

The Forests of Taraba and Adamawa States, Nigeria

An ecological account and plant species checklist



J.D. Chapman & H.M. Chapman

DFID Department for
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The Forest Flora of Taraba and Adamawa States, Nigeria

An ecological account and
plant species checklist

J.D. Chapman and H.M. Chapman

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University of Canterbury

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Front Cover
Looking from Cabbal Shirgu to Dutsin Lamba



The Team returning to camp after a day's work at the River Nwum Forest Reserve (Kop Nti) enumeration plot. From left to right: Francis Kamjoh, forest guard; Ali Genesis Mbuhi carrying the plant press and the spectacular flowers of the climber, *Pararistolochia goldieana*; Aaron with the Dane gun, indispensable for obtaining botanical specimens from the tallest trees; Moses Vava with the long handled crook for collecting up to 15 m; Samuel with the extendable aluminium ladder, and Daniel with the soil samples.

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Foreword

In 1958 I would never have believed that some forty-three years later I should be writing this foreword! As Jim Chapman indicates in his preface he was stimulated to carry out this ecological research by my initial field-work (Hepper, 1962, 1965, 1966).

I had spent the latter part of 1957 in the Shebshi Mountains (also called Vogel Peak) which at that time was in Adamawa Province of North British Cameroons, and later was incorporated into Nigeria. Early in 1958 I continued southwards through Gashaka District and walked across the Mambilla Plateau to join up with the 'Ring Road' at Nkambe, and thence to Bamenda.

At that time I was working as a systematic botanist at the herbarium of the Royal Botanic Gardens, Kew on the revision of the *Flora of West Tropical Africa*. The first edition (Hutchinson & Dalziel, 1927-1936) was thoroughly out of date owing to much field-work, as well as nomenclatural and taxonomic changes. Thus Ronald Keay was seconded to Kew from Nigerian Forest Research to prepare a revision. There were many additional species to include in the new edition, especially from areas that had been little studied at the time of the original edition. One area still to be explored was the extreme eastern boundary bordering the then French Cameroons. True, the German botanist Carl Ledermann had joined an expedition from the coast through the then colony of Deutsch Kamerun in 1908-09 (Ledermann, 1912; Hepper, 1974). Unfortunately, most of the collection, including the type specimens of the new species described by Engler and others (Engler, 1919), was destroyed in Berlin during the Second World War. So, as well as exploring this little known area I was hoping to re-collect Ledermann's new species for which there were names and descriptions but no type specimens.

While in the Vogel Peak and Mambilla areas I was able to make more additions to the first edition of the Flora. I was also concerned about the degradation of the forests and even then the overgrazing of the savanna grassland. I indicated to the Forest Department the desirability of designating further forest reserves but was unable to carry out detailed ecological surveys. It is gratifying to know that in due course not only forest reserves but, more recently, Nigeria's large national parks were gazetted.

When Jim Chapman was appointed a Forest Officer in Nigeria in 1971 he applied to work in Adamawa and set about studying the forests, but, with his other duties, he had insufficient time to survey them in the detail that was necessary. As a result of this he was granted special absence to spend time on them, with the support of a Percy Sladen grant. The full story is recounted by the author himself in his preface; what he does not say is the extreme labour that not only the collection of data involved but its analysis. Nevertheless, he persevered over many years with the cooperation of Frank White and others at Oxford, and colleagues at Kew. Now thanks to his daughter Hazel's commitment it is to be published and made available to any forester, ecologist, botanist or academic who may be interested. In a rapidly changing world it is also a historic document. Jim Chapman, because of this and his other studies (Chapman & White, 1970; White et al. in press), deserves and will receive a notable place in the history of African ecology.

Nigel Hepper
Kew, November 2000

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Chapter 1

Introduction

The aim of this book is to describe the diverse forest flora of Taraba and Adamawa States, Nigeria (Figures 1 & 2). Forest vegetation accounts for scarcely one percent of Taraba and even less in Adamawa, and is continuously being whittled away or actively logged. The remaining forests and forest fragments are extremely important in both a global and local context; they represent a sequence of forest types, *sensu* White (1983), and many support vulnerable populations of faunal taxa (Oates, pers. comm. 2000; Dunn, 1993; Dowsett, 1989). They occur at a range of altitudes, from lowland (c. 300 m), to montane, reaching an upper limit of c. 2300 m. They vary in size from small fragments of less than 1 hectare, to riverine strips and impressive stands of over 46 km².

