 1907 :—

PART I.

OPAPAO (*Afzelia africana*).
BAKU (*Mimusops* species *Djava*).
KOKOTE (*Kokote alata*).
HYEDUA (Gum Copal Tree.)

PARTS II. and III.

ALL TREES.

17. Any person contravening or failing to comply with any of the provisions of these rules shall be liable on summary conviction to a fine not exceeding ten pounds or to imprisonment, with or without hard labour, for a term not exceeding three months or to both in addition to any penalty which may have been incurred under the Timber Protection Ordinance, 1907, or any other rules made thereunder.

SCHEDULE.

FORM A.

THE TIMBER PROTECTION RULES, 1921.

APPLICATION FOR REGISTRATION OF A PROPERTY MARK.

Full Name of Applicant.	Address.	Proposed Property mark.	Area within which applicant proposes to cut mahogany.

I hereby apply for registration of the above property mark and the issue to me of a Certificate of such registration.

Date.....19 . .....

Applicant.

To

The Conservator of Forests.
Coomassie.

FORM B.

THE TIMBER PROTECTION RULES, 1921.

REGISTER OF PROPERTY MARKS.

No.	Date of Registration.	Mark.	Person in whose name mark is registered.	Address of such person.	Area within which applicant proposes to cut mahogany.	Signature of Conservator of Forests.	Remarks

FORM C.

THE TIMBER PROTECTION RULES, 1921.

CERTIFICATE OF REGISTRATION OF A PROPERTY MARK.

I hereby certify that the following property mark was registered by me on the day of , 19 , in the name of of

Date , 19 .

Conservator of Forests.

Made at a meeting of the Executive Council held at Government House, Accra, this 16th day of February, 1921.

F. G. GUGGISBERG,
Governor.

GOLD COAST COLONY.

RULE No. 33 OF 1921.

UNDER THE TIMBER PROTECTION ORDINANCE (CAP. 96).

Under and by virtue of the provisions of section 5 of the above-mentioned Ordinance, I, Reginald Warren Hale Wilkinson, Esquire, Acting Governor of the Gold Coast Colony, with the advice of the Executive Council, do hereby amend Rule 17 of the Timber Protection Rules, 1921 (Rule No. 13 of 1921), made by the Governor in Council on the 16th day of February, 1921, by substituting a full stop for the comma appearing after the word "pounds," and by deleting all the words appearing thereafter.

Made at a meeting of the Executive Council held at Government House, Accra, this 29th day of November, 1921.

(*Sgd.*) R. W. H. WILKINSON,
Acting Governor.

PROPOSED BYE-LAWS FOR THE PROTECTION OF FOREST.

GOLD COAST COLONY OR ASHANTI (AS THE CASE MAY BE).

Bye-laws made on the.....day of.....19 , at a meeting duly called for the purpose by.....Omanhene of....., and Chiefs and Councillors of his Stool, pursuant to the provisions of the Native Jurisdiction Ordinance.

1. (1) It shall not be lawful for any person to make any clearing or cultivation upon any of the following hills in the.....Division :—

(*Here the names of all hills the slopes of which are* 30° *and over must be given.*)

(2) Any person who owns a cocoa plantation upon any of the above-named hills may keep the same until the plants are exhausted, but shall not on any account extend the clearing any further than the portion actually occupied by the cocoa trees, nor shall he replant with cocoa or any other crop the area now under cocoa.

(3) Any person who owns any farm of foodstuffs upon any of the above-named hills shall remove his or her crops within two years from the date of passing of these bye-laws, and shall not make any clearing upon the same after the crops have all been removed.

2. It shall not be lawful for any native of.....to cut down or fell any of the following timber trees without first obtaining the consent of the Chief and Councillors of the Stool within whose jurisdiction the same are situated.

1. *Khaya sp* : Dubini, Odubin, Dukuma, Kwabohoro, Mpengwa.
2. *Entandrophragma :* Penkwa, Pepedom, Odupon, Dukuma.
3 *Chlorophora excelsa :* Odum, Erui, Eluni.

4. *Cylicodiscus gabunensis :* Benya, Odenya, Adadua.
5. *Mimusops sp* : Makure, Makwa, Abaku, Baku.
6. *Heritiera utilis :* Niangwane, Niangwen, Niankum, Yankum.
7. *Albizzia :* Okuro.
8. *Terminalia sp :* Fram, Ofram, Frani, Frangor, Emiri, Emil, Frameri.
9. *Sarcocephalus esculentus :* Kissia, Kusia, Kusiaba, Kishia, Ekusawa.
10. *Piptadenia africana :* Dahoma, Dubma, Odahoma, Dani Odani.
11. *Afzelia africana :* Papao, Opapao.
12. *Afrormosia laxiflora* : Duabai, Duaanyan Duakobin, Ehuranvian.
13. *Lovoa Klaineana :* Pepedom, Penkwa, Mpengwa.
14 *Guarea :* Bossi.
15. *Funtumia elastica :* Fruntum, Ofruntum Ofruntum, Puni, Efunmundoni.
16. *Lophira procera :* Azobe, Assore, Iaka, Kaku.
17 *Daniellia sp :* Eyere, Siadua, Eyedua.
18. (Esa.)
19. Any Fetish Tree.

3. It shall not be lawful for any person not a native of..... to cut down or fell any of the following timber trees or plants, without first obtaining the consent of the Chief and Councillors of the Stool within whose jurisdiction the same are situated.

In addition to the 19 species enumerated in Bye-law 2, the following :—

Alstonia congensis : Nimeribaka, Bakunin, Niamidua, Sindru.
Cola acuminata : Esseri, Ewasi, Bessi, Bawsi, Gwe, Evi, Guru.
Elæis guineensis : Aere, Abebetia, Bentene, Beteng, Abedua.
Landolphia : Amale, Faia, Opania, Enge, Pawi, Jama.
Raphia : Doka, Adube, Alati, Eduiri, Lati.
Pentaclethra macrophylla : Ataba, Ata, Atawa, Ekuana Eklo, Apuro.
Tetrapleura Thoningii : Aprekase, Prekese, Essem.
Pentadesma butyracea : Ehukei, Paeja, Bromabine Asuaindokum, Swenchi.

4. Any person who makes a clearing in forest land for cultivation of cocoa shall remove therefrom all silk-cotton trees (*i.e., Eriodendron anfractuosum,* Enyenga, Enya, Gung, Rimi, Ofwho and *Bombax,* Ekuba, Akronkron, Ekur Kafro, Agutesi, Eku, Akata) but shall leave standing a number of the straightest, healthiest, and most valuable of the other trees of the original forest for the purpose of shading the cocoa.

5. When any cocoa farm is exhausted the owner thereof shall grub up by the roots all cocoa trees and burn them on the area, taking care that the large forest trees left on the land are not injured during the process of burning. He shall also, for the period of two years afterwards, weed out the inferior species of forest growth which spring up on such area, and if there are no large forest trees of the kinds named in Bye-law 2 on the land, shall plant a number of any of the trees named in Bye-law 2.

6. No person shall make a clearing for a farm or fell any tree whatsoever on the following areas which are hereby declared to be Stool Forest Reserves :—

* * * * * *

Provided that nothing herein shall prevent the felling of timber in a Stool Forest Reserve in accordance with a working plan approved by the Forest Officers of the Government.

7. Any person contravening any of the provisions of these Bye-laws shall be liable on conviction to a penalty not exceeding £5, and in the cases where timber of any of the kinds mentioned in Bye-laws 2 and 3 is felled without due consent having been obtained, or land cleared on "Stool Forest Reserves," the offender shall further forfeit the right to the use of the timber felled or the land cleared.

7 (bis.) Any member of the Forestry Department may with or without warrant or other legal process arrest and detain any person whom he finds or suspects of contravening any of the provisions of these Bye-laws in which case he shall immediately convey such person to the Chief of the Stool within whose jurisdiction such contravention took place.

ASHANTI ADMINISTRATION.

ORDINANCE No. 1 of 1902.

AN ORDINANCE TO PROVIDE FOR THE ADMINISTRATION OF THE GOVERNMENT OF ASHANTI.

I. PRELIMINARY.

1. This Ordinance may be cited as "The Ashanti Administration Ordinance, 1902."

* * * * * *

30. It shall be lawful for the Chief Commissioner to make, amend and revoke rules with respect to :—

* * * * * *

(9) The conservation of forests and the collection of forest products.

Any such rules and any amendments or revocations thereof shall be subject to the approval of the Governor, who, before approving, may in his discretion amend them.

To the breach of any such rules may be attached a penalty of a fine not exceeding £25 or of imprisonment with or without hard labour for any term not exceeding three months.

RULES WITH RESPECT TO THE CONSERVATION OF FORESTS.

(s. 30 (9)).

1. (*a*) No timber tree mentioned in Part I. of the Schedule hereto of smaller girth than nine feet at a point one foot above the convergence of the buttress roots, if any, or at the base where there are no such roots, and

(*b*) No timber trees mentioned in Part II. of the Schedule hereto of smaller girth than four and a half feet at a point one foot above the convergence of the buttress roots, if any, or at the base where there are no such roots, and

(*c*) No timber trees mentioned in Part III. of the Schedule hereto of smaller girth than three feet at a point one foot above the base shall be felled without special permission in writing of the Chief Commissioner or Officer deputed by him.

2. Any contravention of the above rule will render a person liable to a fine not exceeding twenty-five pounds or to imprisonment with hard labour not exceeding three months.

3. (1) No person shall buy, sell, export or be in possession of timber which has been cut from a tree below the girths prescribed in rule I. (*a*), (*b*), and (*c*) of these rules.

4. Any person contravening the above rule shall be liable on conviction to a fine not exceeding twenty-five pounds or to imprisonment with hard labour not exceeding three months; and the timber cut in contravention thereof shall be liable to forfeiture.

THE SCHEDULE.

PART I.

MAHOGANY OR DUBINI (*Khaya senegalensis*).
OPAPAO (*Afzelia africana*).
BAKU (*Mimusops* species *Djava*).
ODUM (*Clorophora excelsa*).
KOKOTE (*Kokote alata*) Ofuobrodejui).
HYEDUA (Gum Copal Tree).
CEDAR.
KWABOHOL (Genus and species unknown).
PENKWA (Genus and species unknown).
YANKUM (Genus and species unknown).

PART II.

ODAN (*Piptadenia africana*).
EPRO (Genus and species unknown).
OSUABISE (*Carapa guineensis*).
KAKU (*Fillacopsis Kaku*).
BOMPAJA (*Paranarium robustum*).

PART III.

KUBE (*Borassus æthiopum*).

(Rules 1 and 2 and the Schedule made 13th April, 1915 and approved 11th May, 1915; rules 3 and 4 made 30th August, 1915, and approved 30th September, 1915.)

ASHANTI.

No. 13 OF 1921.

AN ORDINANCE further to amend the Ashanti Administration Ordinance, 1902.

[14th *October*, 1921.

BE IT ENACTED by the Governor of the Gold Coast with respect to Ashanti, as follows :—

1. This Ordinance may be cited as " The Ashanti Administration Seventh Further Amendment Ordinance, 1921," and shall come into force on the date of its enactment.

2. The Schedule to the principal Ordinance is hereby further amended by inserting therein in their proper chronological sequence and in the appropriate columns respectively thereof the additions specified in the Schedule thereto.

SCHEDULE.

Chapter 96 (20 of 1907).	The Timber Protection Ordinance, and all rules heretofore made thereunder and presently in force	

Made this 14th day of October, 1921.

R. W. H. WILKINSON,
Acting Governor of the Gold Coast.

ASHANTI.

RULE. No. 6 OF 1921.

UNDER THE TIMBER PROTECTION ORDINANCE OF THE GOLD COAST COLONY AS APPLIED TO ASHANTI.

Under and by virtue of sections 4 and 5 of the above-mentioned Ordinance, I, Reginald Warren Hale Wilkinson, Esquire, Acting Governor of the Gold Coast Colony, do hereby with respect to Ashanti make the following rules :—

1 These rules may be cited as " The Timber Protection Rules (Ashanti), 1921."

2. Nothing in these rules shall apply to a native cutting mahogany with the consent of the Chief and Councillors of the Stool within whose jurisdiction such mahogany is grown and otherwise than for export or to any mahogany so cut.

3. The Conservator of Forests shall divide such parts of Ashanti as he shall deem necessary into such areas as he shall think fit and shall allot to each of such areas a distinctive mark to be known as a " locality mark " and shall keep at his office at Coomassie a record of such division and of the locality marks allotted, which shall be open to public inspection, free of charge, during ordinary office hours.

4. No person shall cut or fell any growing mahogany tree unless and until he shall have registered a property mark at the office of the Conservator of Forests, Coomassie.

5. No person shall purchase or possess any log, being part of a mahogany tree cut or felled in Ashanti, unless and until he shall have registered a property mark at the office of the Conservator of Forests, Coomassie.

6. Applications for registration of a property mark shall be made in writing to the Conservator of Forests, Coomassie, and shall be in Form A in the Schedule hereto.

7. Should the Conservator of Forests consider the proposed property mark in any way unsuitable, he may refuse to register the same.

8. If the Conservator of Forests approves the proposed property mark he shall cause the same to be registered free of charge in a book to be kept in his office and called " The Register of Property Marks " and shall cause the applicant to be given a certificate of registration.

9. The Register of Property Marks shall be in Form B in the Schedule hereto and a Certificate of Registration shall be in Form C in the said Schedule.

10. (1) Every person who shall cut or fell a growing mahogany tree shall as soon as possible,

(*a*) mark the stump thereof with his registered property mark and with a number (called the " stump number").

(*b*) mark each of the logs therefrom with the locality mark of the area in which the tree is situate, his registered property mark, the number of the tree and the log number.

(2) Stump numbers shall run consecutively from number 1 upwards, number 1 being applicable to the first mahogany tree felled by any person after he has registered his property mark.

(3) Log numbers shall run consecutively from number one upwards, the butt log always being numbered 1.

Example :—A. has registered the following property mark [A] Since doing so he has felled and duly marked 26 mahogany trees. On felling the 27th from which he obtains (say) four logs and which is situate in an area of which the locality mark is [L5] he must :—

mark the stump thus [A] 27

mark the butt log thus [L5] [A] 27.1

mark the other logs respectively thus	L5	A	27.2
	L5	A	27.3
	L5	A	27.4

11. Every person who shall purchase or come into possession of any log, being part of a mahogany tree cut or felled in the Colony or Ashanti, shall as soon as possible mark such log with his property mark.

12. Any person felling or cutting any growing mahogany tree or purchasing or being in possession of any mahogany being part of a mahogany tree cut or felled in the Colony or Ashanti, shall on demand produce the certificate of registration of his property mark to any Administrative, Police or Forest Officer.

13. No person shall buy, sell, export or be in possession of any mahogany log which is not duly marked in accordance with the provisions of these rules.

14. Every person having a registered property mark shall on demand show to any Administrative or Forest Officer the stump of any mahogany tree felled by him or give such information as will enable him to find such stump without difficulty.

15. The following amendments are hereby made in the names and descriptions of timber trees in the schedule to the Timber Protection Ordinance of the Gold Coast Colony as applied to Ashanti.

PART I.

For *Khaya senegalensis* substitute *Khaya caudata*. *Khaya ivorensis*.

For KWABOHOL (genus and species unknown) substitute KWABOHORA (*Khaya* species).

For PENKWA (genus and species unknown) substitute PENKWA, ODUPON (*Entandrophragma* species).

For YANKUMA (genus and species unknown) substitute NIANKUM (*Heritiera utilis*).

16. The following timber trees are hereby excluded from the operation of the Timber Protection Ordinance of the Gold Coast Colony as applied to Ashanti.

PART I.

OPAPAO (*Afzelia africana*).
BAKU (*Mimusops* species *Djava*).
KOKOTE (*Kokote alata*).
HYEDUA (Gum Copal Tree).

PARTS II. AND III.

All trees.

17. Any person contravening or failing to comply with any of the provisions of these rules shall be liable on summary conviction to a fine not exceeding ten pounds.

SCHEDULE.

FORM A.

THE TIMBER PROTECTION RULES (ASHANTI), 1921.

APPLICATION FOR REGISTRATION OF A PROPERTY MARK.

Full Name of Applicant.	Address.	Proposed property mark.	Area within which Applicant proposes to cut mahogany.

I hereby apply for registration of the above property mark and the issue to me of a certificate of such registration.

Date.....19 .....

To *Applicant.*

The Conservator of Forests.
Coomassie.

FORM B.

THE TIMBER PROTECTION RULES (ASHANTI), 1921.

REGISTER OF PROPERTY MARKS.

No.	Date of Registration	Mark.	Person in whose name mark is registered.	Address of such person.	Area within which applicant proposes to cut mahogany.	Signature of Conservator of Forests.	Remarks.

FORM C.

THE TIMBER PROTECTION RULES (ASHANTI), 1921.

CERTIFICATE OF REGISTRATION OF A PROPERTY MARK.

I hereby certify that the following property mark was registered by me on the day of , 1921, in the name of of

Date 1921.

Conservator of Forests.

Made at Government House, Accra, this 24th day of October, 1921.

R. W. H. WILKINSON,
Acting Governor.

NORTHERN TERRITORIES ADMINISTRATION.

ORDINANCE No. 1 OF 1902.

An Ordinance to provide for the Administration of the Northern Territories of the Gold Coast.

* * * * *

25. It shall be lawful for the Chief Commissioner to make, amend and revoke rules with respect to :—

* * * * *

(9) The conservation of forests and the collection of forest products.

CONCESSIONS AND SURVEY RULES.

THE GOLD COAST COLONY.

CHAP. 87.

CONCESSIONS.

An Ordinance to Regulate the Concession of Rights with respect to land by Natives.

(Not repeated here as recently circulated to Officers of the Department in pamphlet form, " Selected Ordinances of the Gold Coast, etc.")

COLONIAL SECRETARY'S OFFICE,
ACCRA,
3rd June, 1908.

SIR,

I am directed by the Governor to request you to instruct the District Commissioners in your Province to grant permission in writing under section 3 (i) of Ordinance No. 20 of 1907, to the various Mine Managers to cut or fell " Kaku " trees of any dimensions for firewood or other purpose connected with their mines.

I am, etc.,

(*Sgd.*) A. WILLOUGHBY OSBORNE,
Acting Colonial Secretary.

THE COMMISSIONER,
Western Province,
Sekondi.

GOLD COAST COLONY.

ORDER BY THE GOVERNOR.

No. 27 OF 1921.

UNDER THE CONCESSIONS ORDINANCE.

Under and by virtue of the authority vested in the Governor by section 2 of the Concessions Ordinance, I, Reginald Warren Hale Wilkinson, Esquire, Acting Governor of the Gold Coast Colony, do hereby appoint the following officers to perform all acts and to exercise any authority imposed on the Treasurer by the said Ordinance relating to the assessment of duties on profits :—

(1) With respect to timber concessions—The Conservator of Forests.

(2) With respect to other concessions—The Secretary for Mines.

The order made by the Governor on the 9th day of June, 1908, is revoked.

Made this 29th day of August, 1921.

(*Sgd.*) R. H. W. WILKINSON,
Acting Governor.

ASHANTI.

CONCESSIONS.

ORDINANCE No. 3 OF 1903.

An Ordinance to Regulate the Concession of Rights with respect to Land in Ashanti by Natives.

Be it enacted by the Governor of the Gold Coast with respect to Ashanti as follows :—

PRELIMINARY.

1. This Ordinance may be cited as " The Ashanti Concessions Ordinance, 1903."

2. In this Ordinance unless the context otherwise requires :—

" Concession " means any writing whereby any right, interest or property in or over land, with respect to minerals, precious stones, timber, rubber, or other products of the soil or the option of acquiring any such right, interest or property purports to be either directly or indirectly granted or agreed to be granted by a native, but shall not include an assignment of a concession as above defined.

" Prospect " means to search, seek for or explore for minerals, precious stones, timber or other products of the soil.

9. (1) On or before the 31st July, 1904, with respect to any concession made prior to the 1st February, 1904, and within six months after the date of the concession with respect to concessions made on or after the 1st February, 1904, notice of every concession shall be filed by the person claiming to be entitled to the benefit thereof (hereinafter called " the claimant ") with the Registrar of the Court. Such notice shall be in the prescribed form and shall contain the prescribed particulars. The claimant shall also file within the like time such other documents, or duly certified or attested copies thereof, as the claimant relies upon in support of his right to such concession, provided that the filing of any such copies shall not be deemed to render unnecessary the due production at the enquiry into any concession or at the trial of any question relating to any concession of the original document so relied upon.

17. Whenever the Court shall have decided that a concession is valid, a certificate to that effect bearing the seal of the Court hereinafter referred to as a " Certificate of Validity," shall be attached to, or indorsed upon, such concession.

18. Every certificate of validity :

(*a*) Shall state the boundaries, extent and situation of the land in respect of which the certificate is given ;

(*b*) Shall briefly specify the nature of the concession ;

(*c*) Shall contain a complete statement of any limitations, modifications and conditions imposed by the Court ;

(*d*) Shall declare the concessions to be valid subject to the terms of the certificate of validity ;

(*e*) Shall be signed by the president of the Court making the final order for the issue of the certificate of validity or his successor in office ; and

(*f*) May be in the form in Schedule C. hereto.

20. No certificate of validity shall be issued in respect of any concession which purports to confer any right or interest in or over any land for a longer period than 99 years or in respect of any concession which purports to confer an option of acquiring any such right or interest for a longer period than three years. The Court may reduce the term of any concession so as to bring it within the limits aforesaid.

21. (1) No concession shall be valid if made before the coming into force of this Ordinance which purports to confer on any person rights over an area larger than that which he is entitled to hold under sub-section (2) hereof or if made after the coming into force of this Ordinance which purports to confer any rights over on area exceeding :

(*b*) In the case of land in respect of which rights to cut timber or collect rubber, or relating to other products of the soil are conferred, twenty square miles.

(2) No person shall hold at one time concessions the aggregate area of the land comprising in which shall exceed, in the case of mining rights, twenty square miles, or in the case of rights relating to timber, rubber or other products of the soil, forty square miles.

28. (1) No person shall prospect within Ashanti without licence from the Chief Commissioner in the form set forth in Schedule D. hereto and every such licence shall be subject to a stamp duty of £5 ; provided that the holder of a mining licence with respect to any land and those under him may prospect on such land without first obtaining a licence under this section. Every person contravening this sub-section shall be guilty of an offence and be liable to a penalty not exceeding fifty pounds.

(2) Every prospecting licence shall be made out in the name of the individual applying for the same and shall not be transferable.

(3) It shall be lawful for any officer to demand from any person prospecting (not being the holder of a mining licence or those under him prospecting on land included in such mining licence) the production of a licence to prospect. If such person shall not produce a licence duly granted to him to prospect within the limits within which he is prospecting and permit the officer demanding the production thereof to read such licence, it shall be lawful for such officer to require such person to declare to him immediately his name and place of residence and if such person shall refuse to declare his name and place of residence as aforesaid he shall be guilty of an offence and be liable to a penalty

not exceeding ten pounds. And every such person so refusing may be arrested and taken before the Chief Commissioner or a District Commissioner.

(4) In this section " officer " shall include the Chief Commissioner, any District Commissioner, Justice of Peace, any member of the Police or the West African Frontier Force, or any other officer who is appointed by the Governor and whose appointment under this section is notified in the *Gazette*.

31. Every holder of a concession, whether or not the same shall have been adjudicated upon by the Court, shall as from the date of the coming into force of this Ordinance be charged with the payment to His Majesty of the following duty, namely, one shilling for every twenty shillings of the annual amount of all profits made from or in respect of the exercise of the rights conferred by such concession.

51. Every person who after the coming into force of this Ordinance obtains or attempts to obtain any concession in Ashanti without complying with the rules laid down in Schedule B. to this Ordinance shall be guilty of an offence and shall be liable to a fine not exceeding one hundred pounds or to imprisonment with or without hard labour for a period not exceeding six months and any concession so obtained by him shall be absolutely void and of no effect.

ASHANTI SURVEYS.

SURVEY RULES (s. 4).

19. Where a timber concession has a boundary parallel for a length of one mile or more to the centre of a railway track, and distant not more than one mile from the centre of that track, that boundary of the timber concession shall be held to have been surveyed and demarcated when the railway track has been surveyed and boundary marks erected at distances not greater than half a mile apart along the railway track and at such distance from the railway track that they will not interfere with the maintenance of the same and there must be indicated on these boundary marks in a permanent manner on one side their exact distance from the centre of the railway track and on the other their exact distance from the boundary parallel to it. The boundary parallel to the centre of the railway track shall be held to be formed by the straight lines joining the points indicated on the boundary marks as being on that boundary.

Rules with respect to the Charges for Government Surveys of Concessions in Ashanti, etc. (s. 4.).

1. The following charges shall be payable by the applicant for Government surveys of concessions and for certifying surveys of

licensed surveyors and for connecting survey to general survey :—

(*iii*) Survey of Timber and Agricultural Concessions :

(*a*) Concessions other than those having a railway track for one boundary and a depth of not more than one mile from that railway track :

For cutting and surveying a boundary, including the fixing of boundary marks, but not provision of posts or name plates, per mile .. .. £20 os. od.

For cutting and surveying a boundary when a stream forms a boundary, per mile .. .. £12 10s. od.

For cutting and surveying a boundary when a road forms a boundary, per mile .. .. £8 os. od.

(*b*) Concessions, one boundary of which is a railway track having a depth of one mile or less from that railway track :

For cutting and surveying a boundary, including fixing of boundary marks, but not the provision of posts and name plates, per mile of railway track .. .. .. £12 10s. od.

(*iv*) Certifying Survey of Licensed Surveyor :

Mining Concessions, for every 1,000 fathoms of boundary £10 os. od.

River concessions, per mile .. .. .. £10 os. od.

Timber and Agricultural Concessions :

(*a*) Concessions other than those having a railway track for one boundary and a depth of not more than one mile from that railway track, per mile of boundary, whether cutting, road or stream .. .. £5 os. od.

(*b*) Concessions, one boundary of which is a railway track having a depth of one mile or less from that railway track, per mile .. .. £10 os. od.

RELATING TO THE USE OF RIVERS.

The Gold Coast Colony

Chapter 105.

RIVERS.

An Ordinance to Regulate the Use of Certain Rivers in the Colony.

[4th *February*, 1903.

Be it enacted by the Governor of the Gold Coast Colony with the advice and consent of the Legislative Council thereof, as follows :—

Preliminary.

1. This Ordinance may be cited as " The Rivers Ordinance."

2. In this Ordinance unless the context otherwise requires :

" River " means a river specified in the first Schedule to this Ordinance or added thereto in manner hereinafter provided :

* * * * * *

13. The Governor in Council may from time to time make, amend and revoke rules :

* * * * * *

(*b*) With respect to the use of any river for the transport of floating timber.

(*c*) For regulating the traffic on any river.

(d) Generally for the purpose of protecting and improving the navigability of any river.

* * * * * *

SCHEDULE I.

Rivers to which this Ordinance applies :—

The Tano and its tributary the Boi.
The Ankobra and its tributary the Bonsa.
The Volta and its tributary the Afram.
The Prah.
The St. John's or Prince's.
The Boutry.
The Fura.
The Birrim.
The Ahama.
The Mansi.
The Whin.
The Suni or Akivida.