This account is based on extensive field surveys undertaken by Jim Chapman (JDC) during the 1970s¹. Despite the delay in publishing this work, the data are, however, extremely relevant, as many of the forests, especially those at higher altitudes, and several of the low altitude forest reserves, remain relatively undisturbed (Barnwell, pers. comm. 2000; Dowsett-Lemaire, 1989).

Inevitably however, their future is precarious. One objective of this work is to bring the forest flora and fauna of this remote area of Nigeria to the attention of conservation bodies and other sympathetic parties. Without their support the survival (perhaps even short-term) of these forests is extremely unlikely.

Global significance

The forests of West Africa are being lost at a faster rate than those of any other African region (Davis et al., 1994). The annual average loss of closed canopy moist forest in Nigeria was (1981-85) 5%, and in 1994 only 9% of the original closed canopy forest remained (Davis et al., 1994). More specifically, and following the classification of White (1983),

Taraba and Adamawa States include examples of lowland rain forest, transitional rain forest, and transitions from lowland to montane, including an Afromontane element.

Nugent (1914) made the first published reference to the lowland forest of the Donga Valley, and recognized its magnificence. Since then the timber potential of these forests has been the subject of various unpublished departmental reports, for example Trappes-Lomax (1955), concerning lowland Gashaka.

The montane and submontane forests, belonging to the Afromontane archipelago-like regional centre of endemism (White, 1983) is arguably the most significant forest type in Nigeria, because it is relatively rare in West Africa (Sayer et al., 1992; White, 1978; Morton, 1972). A high proportion of species in these forests are (near-) endemic to the Afromontane Region (White, 1983), so that they have a floristic affinity with East African montane floras (Keay, 1959; Morton, 1972; Brenan, 1978). For this reason alone they are scientifically invaluable (White, 1981). Hepper (1965 & 1966), Hall (1970 & 1971) and Tuley & Jackson (1971) have each contributed to our understanding of the floristic diversity of West African montane forests.

The international significance of the North East Nigerian montane flora has been emphasized by Hepper (1968). He noted a high proportion of endemic species in the montane grassland, and also realized that the enrichment of this highland flora, by its proximity to the Cameroon highlands to the south, made it one of the richest natural floristic regions of West Africa. This was confirmed by Tuley and Jackson in 1969, when their botanical collections on Cabbal Wade (Chapter 3) included two new species and several first records for the Flora of West Tropical Africa (FWTA). Several species

¹ Chapman, J.D. (1993-1997). Series of unpublished reports. Held at the Royal Botanic Gardens, Kew, and the Daubeny Herbarium, Oxford. These reports include information on ecology and soil analysis not reported here.

new to West Africa have since been added by Jim Chapman (see checklist).

Combining all forest types, a total of 23 Red Data Listed species (IUCN, 2000) have been recorded from the forests and associated areas. Undoubtedly more are present, and are either awaiting identification (especially JDC's herbaceous material) or have yet to be discovered.

Preliminary inventories of the forest dwelling birds, reptiles, amphibia and lepidoptera in Taraba and Adamawa states have shown that the Gotel Mountains (Chapter 3) represent the extreme end of the range for many of these taxa, and therefore may harbour unique genetic varieties (Dowsett, 1989).

John Oates (pers. comm. 2000) has pointed out that the chimpanzees in the montane and submontane forests belong to the distinct subspecies, *Pan troglodytes vellerosus*, listed as 'endangered' by IUCN Primate Specialist Group (IUCN, 2000). He also notes that the putty-nose monkey (*Cercopithecus nictitans*, cf. subspecies *martini*) needs taxonomic review and suspects that the Mambilla putty-noses may be different from those in the Gashaka lowlands. John also emphasizes that the Mambilla forests, such as Ngel Nyaki (Chapter 2) are very special and under extreme threat, so deserve national park status.

Further recognition of the biological importance of the forests of the Gotel Mountains, Cabbal Hendu, Vogel Peak and the Tiba Plateau and the urgent need for their conservation has been underlined by Bawden & Tuley (1966) and more recently, by the Nigerian Conservation Foundation (1999), and Dowsett-Lemaire (1989).