Orders and Rules under the Rivers Ordinance.

Extent to which the Rivers Ordinance applies to Scheduled Rivers (s. 4).

To so much of the Tano and its tributary the Boi as are within the boundaries of the Colony.

To so much of the Ankobra as is within the boundaries of the Colony and to the whole of its tributary the Bonsa.

To so much of the Volta and its tributary the Afram as are within the boundaries of the Colony.

To the whole length of the St. John's or Prince's.

To the whole length of the Boutry.

To the whole extent of the Ahama.

To the whole extent of the Mansi.

RULES WITH RESPECT TO TRAFFIC AND FLOATING TIMBER ON THE ANKOBRA.

(S. 11).

* * * * * *

4. Every log of timber floating down the river shall be accompanied by some person in charge. Where two or more logs are floated down the river at the same time they shall be securely fastened together at both ends with ring bolts and cable. When a number of logs not exceeding five shall be floated down the river together in a raft they shall be accompanied by two persons in charge. When the number of logs in a raft exceeds five and does not exceed ten, they shall be in charge of three persons and when the raft consists of more than ten logs it shall be in charge of four or more persons.

5. Every log or raft of logs when floating down the river or moored in the fairway of the river shall, between the hours of sunset and sunrise, carry a red light in front.

* * * * * *

7. No log, raft of logs, boom, float or other structure of like character shall be moored or anchored at the mouth or in the fairway of the river without a licence issued for that purpose by the District Commissioner of the district or except in accordance with the conditions (if any) which the District Commissioner may attach thereto.

8. For the purpose of Rule 9 of these rules, every day during which a contravention of Rule 7 of these rules occurs or continues shall be deemed to constitute a separate contravention of the provision of such last mentioned rule; and the Court before which a person has been convicted of an offence under the said rule may order such person to remove the log, raft of logs, boom, float or other structure, as the case may be, and if such person shall omit to comply with such order forthwith, may cause such removal to be carried out; and the cost of such removal may be recovered from the person so convicted as aforesaid. A certificate under the hand of the Commissioner of the District or Provincial Engineer of the amount of such cost of removal shall in any Court of Law be deemed to be conclusive evidence of the amount due from and payable by such convicted person as aforesaid.

9. Before the District Commissioner shall issue any licence under Rule 7 of these rules he shall first be satisfied that the use of the log, raft of logs, boom, float or other structure to be moored or anchored under the licence will not cause any substantial obstruction, hindrance or danger to the proper navigation of the river on either side of such log, raft of logs, boom, float or other structure as aforesaid.

* * * * * *

11. A fee of £5 shall be chargeable on the issue of every such licence and when issued the licence shall be valid for a period of one year from the date of such issue.

* * * * * *

14. Any person who contravenes the provisions of any of these Rules shall be liable on conviction to a penalty not exceeding five pounds.

ASHANTI.

RIVERS.

ORDINANCE NO. 1 OF 1903.

An Ordinance to Regulate the Use of Certain Rivers in Ashanti. Be it enacted by the Governor of the Gold Coast with respect to Ashanti as follows :—

PRELIMINARY.

1. This Ordinance may be cited as "The Ashanti Rivers Ordinance, 1903."

* * * * * *

11. The Governor may from time to time make, amend and revoke rules :—

(*a*) With respect to steam vessels on any river,

(*b*) With respect to the use of any river for the transport of floating timber,

(*c*) For regulating the traffic on any river, and

(*d*) Generally for the purpose of protecting and improving the navigability of any river ;

and may for the breach of any such rule impose a penalty not exceeding five pounds.

Any such rules, amendments or revocations shall come into force on their publication in the *Gazette* or on such later date as may be therein declared.

* * * * * *

13. All offences under this Ordinance shall be dealt with summarily and may be heard before a District Commissioner.

SCHEDULE I.

Rivers to which this Ordinance applies :—

The Tano	The Prah
The Ofin	The Volta

RULES UNDER THE ASHANTI RIVERS ORDINANCE, 1903.

RULES AS TO TRAFFIC AND FLOATING TIMBER ON THE OFIN RIVER.

1. Every log of timber floating down the river shall be accompanied by some person in charge. Where two or more logs are floated down the river at the same time they shall be securely fastened together at both ends with ring bolts and cable. When a number of logs not

exceeding five shall be floated down the river together in raft they shall be accompanied by two persons in charge. When the number of logs in a raft exceeds five and does not exceed ten they shall be in charge of three persons and when the raft consists of more than ten logs it shall be in charge of four or more persons.

2. Every log or raft of logs when floating down the river or moored in the fairway of the river shall, between the hours of sunset and sunrise, carry a red light in front.

3. No vessel, log, or raft of logs shall be moored or anchored in the fairway of the river in such a manner as to cause obstruction to the proper navigation of the river.

4. Any person who contravenes the provisions of any of these rules shall be liable on summary conviction to a penalty not exceeding five pounds.

THE NORTHERN TERRITORIES.

RIVERS.

ORDINANCE NO. 1 OF 1903.

An Ordinance to Regulate the Use of Certain Rivers in the Northern Territories of the Gold Coast.

Be it enacted by the Governor of the Gold Coast with respect to the Northern Territories as follows :—

PRELIMINARY.

1 This Ordinance may be cited as "The Northern Territories Rivers Ordinance, 1903."

* * * * * *

11. The Governor may from time to time make, amend and revoke rules :—

(*a*) With respect to steam vessels on any river ;

(*b*) With respect to the use of any river for the transport of floating timber ;

(*c*) For regulating the traffic on any river ; and

(*d*) Generally for the purpose of protecting and improving the navigability of any river ;

and may for the breach of any such rule impose a penalty not exceeding five pounds.

Any such rules, amendments and revocations shall come into force on their publication in the *Gazette* or on such later date as may be herein declared.

12. For every licence taken out under this Ordinance there shall be payable the fee prescribed therefor in the Fourth Schedule hereto

13. All offences under this Ordinance shall be dealt with summarily and may be heard before a District Commissioner.

SCHEDULE I.

Rivers to which this Ordinance applies :—

The Volta and its tributaries the White Volta and the Black Volta.

EXPORT DUTY ON TIMBER.

GOLD COAST COLONY.

No. 7 OF 1921.

I assent

F. G. GUGGISBERG,

Governor.

4th February, 1921.

An Ordinance to raise export duties on Timber.

[*4th February*, 1921.

Whereas it is desired to raise further revenue in the Colony and to that end to impose a duty on timber exported from the Colony :

Be it therefore enacted by the Governor of the Gold Coast Colony, with the advice and consent of the Legislative Council thereof, as follows :—

Short title.

1. This Ordinance may be cited as " The Timber Export Duty Ordinance, 1921."

Definition of "Exporter."

2. In this Ordinance the term " exporter " shall include any owner or other person for the time being possessed of, or beneficially interested in, any timber from the time the same is placed in the sea or in any boat, canoe or other craft whatsoever for the purpose of being exported until such timber shall be conveyed out of the territorial waters of the Colony.

Export duty levied on timber exported.

3. There shall be raised, levied, collected and paid unto His Majesty for the Government of the Gold Coast Colony, an export duty at the rate of two pence per cubic foot or part thereof on all timber exported from the Colony.

Timber to be marked, duty to be paid and export entry passed before shipment.

4. No person shall export any timber or, for the purpose of exportation, cause any timber to be placed in the sea or in any boat, canoe or other craft whatsoever or to be carried to any ship or to be shipped or transhipped unless and until such timber shall have been passed by an officer of the Forest Department as having been lawfully cut and shall have been marked as so passed by such officer in the manner prescribed by rules under this Ordinance and such person shall have passed in respect thereof an export entry in the form given in the Schedule hereto and shall have paid the export duty thereon.

Master to deliver manifest of timber shipped.

5. The master of any steamer taking timber for exportation from any port in the Colony shall deliver to the Officer of Customs, before leaving such port, a manifest shewing the marks, numbers and cubical dimensions (in feet) of all timber which has been so taken on board.

Power of Governor in Council to make rules.

6. It shall be lawful for the Governor in Council to make rules for the better carrying into effect of any of the purposes or provisions of this Ordinance; and in particular prescribing the manner in which the cubic contents of any timber shall be ascertained for the purposes of this Ordinance; and such rules shall on publication thereof in the *Gazette* have the same effect as if they had been enacted herein, either immediately or at such future date as may therein be provided.

Punishment for breach of Ordinance.

7. The exporter and any person concerned in any contravention of the provisions of this Ordinance or of any rule made thereunder, or wilfully or negligently failing to comply with such provisions, shall be guilty of a misdemeanour.

Offence triable summarily.

8. A misdemeanour under this Ordinance shall be triable summarily and any person so convicted thereof shall be liable to a fine not exceeding one hundred pounds, or to a term of imprisonment with or without hard labour not exceeding one year, or to both, and it shall be lawful for the Court to order that all timber in respect of which any such misdemeanour is committed, or attempted, be forfeited to His Majesty; thereupon such timber shall be dealt with as the Governor shall direct.

SCHEDULE.

EXPORT ENTRY.

Port of.....

Exporter's Name.....

Wharf, Dock or Station.	Ship's Name.	Whether British or Foreign; if Foreign the Country.	Master's Name.	Port or Place of Destination.	Date of Shipment.

Marks Numbers.	Value, including cost of Packages.	Number and Description of Packages.	Quantity, Quality and Description of Goods.	Rate of Duty.	Amount of Duty.

.....declare the quantity and description of the goods above mentioned to be correctly stated and the value of the said goods to be.....pounds..... shillings and.....pence.

Dated this.....day of.....19....

Signed..... Signed.....

Comptroller of Customs. *Exporter or Agent.*

Passed in the Legislative Council this Fourth day of February, in the year of our Lord, One thousand nine hundred and twenty-one.

A. J. CUTFIELD,
Clerk of the Legislative Council.

This Printed Impression has been carefully compared by me with the Bill which has passed the Legislative Council and found to be a true and correct printed copy of the said Bill.

A. J. CUTFIELD.
Clerk of the Legislative Council.

GOLD COAST COLONY.

RULES.

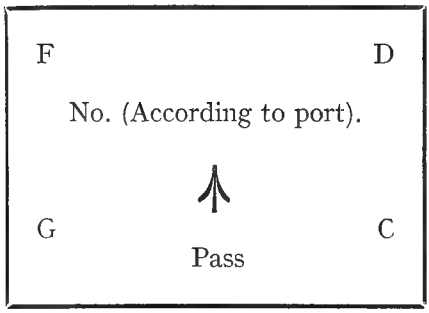
No. 23 OF 1921.

UNDER THE TIMBER EXPORT DUTY ORDINANCE, 1921.

Under and by virtue of the provisions of section 6 of the Timber Export Duty Ordinance, 1921, I, Reginald Warren Hale Wilkinson, Esquire, Acting Governor of the Gold Coast Colony, with the advice of the Executive Council of the said Colony, do hereby make the following rules :—

1. Before any timber is shipped for exportation, or entered for such purpose and the export duty paid thereon, each log intended for

export shall bear on one end at least the following marks impressed by the proper officer of the Forestry Department with a marking hammer :



2. Six marking hammers, numbered consecutively from 1 to 6 shall be assigned as under for the purpose of marking timber for exportation.

Port.	*Hammer Numbers.*
Half Assinie	1
Axim	2 and 3
Seccondee	4 and 5
Accra	6

3. For the purpose of assessing export duty on timber exported from the Colony, the average cubical dimensions of the logs shipped as ascertained periodically in the Forestry Department, shall be accepted by the Customs Department for duty purposes subject to the following test checks. Three per cent. of the logs shipped on an entry shall be measured by the Customs Officer on export duty, for the purpose of ascertaining whether the Bill of Lading and Export Entry particulars are substantially accurate and whether the totals in such documents agree with the cubical dimensions in the manifest which the master of the exporting vessel is required to deliver to the Customs Department under Section 5 of " The Timber Export Duty Ordinance, 1921 " (No. 7 of 1921). A less percentage may be measured at the discretion of the Comptroller.

4. Until further notice the undernoted average measurements furnished by the Conservator of Forests shall be accepted for duty purposes by the Officers of Customs at the following ports.

Port.	*Each log to be accepted as measuring.*
Half Assinie	126 cubic feet.
Axim	78 ,,
Seccondee	100 ,,
Accra and unenumerated ports ..	By actual measurement of three per cent. of the logs intended for exportation.

5. The Conservator of Forests shall cause to be reviewed the measurements specified in the preceding paragraph at the end of June each year and shall notify the Comptroller of Customs not later than the end of July annually what alterations, if any, shall be made for the ensuing year in the aforegoing cubical dimensions for the purpose of duty assessment. Any such change shall take effect from the day following that on which the Comptroller of Customs actually receives official notice of amended average measurements as calculated in the Forestry Department.

6. For the purpose of ascertaining or test-checking the cubical dimensions of timber for exportation, the following procedure shall be followed. The measuring tape shall be passed round the middle of the log, and at right angles to its length, and this measurement shall be recorded *in feet and inches*. The length of the log shall then be measured and recorded *in feet and inches*. The cubical volume of the log shall then be ascertained in accordance with the following formula :

$$\frac{\text{Middle girth}}{4} \quad 2 \times \text{Length}.$$

If for any reason the measuring tape cannot be passed round the middle of the log it shall be passed successively round the two ends of the log and the mean girth calculated by averaging such measurements.

7. No timber shall be exported overland or by any inland water from the Colony except between the hours of 6 a.m. and 6 p.m., or except through such stations as provided by law for the importation of goods.

8. No timber shall be exported overland or by any inland water from the Colony until the duty thereon has been previously paid.

Made at a meeting of the Executive Council this 24th day of September, 1921.