Local significance

The lowland and transitional forests have traditionally been used as a source of food, leaves, beeswax, and palm wine (Appendix 1). Timber trees include *Albizia* spp, *Antiairs africana*, *Berlinia africana* and *Khaya grandifoliola*, *Milicia excelsa* and *Terminalia superba*.

By maintaining year-round stream flow, mitigating flooding and erosion, and affording a refuge to wildlife, the montane forests have a vital protective function.

Protection of the forests

Some of the forests described here have statutory protection as forest reserves (Appendix 1). Others are within Gashaka Gumti National Park (Figure 2). A number have no protection other than inaccessibility or local taboos. All are vulnerable to increasing pressures, with logging and farming the greatest threat to the lowland and mountain forests respectively.

Baissa Forest Reserve, (lowland forest), had been logged out by the mid 1980 (Dangpurki, pers. comm.), and there is increasing pressure on nearby River Amboi (Chapter 7). The taboo which formerly protected the Akwaizantar forest from hunting no longer applies (Hopkins, pers. comm.).

Location of the forests

Figures 1 and 2 illustrate the location of the forests. Taraba State includes Mambilla Plateau (Chapter 2) the Gotel Mountains (Chapter 3), Cabbal Hendu (Chapter 4), the west escarpment forest (Chapter 6) and Baissa, Bissaula and River Amboi forests (Chapter 7), and Gangumi and Wurkam River Forest Reserves (Chapter 8). The Shebshi Mountains (Chapter 5) are in Adamawa State.

Content

The book comprises descriptions, in varying detail, of all these forests. The information is presented as botanical notes, summary results of detailed profile strips and enumeration plots, and a checklist. Chapters 2-8 describe the forests and associated vegetation of each of the principal upland areas, followed by the escarpment forests and lowland forest outliers. There is thus an altitudinal sequence from the Gotel Mountains, where forest of a kind persists up to 2300 m, down to the high forest outliers in the river basins at c. 230 m.

Each chapter begins with a short summary of all the vegetation types (including for example, grassland or forest/grassland ecotone) referred to in the chapter. In addition, for each of the forest areas that were studied in detail, the altitude, approximate area, and Red Data List species are presented.

History of Botanical Exploration

Mambilla Plateau (Chapter 2)

Hepper (1966) has described Mr and Mrs Gates as making the first known botanical collections from Mambilla Plateau in 1947. These were followed by about 50 collections made by the FHI (Forest Herbarium Ibadan) collectors M.G. Latilo and B.O. Daramola in January 1955. A more comprehensive collection (335 species) was made by Nigel Hepper in 1958, accompanied by Ben Daramola, and assisted by J.W.F. Chapman. Hepper and Daramola made a trek across the Plateau from Mayo Selbe in the north to Nkambe in the West Cameroons. En route they passed by Ngel Nyaki forest, and Hepper was the first to comment on its extent and probable rich diversity (Hepper, 1966). He also commented on the fact that at Ngel Nyaki village people were accustomed to hear the roar of lions (Hepper, 1962).

Following this visit up until 1970 only a few collections were made by casual visitors to the Plateau, including S.H. Wimbush, C.A.M. Nash and W.J. Howard (Hepper, 1966). Between March and April 1970 J.B. Hall, accompanied by Z. Gbile, Ben Daramola (FHI), Mrs Medler, a botanist from the University of Ife, and Miss J. Bowden from Kew, made further botanical collections (Hall, 1970). They made about 314 gatherings, of which 16 were possibly new to Nigeria. Their botanical collections are deposited at FHI, the University Herbarium at Ife, and Kew.

Mr C.F.A. Onochie of the Federal Department of Forest Research was the next botanical visitor, in March, 1973. Mr Onochie included Ngel Nyaki in a list of areas in the south of the (then) North Eastern State which he recommended be made strict natural reserves (C.F.A. Onochie to the Director, Federal Dept. of Forest Research, 1973). In the same year Dr I. Colquhoun, the Senior Wildlife Officer, visited the forest. He was so impressed with the abundant wildlife which included buffalo (*Syncerus caffer nanus*), chimpanzees (*Pan troglodytes*), black and white colobus monkeys (*Colobus guereza occidentalis*), putty-nosed monkeys (*Cercopithecus nictans*), red flanked duiker (*Cephalophus rufilatus*), red river hog (*Potamochoerus porcus*), and numerous bush buck (*Tragelaphus scriptus*), that the following year Ngel Nyaki was gazetted a game sanctuary.