R. W. H. WILKINSON,
Acting Governor.

GOLD COAST COLONY.

RULE.

No. 34 OF 1921.

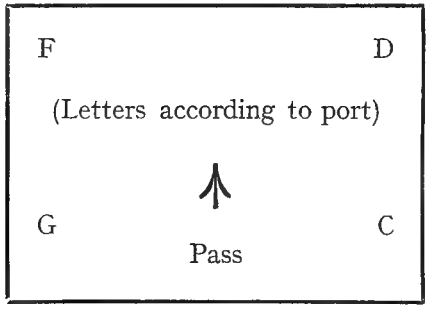
UNDER THE TIMBER EXPORT DUTY ORDINANCE, 1921.

Under and by virtue of the provisions of section 6 of the above-mentioned Ordinance, I, Frederick Gordon Guggisberg, Governor and Commander-in-Chief of the Gold Coast Colony, with the advice of the Executive Council of the said Colony, do hereby amend the Rules

made on the 24th day of September, 1921, under the statutory authority aforesaid (hereinafter called " the said Rules ") as follows :—

1. Rule 1 of the said Rules is hereby deleted and the following Rule is substituted therefor :

> 1. Before any timber is shipped for exportation or entered for such purpose and the export duty paid thereon, each log intended for export shall bear on one end at least the following marks impressed by the proper officer of the Forestry Department with a marking hammer.



2. Rule 2 of the said Rules is hereby deleted and the following Rule is substituted therefor :

> " 2. Marking hammers, bearing letters according to the port of export, shall be assigned for the purpose of marking timbe for exportation "

3. Rule 4 of the said Rules is hereby amended by substituting for the figures " 100 " where they occur therein after the word " Seccondee " the figures " 82."

4. Rule 6 of the said Rules is hereby amended by substituting for the formula which appears therein the following formula :

$$\left(\frac{\text{Middle girth}}{4}\right)^2 \times \text{Length.}$$

Made at a meeting of the Executive Council this 19th day of December, 1921.

(*Sgd.*) F. G. GUGGISBERG,
Governor.

Appendix I

NOTES ON OUTFIT AND LIFE ON THE COAST.

The West African Pocket Book issued by the Crown Agents for the Colonies contains information for the guidance of officers coming to any part of the West Coast. It has been represented, however, that the conditions on the West Coast are peculiar to that part of the world and so little information is available to assist a Forest Officer in his own special equipment that it is advisable to add a few notes of assistance to prospective Gold Coast Forest Officers. The main facts to be borne in mind are that a new Forest Officer has to be prepared for a more or less isolated life in the bush and must be as self-contained as possible. If in doubt as to what to bring he should bring more rather than less but always remembering that he must at first be prepared to be mobile. He will as far as possible be attached to a Senior Officer for the first few months, but he must be prepared to change his station at short notice and to spend periods of a month or more away from his station, touring the " bush."

In the Gold Coast the term " bush " is generally applied to the dense forest and is the equivalent of the Eastern " jungle." The open Savannah country is generally known as the " grass " or " orchard " country.

There can be no question that a new Forest Officer cannot bring his wife with him his first tour and it is inadvisable for him to think of doing so for the first few tours. Except at a very few stations there are at present no definite quarters able to be allotted to Forest Officers. Apart from that, a new man will be expected to travel considerably, his wife cannot then accompany him, and it is difficult for her to be left alone. As he rises in the service his travelling will be neccessarily curtailed, his station permanent and he will then be able to be accompanied by his wife.

Preparations at Home.

It is strongly recommended that the advice and assistance of one of the firms who specially deal in West African out-fitting be obtained. There are several in London and from their special knowledge of the conditions on the West Coast their advice will be of considerable assistance and probably a saving of expense.

In assembling one's belongings it is important to realise the peculiar means of transport that is in vogue on the Coast, namely, carrying on the head. Despite the recent progress of railways and

motor roads the Forest Officer must for many years be mainly dependent on carriers for the touring that he will be required to do. Loads should be made up in England to an approximate weight of 60 lbs. inclusive, and in that state they can be dealt with no matter where an Officer has to land or proceed on landing. Special short airtight uniform cases are advisable for clothing; stores and kit can be taken in ordinary packages and packing cases, but one or two venesta boxes should be included. Names should be printed on the front of the boxes and a distinctive mark with the box number on each end.

Clothing.

For outdoor work, khaki "bush-shirts" with spine pad, shorts, knickers or trousers are preferred but advisably of khaki drill. Puttees or stockings and at least two strong pairs of heavy nailed marching boots, khaki pith helmet and oil-silk rain cover.

For office work, drill suits or the equivalent, soft collars, white canvas or leather shoes. For recreation, clothing as at home. For evening wear, dress suit, dinner suit (required on the voyage), and white dress mess jackets with kummerband. A dark suit of thin tropical cloth is also required for afternoon functions. The civil uniform described in the West African Pocket Book is not in general use on the Gold Coast. Mosquito boots, black for town wear and buff for bush wear are a necessity. A light rain coat is required and gum boots are found useful. Underclothing varies considerably with the individual but is most important. Especially during the wet season the forests are never dry and the constant dripping from the trees and brushing from the wet bushes and herbs necessitate good warm underclothing at the end of a march.

Stores.

It is generally found cheaper to bring out necessities. Advice as to quantities and packing should be obtained from an African outfitter. Neither fresh milk nor fresh butter are obtainable locally. Tinned stores generally can be bought at the bigger stations.

Camp Kit.

The following articles are considered necessary for a Forest Officer to bring out. Towards his expenses he now receives a Government grant of £60 for Class "A" Officers and £45 for Class "B." Tents are provided.

Housewife.
Table and bed linen, strong and serviceable.
Mosquito net.
Cutlery.
China.
Glass.

Hurricane lamp (burning paraffin).
Two table lamps for quarters (burning paraffin).
Deck chair.
Camp chair.
Camp bed.
Travelling bath with wicker lining.
Fitted cook's box.
Travelling drip filter with spare candles.
Folding table.
Enamel or canvas basin.

The following additional articles are recommended but are not absolutely necessary : Sand-fly sleeping net, " road " box.

It is wise to effect insurance on one's belongings and stores against leakage, breakage, pilferage and all marine risks from Liverpool to Seccondee and against fire, theft and burglary on the Coast. Information can be obtained from the Crown Agents.

Guns, Etc.

Very little shooting except birds can be obtained in the bush and an officer is recommended to bring a 12-bore shot gun and ammunition only with him for the first tour if he is keen on shooting. He will then be able to see what chance of big game shooting he is likely to get and equip himself suitably at a later date.

Preparations for Landing.

For the next few years at any rate landing will be effected at all parts of the Gold Coast in surf boats into which one is lowered from the steamer in a " mammy chair." A sun helmet must be worn and if the surf is anything but calm a rain coat or macintosh is useful to keep one from spray. On arrival on shore one must first go to the Customs Warehouse, declare what stores one has and hand over all arms and ammunition. At Seccondee or Accra a representative of the Government transport service will assist in this routine. If a list of boxes with their contents severally priced has been made ready, this may be handed in to the Customs and the opening of boxes avoided All stores and liquors are subject to Customs Duty. It is often advisable to open boxes of spirits and so avoid paying duty on bottles that have been smashed on the journey. As soon as the Customs authorities have assessed the duty the boxes may be withdrawn. For the firearms and ammunition an authority to import must be obtained from the local District Commissioner and the various dues paid before they can be obtained. As most Forest Officers will land at Seccondee

it may be useful to indicate the procedure at that port. Accommodation on landing will be found to have been provided by the Transport Officer at the "Rest House." It is advisable that an Officer has a camp bed, mosquito net, bed linen, and towels ready for use the first night. Other necessaries and messing are provided. As soon as practicable after landing officers must report at the Provincial Commissioner's Office and sign the duty book. Instructions as to destination will be given to officers through the Transport Officer. Officers proceeding up country by rail must provide themselves with food and drink for the journey. Railway tickets will be obtained through the Transport Officer.

INFORMATION ABOUT THE COAST.

Recreation.

Tennis is played at nearly all stations, generally on hard courts but sometimes on grass. Cricket can be obtained at the larger stations. Polo, except at Accra and Tamale, has been in abeyance since the war.

Literature.

One is entirely dependent for news of the outside world and for reading matter on one's own supplies. It is necessary to arrange for newspapers to be sent out.

Currency.

The West African Currency is common to all British West Africa and is the same value and denomination as English money. English silver is still used but the local currency is in notes and alloys.

Languages.

Owing to the wide range of country over which Forest Officers have to travel and the many unwritten native languages in use it is not at the present stage practicable to recommend the study of any particular native language. The African Forest Staff and Officers' personal servants understand English to a certain extent.

Banks.

The Bank of British West Africa is established in all large stations. The Colonial Bank is also now established on the Coast.

Mails.

Since the war the mail service has been somewhat irregular. A fortnightly service can be relied upon and often there is a weekly boat. Normally mails take fourteen days from Liverpool to Seccondee.

Medicines.

What is required can be obtained locally. A clinical thermometer should, however, be brought out.

Servants.

A cook and a steward boy are normally required but some manage to do with a cook-boy only. They can be obtained without difficulty. Wages vary according to locality from £2 10s. 0d. to £4 per month for a cook and £2 to £3 per month for a steward-boy.

Transport.

A Forest Officer will have to be prepared to travel almost entirely on foot and frequently without the assistance of a hammock through bush tracks. As there are no draught animals there are only a few main roads over which motor vehicles travel.

Postage.

Ordinary Empire rates. There is a special Gold Coast series of stamps of the values of ½d., 1d., 2d., 3d., and upwards.

Hobbies.

An officer interested in natural history has a full field to indulge his taste especially the botanist, entomologist and ornithologist. There is also much scope for photography, painting and sketching. Materials must be brought with one for these latter.

Travelling Allowance.

An allowance of ten shillings per twenty-four hours for class "A" Officers and six shillings for Class "B" Officers is allowed when an Officer is travelling on duty. At present this is commuted with the field allowance at the rate of £10 per month for Class "A" and £7 per month for Class "B" Officers.

INDEX.

Only the botanical and native names of trees and plants that are found in the text are included in this Index. For complete lists reference must be made to Chapter IV., "Synopsis of Natural Orders," Chapter VIII., "Trees and Plants of Economic Importance" and Chapter IX., "Native Names of the Principal Trees."

An indexed list of Ordinances and Rules will be found on page 69.

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PLATES.

The accompanying Plates have been reproduced from Mr. H. N. Thompson's "Report on Forests," Gold Coast Colonial Reports—Miscellaneous No. 66, 1910.

PLATES.

I. Bombax brevicuspe.

II. Triplochiton Johnsoni.

III. Tarrietia (Heritiera) utilis.

IV. Khaya ivorensis.

V. Khaya senegalensis.

VI. Lovoa Klaineana.

VII. Entandrophragma cylindricum.

VIII. Entandrophragma septentrionale.

IX. Entandrophragma utile.

X. Pseudocedrela Kotschyi.

XI. Afzelia africana.

XII. Piptadenia africana.

XIII. Cylicodiscus gabunensis.

XIV. Sarcocephalus esculentus.

XV. Butyrospermum Parkii.

XVI. Mimusops sp.

XVII. Funtumia elastica.

XVIII. Landolphia owariensis.

XIX. Chlorophora excelsa.

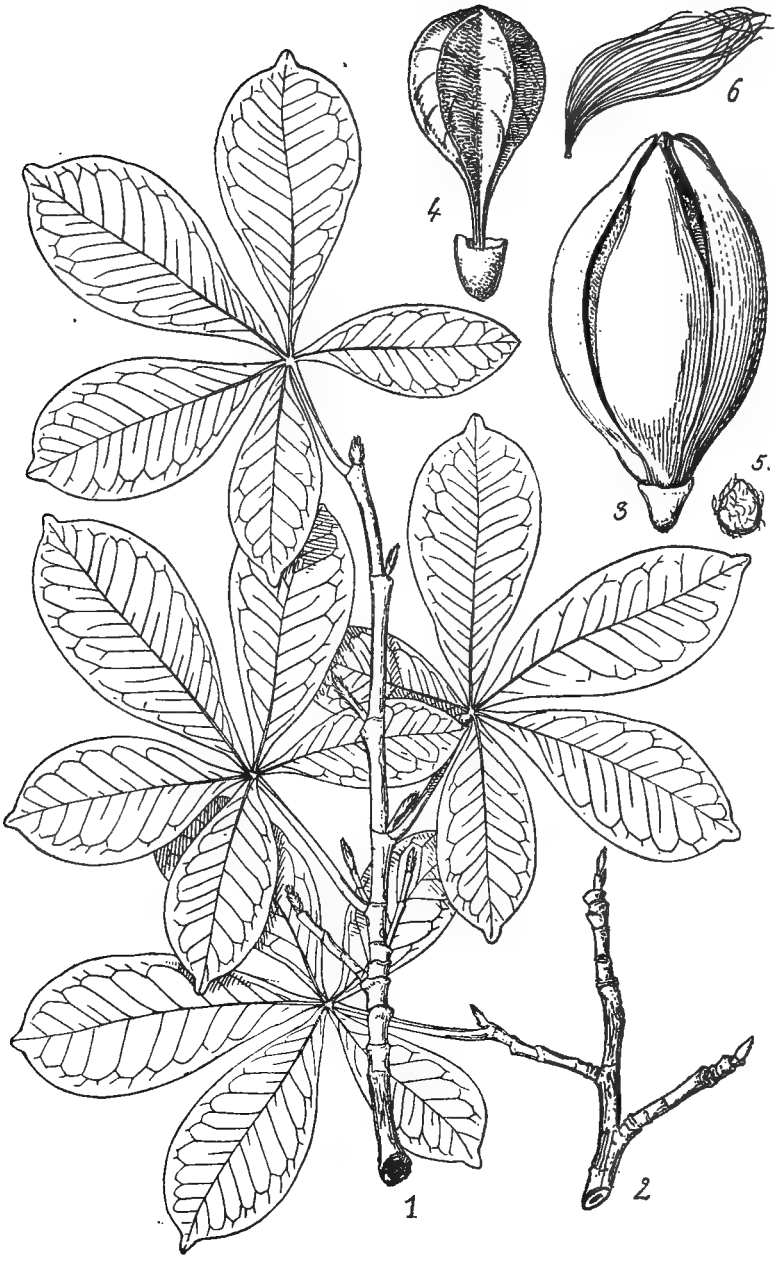
XX. Musanga Smithii.

PLATE 1.

BOMBAX BREVICUSPE.

Figs. 1 and 2, branchlets; 3, fruit; 4, central axis of fruit, and calyx; 5, seed; 6, hair from inner wall of fruit.

Figs 1—5, × $\frac{2}{3}$; 6, × 2.



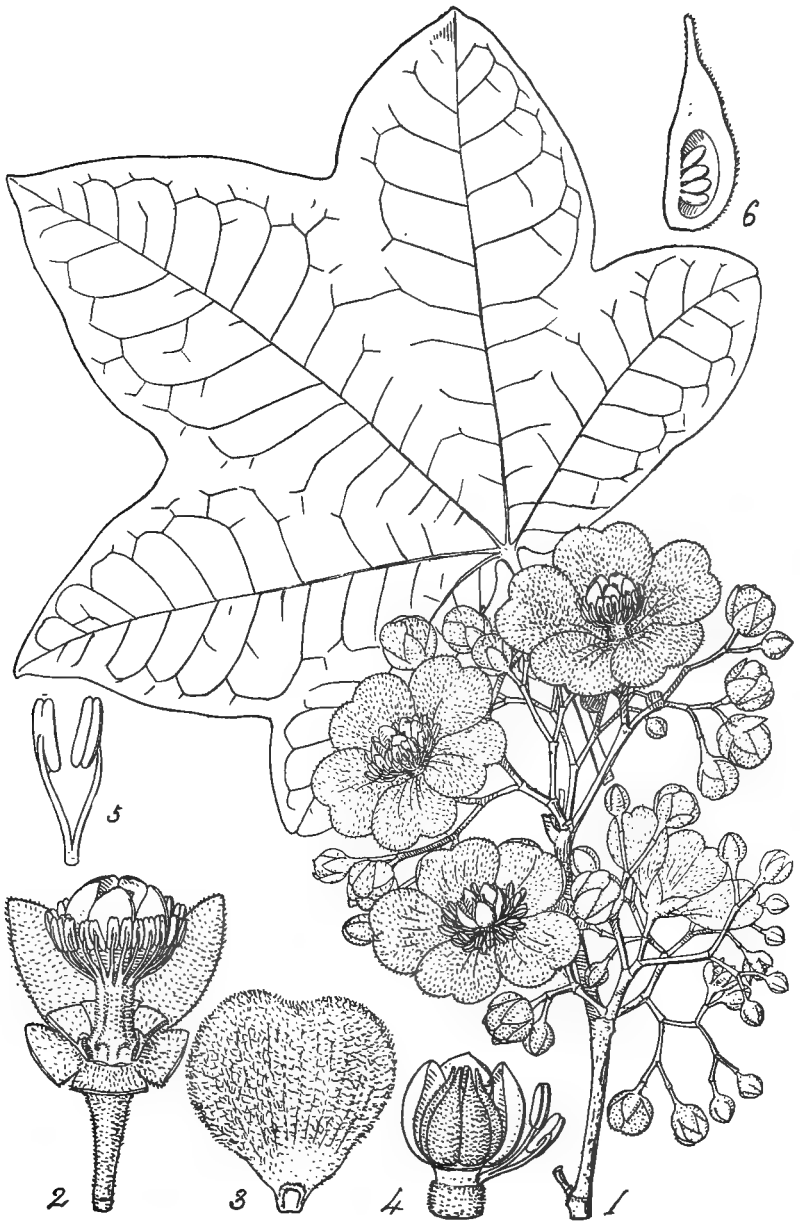
Bombax brevicuspe.

PLATE 2.

TRIPLOCHITON JOHNSONI.

Fig. 1, flowering branch; 2, flower with part of calyx and petals cut off; 3, petal; 4, apex of gonophore, with two staminodes and all but one pair of stamens removed; 5, pair of stamens; 6, longitudinal section of carpel.

Fig. $1 \times \frac{2}{3}$, 2×3, 3×2, 4×4, 5×5, 6×8.



Triplochiton Johnsoni.

PLATE 3.

TARRIETIA (HERITIERA) UTILIS.

Fig. 1, flowering branch; 2, upper part of leafy branch; 3, tetramerous flower; 4, pentamerous flower laid open; 5, pistil; 6, carpel; 7, peltate scale from carpel; 8, fruit; 9, seed; 10, section through seed.

Figs. 1—2 × $\frac{2}{3}$, 3—4 × 3, 5—6 × 8, 7 × 50, 8—10 × $\frac{2}{3}$.

Note.—The leaves are usually 3—7 foliolate.

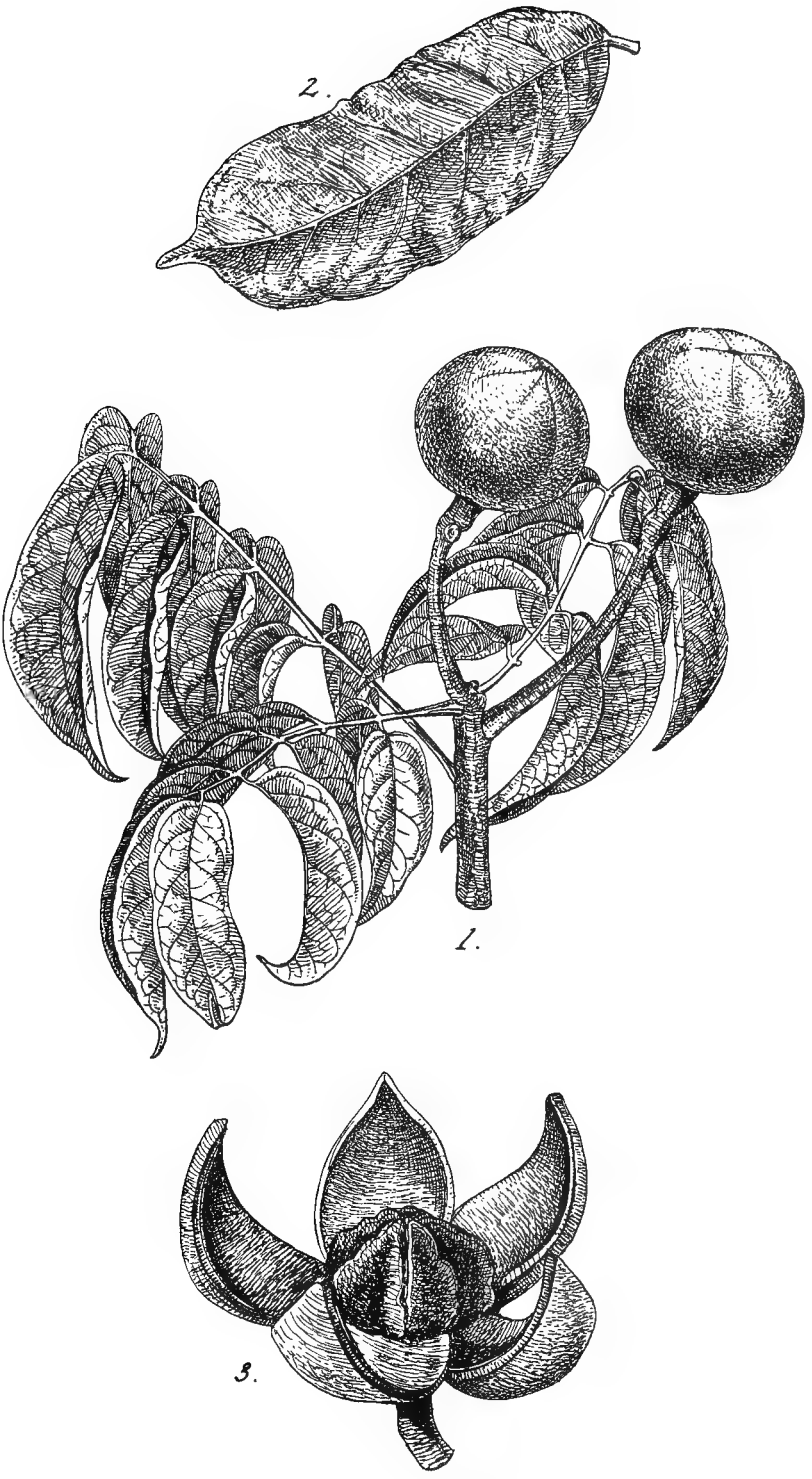
Tarrietia (Heritiera) utilis.

PLATE 4.

KHAYA IVORENSIS.

Fig. 1, fruiting branch ; 2, leaflet ; 3, empty capsule.

Fig. 1 × $\frac{1}{3}$, 2—3 × $\frac{2}{3}$.



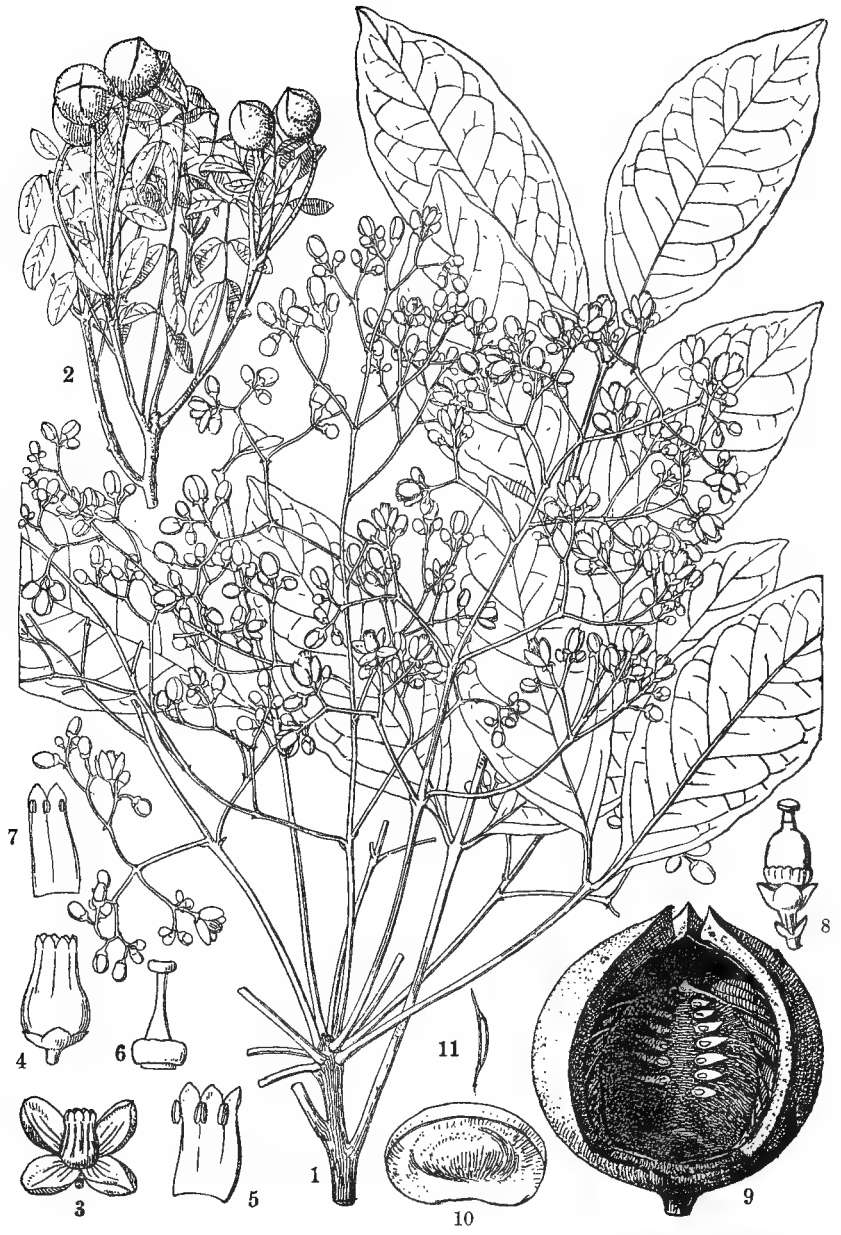
Khaya ivorensis.

PLATE 5.

KHAYA SENEGALENSIS.

Fig. 1, flowering branch ; 2, fruiting branch ; 3—6, male flower—(3) expanded, (4) with the corolla removed, (5) part of staminal tube from within ; (6) abortive pistil ; 7—8, female flower—(7) part of staminal tube from within, (8) calyx and pistil ; 9, capsule ; 10, seed ; 11, dross section through seed.

Fig. 1 × $\frac{2}{3}$, 2 × $\frac{1}{7}$, 3 natural size, 4—6 × 2, 7—8 × 3, 9—11 × $\frac{2}{3}$.



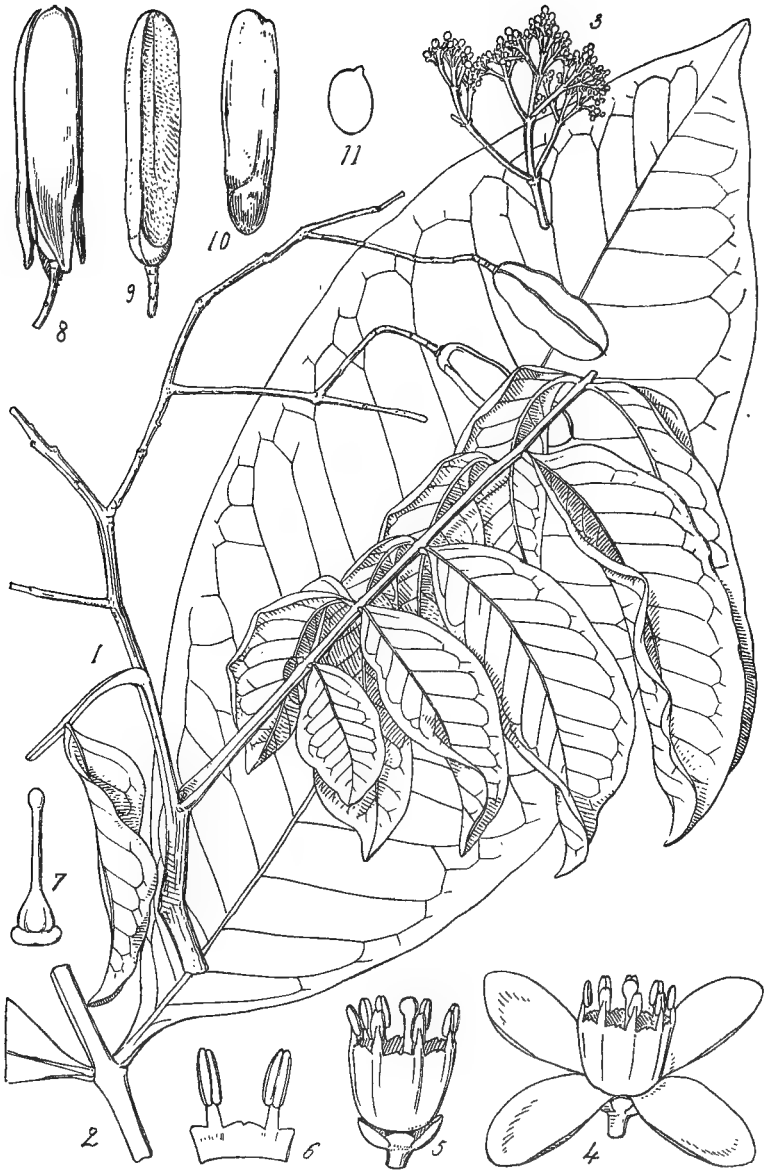
Khaya senegalensis.

PLATE 6.

Lovoa Klaineana.

Fig. 1, fruiting branch; 2, portion of a lower leaf; 3, portion of young inflorescence; 4, flower; 5, flower with petals removed; 6, portion of upper part of staminal tube from within; 7, pistil; 8, fruit; 9, central axis of fruit; 10, seed; 11, embryo.

Fig. 1 × $\frac{1}{2}$, 2—3 × $\frac{2}{3}$, 4 × 4, 5 × 5, 6 × 9, 7 × 6, 8—11 × $\frac{2}{3}$.



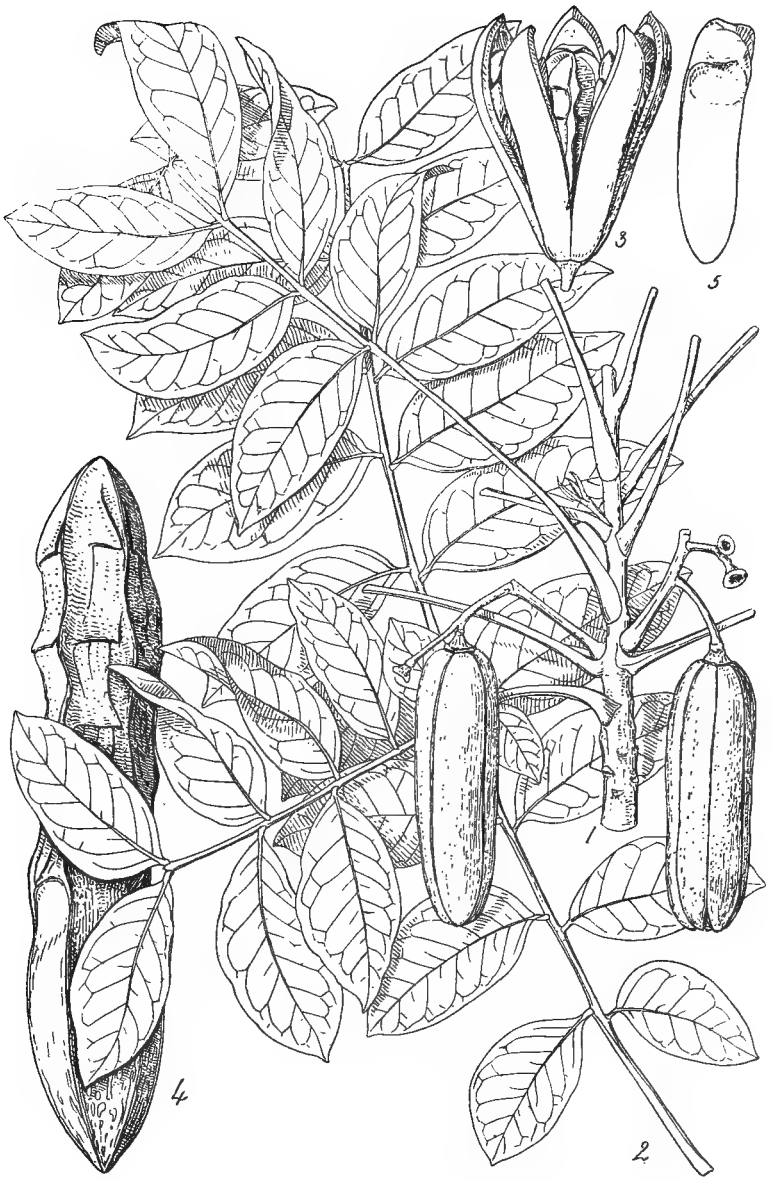
Lovoa Klaineana.

PLATE 7.

ENTANDROPHRAGMA CYLINDRICUM.

Fig. 1, fruiting branch; 2, leaf; 3, a small fruit; 4, central axis of a large fruit; 5, seed from small fruit.

Figs. 1—2 × $\frac{1}{2}$, 3—5 × $\frac{2}{3}$.



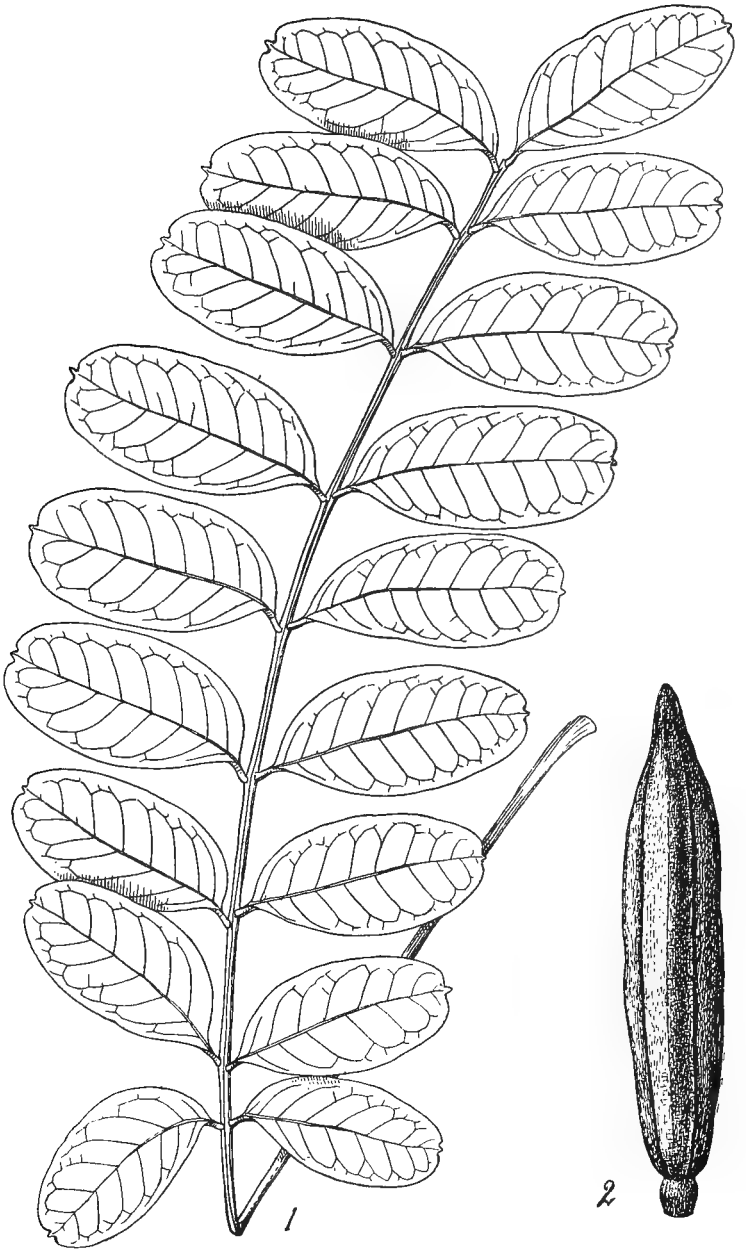
Entandrophragma cylindricum.

PLATE 8.

ENTANDROPHRAGMA SEPTENTRIONALE.

Fig 1, leaf ; 2, fruit.

Fig. 1 × $\frac{1}{2}$, 2 × $\frac{2}{3}$..



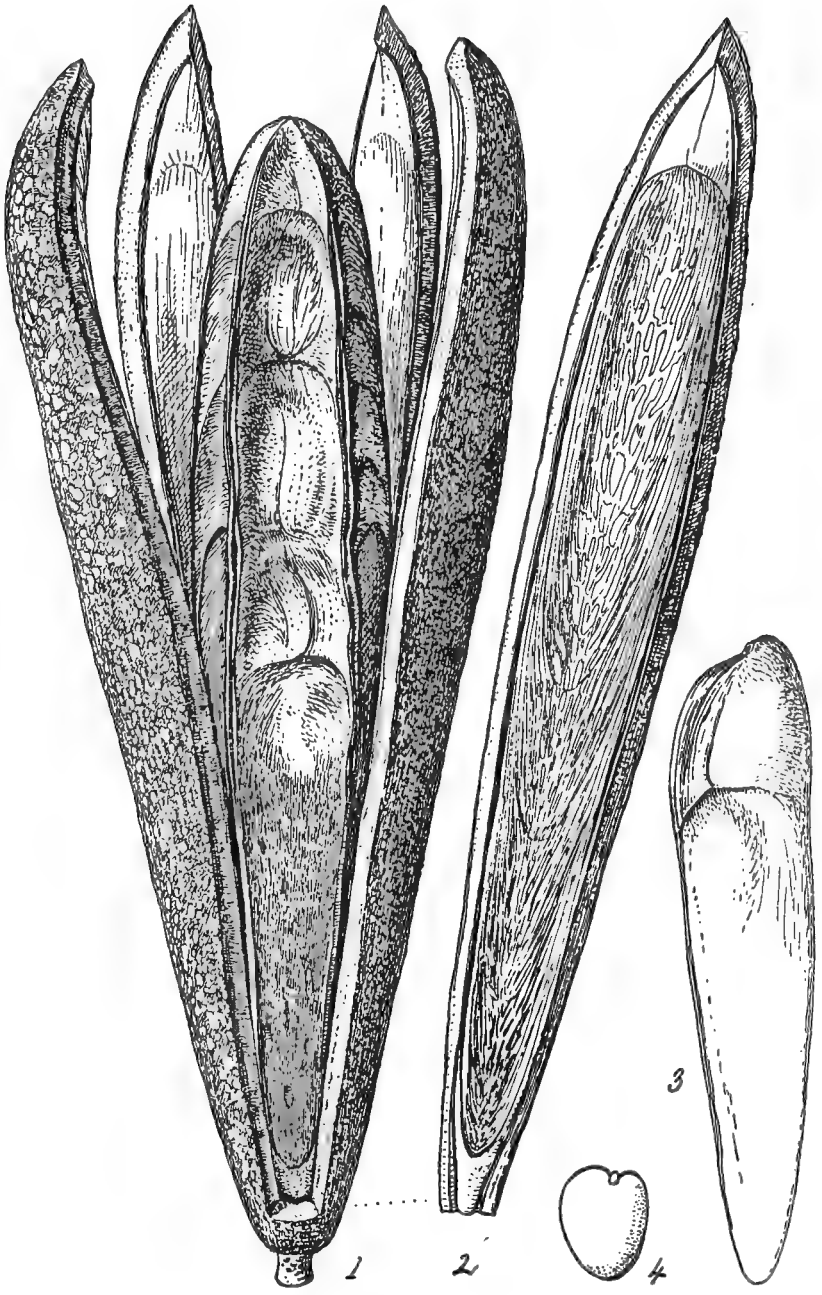
Entandrophragma septentrionale.

PLATE 9.

ENTANDROPHRAGMA UTILE.

Fig. 1, fruit ; 2, valve of fruit ; 3, seed ; 4, embryo.

Figs. 1—4 × $\frac{2}{3}$.



Entandrophragma utile.

PLATE 10.

Pseudocedrela Kotschyi.

Fig. 1, flowering branch; 2, flower; 3, flower with petals removed; 4, portion of upper part of staminal tube from within; 5, pistil; 6, fruit; 7, seed; 8, embryo.

Fig. 1 × $\frac{2}{3}$, 2 × 4, 3 × 3, 4 × 8, 5 × 5, 6 × $\frac{1}{2}$, 7—8 × $\frac{2}{3}$.

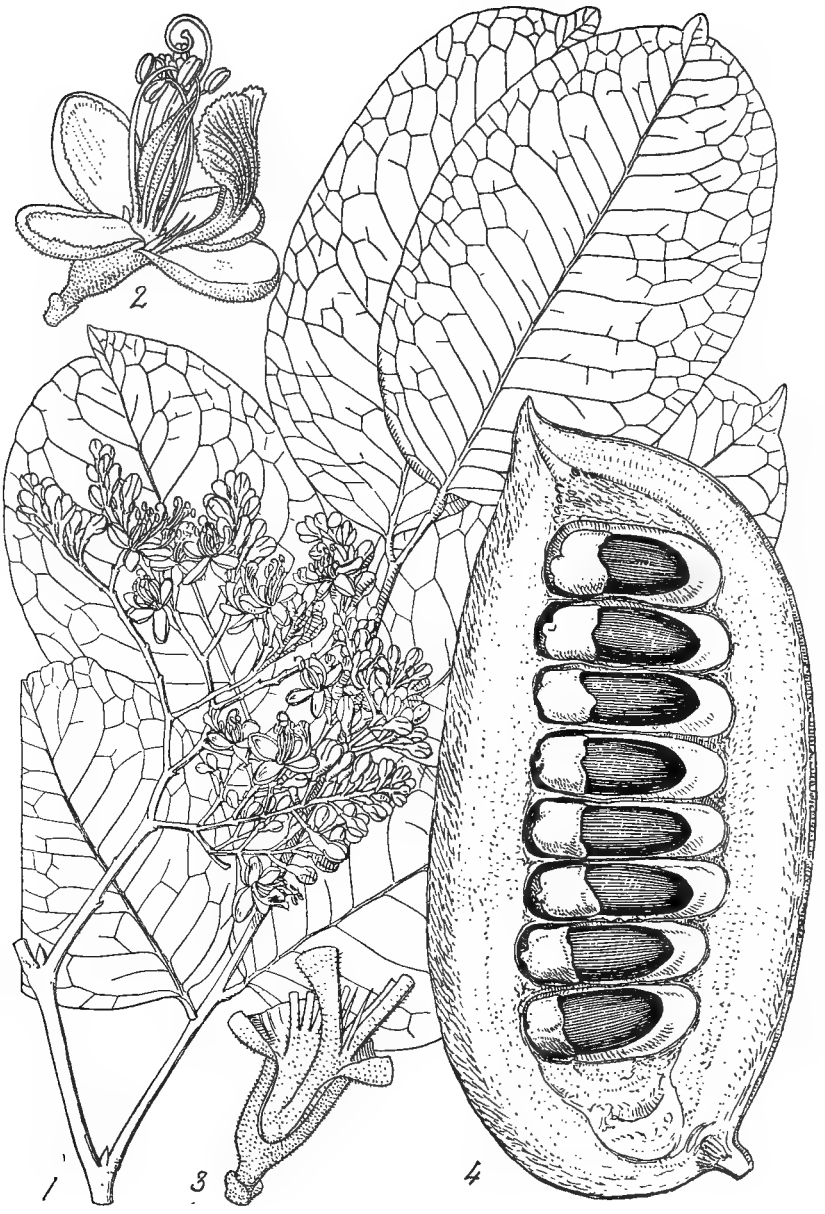
Pseudocedrela Kotschyi.

PLATE II.

AFZELIA AFRICANA.

Fig. 1, flowering branch; 2, flower; 3, interior of calyx-tube, upper parts of sepals, petal, stamens and ovary cut off; 4, valve of fruit from within, showing seeds.

Fig. 1 × $\frac{2}{3}$, 2 × 2, 3 × 4, 4 × $\frac{2}{3}$.



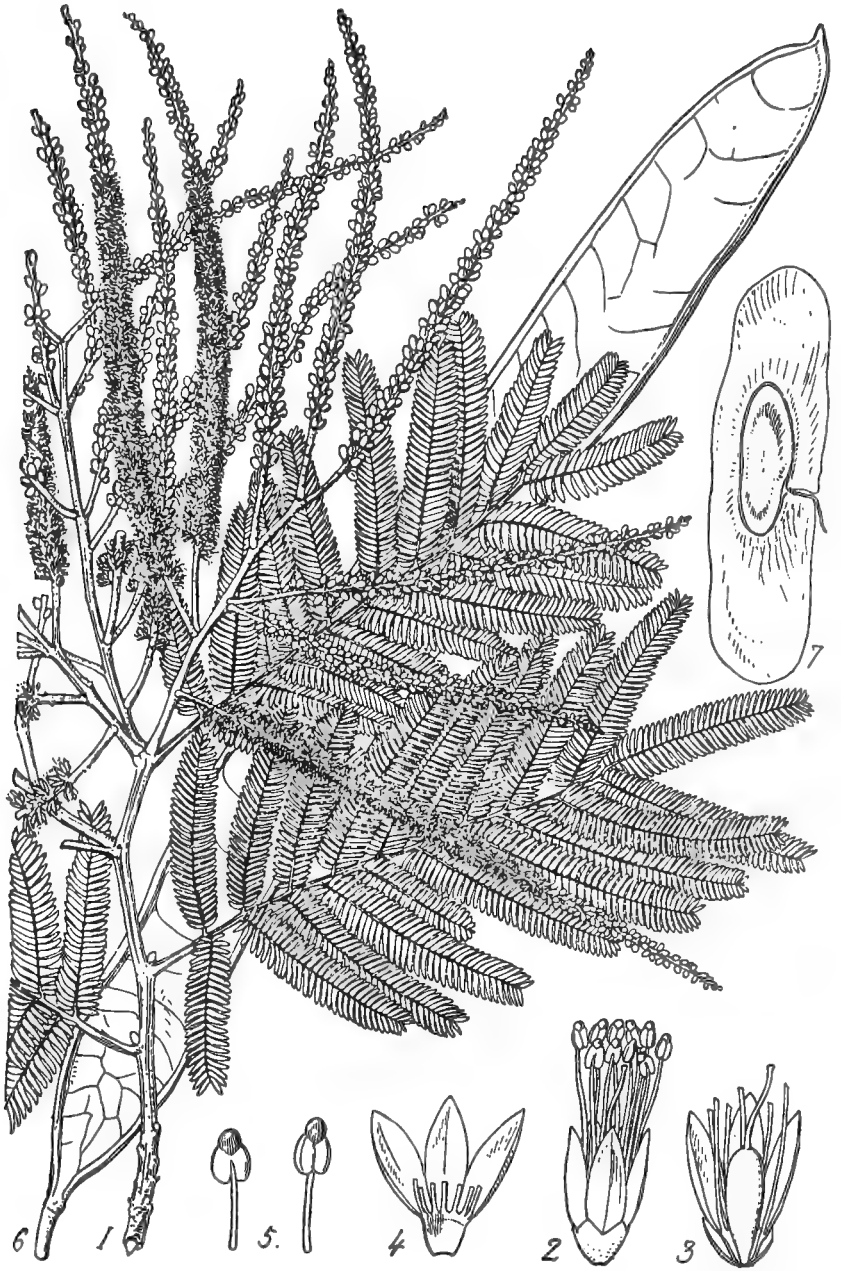
Afzelia africana.

PLATE 12.

PIPTADENIA AFRICANA.

Fig. 1, flowering branch ; 2, flower ; 3, section of flower ; 4, portion of corolla showing insertion of stamens ; 5, anthers ; 6, fruit ; 7, seed.

Fig. 1 × $\frac{2}{3}$, 2 × 8, 3—4 × 10, 5 × 16, 6—7 × $\frac{2}{3}$.



Piptadenia africana.

PLATE 13.

CYLICODISCUS GABUNENSIS.

Fig. 1, flowering branch; 2, bud; 3, flower; 4, petal; 5, pistil and disc with a single stamen; 6, anthers; 7, fruit; 8, seed.

Fig. 1 × $\frac{2}{3}$, 2—5 × 10, 6 × 20, 7—8 × $\frac{2}{3}$.

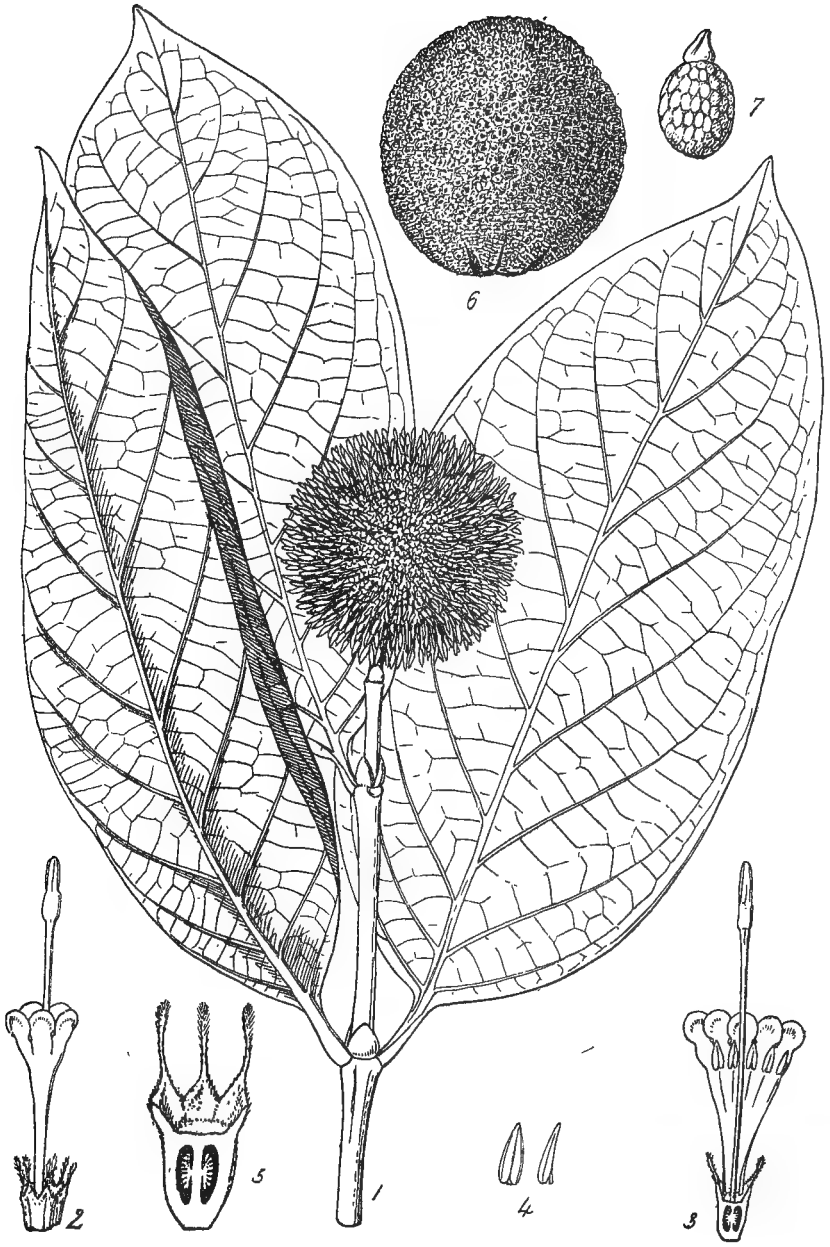
Cylicodiscus gabunensis.

PLATE 14.

SARCOCEPHALUS ESCULENTUS.

Fig. 1, flowering branch ; 2, flower ; 3, flower laid open ; 4, anthers ; 5, longitudinal section of ovary ; 6, fruit ; 7, seed.

Fig. 1 × ⅔, 2—3 × 2, 4 × 4, 5 × 6, 6 × ⅔, 7 × 10.



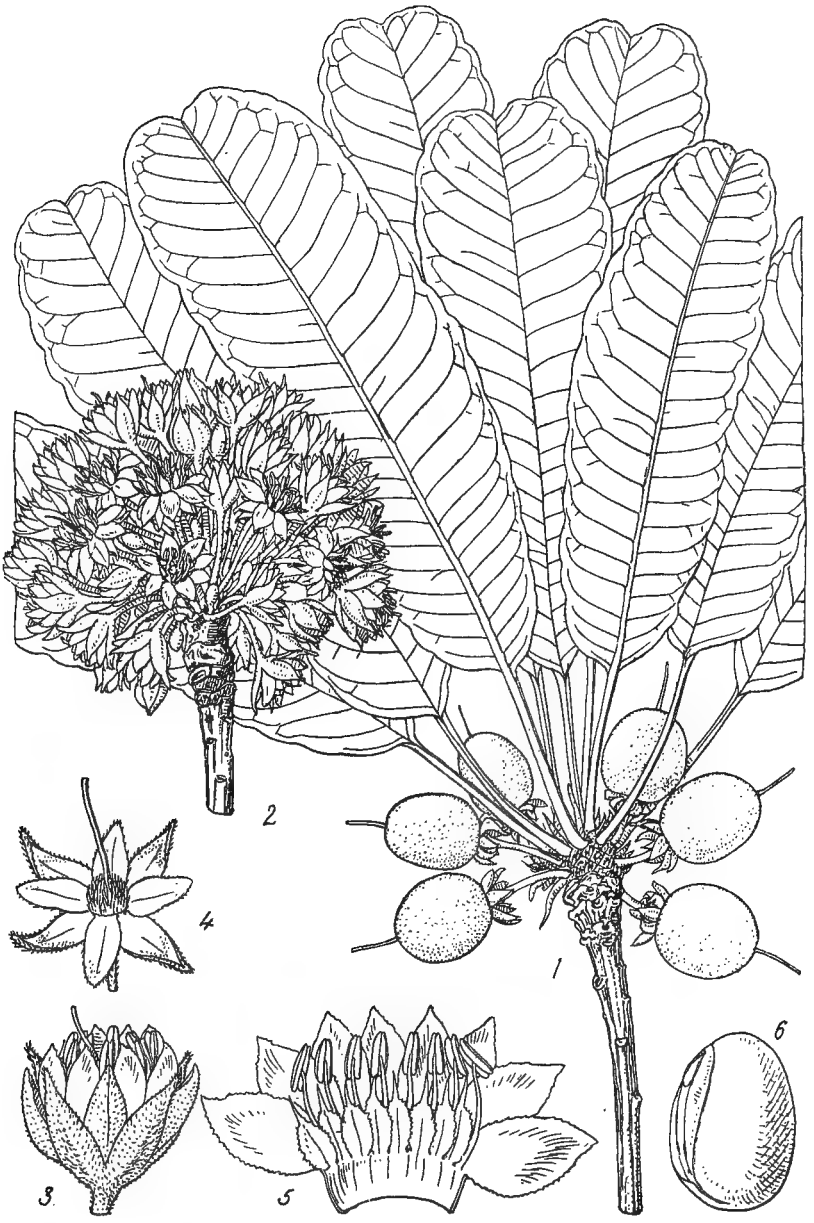
Sarcocephalus esculentus.

PLATE 15.

Butyrospermum Parkii.

Fig. 1, fruiting branch; 2, inflorescence; 3, flower; 4, flower with corolla and stamens removed; 5, corolla and stamens; 6, seed.

Figs. 1—2 × $\frac{2}{3}$, 3—5 × 2, 6 × $\frac{1}{2}$.



Butyrospermum Parkii.

PLATE 16.

MIMUSOPS SP.

Fig. 1, flowering branch ; 2, calyx and pistil ; 3, corolla and stamens from without ; 4, corolla and stamens from within ; 5, anther ; 6, transverse section of ovary ; 7, fruit ; 8, seed.

Fig. 1 × $\frac{2}{3}$, 2 × 1$\frac{1}{2}$, 3—5 × 4, 6 × 5, 7—8 × $\frac{2}{3}$.

Mimusops sp.

PLATE 17.

FUNTUMIA ELASTICA.

Fig. 1, flowering branch; 2, pits on lower surface of leaf; 3, flower; 4, section of flower; 5, portion of calyx with the pistil surrounded by the disc; 6, an anther, front view; 7, a pair of open follicles, seen from the back; 8, seed.

Fig. 1 × $\frac{2}{3}$, 2 × 2, 3 × 1$\frac{1}{2}$, 4—5 × 2, 6 × 5, 7—8 × $\frac{2}{3}$.

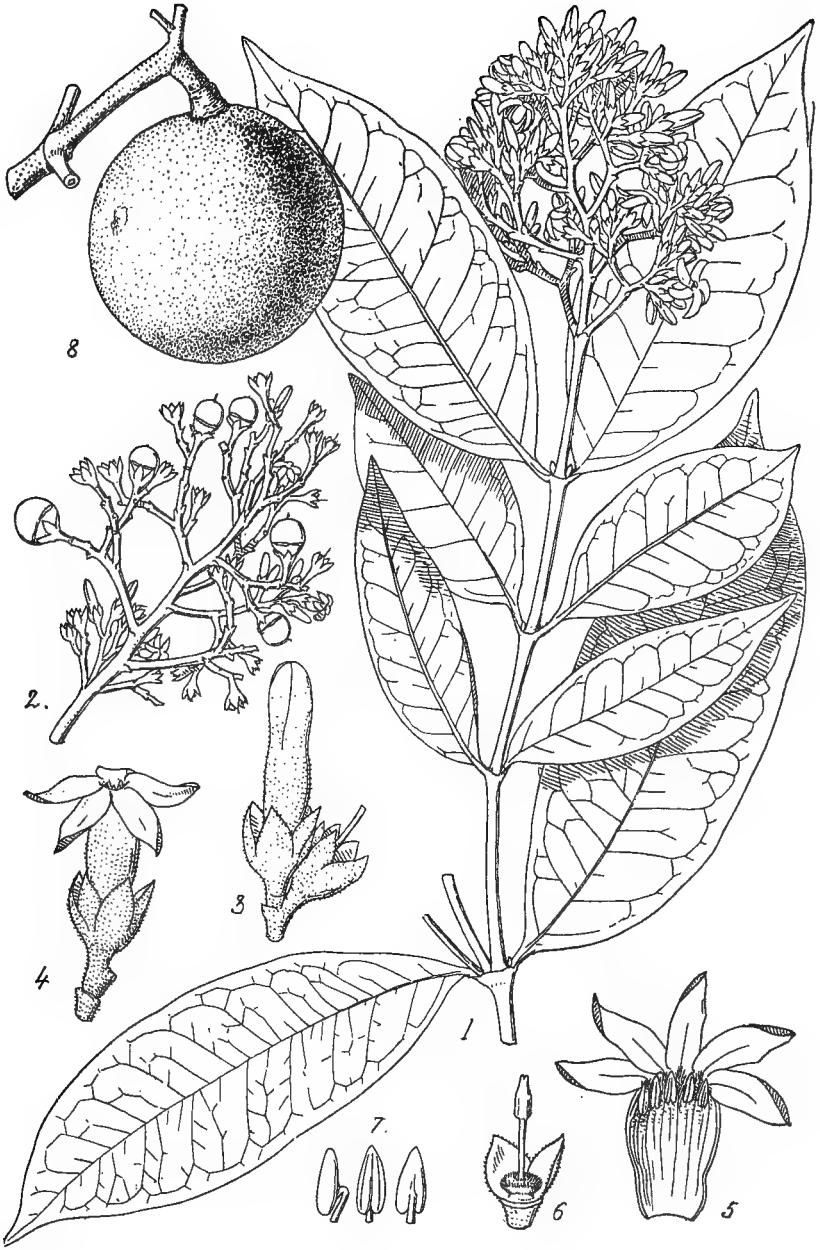
Funtumia elastica.

PLATE 18.

LANDOLPHIA OWARIENSIS.

Fig. 1, flowering branch; 2, upper part of young fruiting branch; 3, bud; 4, flower; 5, corolla, opened; 6, pistil; 7, anthers; 8, fruit.

Figs. 1—2 × $\frac{2}{3}$, 3—6 × 3, 7 × 6, 8 × $\frac{2}{3}$.



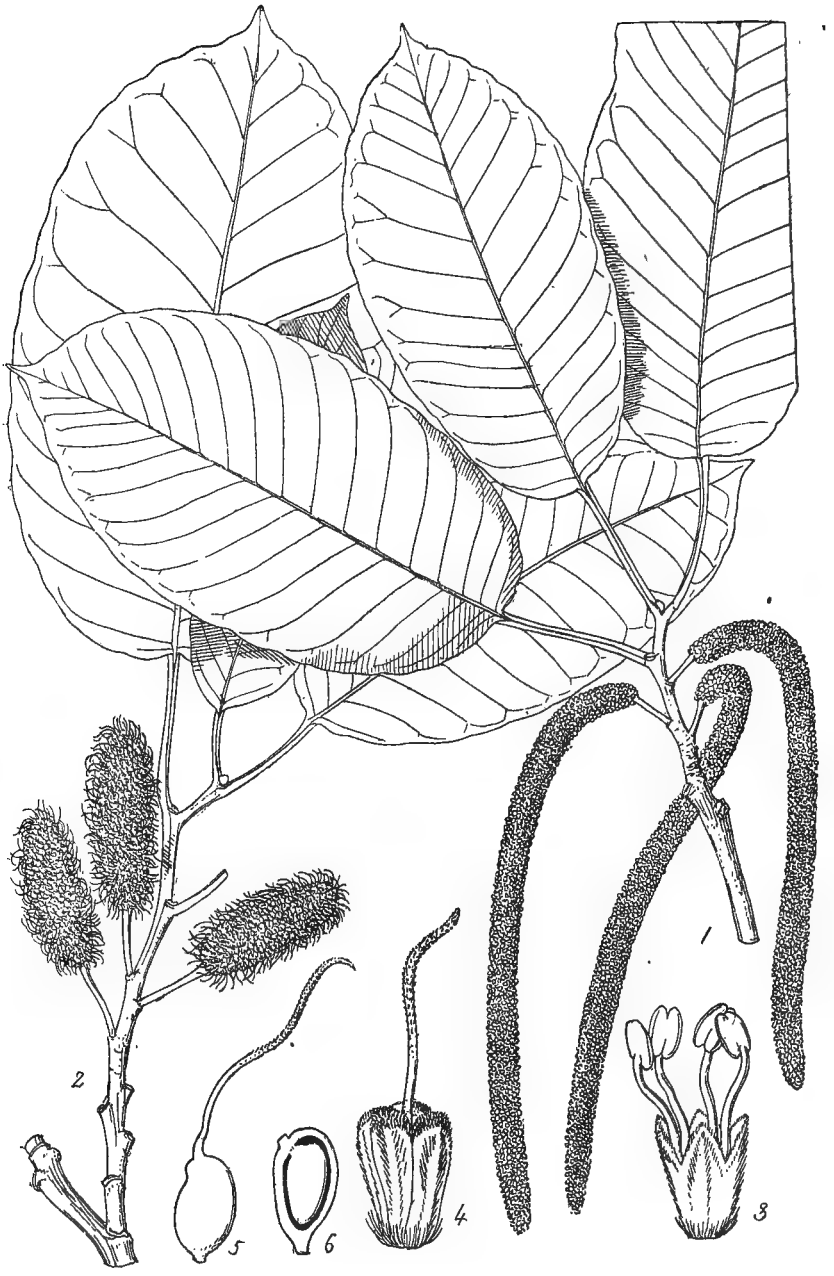
Landolphia owariensis.

PLATE 19.

CHLOROPHORA EXCELSA.

Fig. 1, flowering branch of male; 2, flowering branch of female; 3, male flower; 4, female flower; 5, pistil; 6, longitudinal section of pistil.

Figs. 1—2 × $\frac{2}{3}$, 3 × 7, 4—6 × 8.



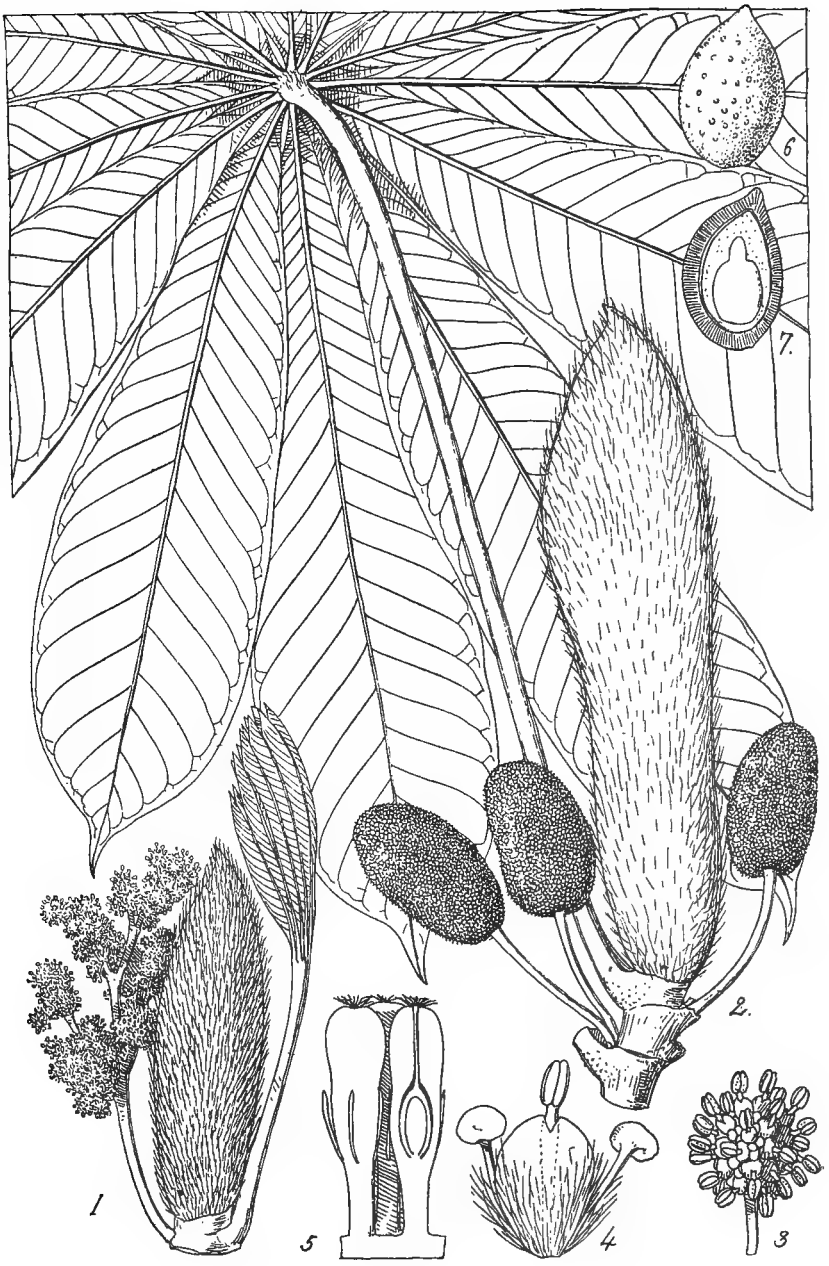
Chlorophora excelsa.

PLATE 20.

MUSANGA SMITHII.

Fig. 1, male inflorescence and young leaf; 2, branchlet bearing female inflorescences; 3, head of male flowers; 4, male flower and bracteoles; 5, female flowers; 6, seed; 7, longitudinal section of seed.

Figs. 1—2 × $\frac{2}{3}$, 3 × 4, 4 × 8, 5 × 12, 6—7 × 8.



Musanga Smithii.