Jim Chapman's collections (over 3000 numbers) were made between 1972 and 1978. They comprised a high proportion of woody plants from forest patches throughout the Plateau and included concentrated collections at Ngel Nyaki. Hazel Chapman made casual collections during this period, in school holidays.

In 1988 Françoise Dowsett-Lemaire explored the forests on behalf of the Nigerian Conservation Foundation and produced a summarized account of the forest structure and species composition (Dowsett-Lemaire, 1989). This was especially important as it highlighted the size and floral diversity of Ngel Nyaki.

Bawden & Tuley (1966) have described the physiography and discussed the physical and human aspects of the environment of Mambilla in detail.

Gotel Mountains (Chapter 3)

The first published account of the vegetation of the Gotel Mountains (Figure 2) was by Tuley and Jackson (1971), who visited the area in 1969, early in the dry season. They were accompanied by Z. Gbile and B. Daramola. Their botanical collections included an *Eriocaulon* (sp. nr. *pulchellum*) and a *Bidens* sp. - both new species. *Aristida junciformis* and *Plectranthus sanguineus* were first records for FWTA whilst 59 other taxa were collected here for the first time in Nigeria. As Menefy observed, "This was indeed a remarkable scientific event, especially so in a country like Nigeria, where by African standards the flora is well known." (Menefy, 1974).

In April 1970, J.B. Hall, plant ecologist at the University of Ife, led a party of botanists to the mountains, which included Z. Gbile and Ben Daramola.

Jim Chapman was the next botanist to visit the area, and made substantial gatherings during November 1974 and February 1975, again concentrating on the woody forest flora. In those days local tradition attached a sense of awe to the whole mountain, and the huge rock, Dutsin Dodo, and adjoining forest was shunned except by the boldest hunters. This

could explain the relative abundance of wildlife even before Gangirwal was included in the Gashaka Gumti Game Sanctuary in the early 1970s. Besides forest animals there were (1974-75) baboons (*Papio anubis*), warthog (*Phacochoerus africanus*), mountain reedbuck (*Redunca fulvorufula*), and occasionally lions (*Panthera leo*). Warthog were abundant and could be seen feeding alongside cattle on Cabbal Wade. The local Muslim people did not hunt them although poachers from Cameroon will do so. Mountain reedbuck were quite common.

At Gangirwal there was (in 1974/75) a sizeable population of bushcow (*Syncerus caffer* ? *nanus*). They spent their days in the forests, moving up to graze on Gangirwal late in the afternoon or after dark. It seems unlikely they were ever numerous enough to affect the floristic composition of the grassland as cattle have done, but they kept the forest understorey open in their daytime haunts.

Bushpig (*Potamochoerus* sp.) were seen on occasion and giant forest hog (*Hylochoerus meinertzhageni*) have been recorded by Menefy (1974) and more recently by Dowsett-Lemaire (1989) and Dowsett (1989). Their rooting must influence tree regeneration, as does the presence of chimpanzees (*Pan troglodytes*), monkeys including black and white colobus monkeys (*Colobus guereza occidentalis*), putty-nose monkeys (*Cercopithecus nictans*), and baboons which also frequent the forests on occasion. All these animals include tree fruits in their diet.

Bushbuck (*Tragelaphus scriptus*), yellow-backed duiker (*Cephalophus sylvicultor*) and red-flanked duiker (*Cephalophus rufilatus*), all common in 1974-75, browsed the forest undergrowth.

Francoise Dowsett-Lemaire visited the Gotel Mountains in 1988 (Dowsett-Lemaire, 1989). Her account is interesting in that it emphasizes the strong Afromontane element in these forests.

Cabbal Hendu (Chapter 4)

As far as the authors are aware, Jim Chapman, during 1978, was the first and perhaps only botanist to have collected on Cabbal Hendu.

The Shebshi Mountains (Chapter 5)

Nigel Hepper, in January 1958, was first to make

botanical collections from Vogel Peak “a fascinating area in the (then) Northern Cameroons, which had been entirely neglected botanically, and, as I was to find out, in other ways too” (Hepper, 1962). Backed by Keay, and accompanied by Ben Daramola, Hepper’s trek lasted from early November to mid December 1957. Hepper collected 490 species, 30 of which were then new to West Africa (Hepper 1961, 1963 & 1965).

While Hepper’s visit was confined to Vogel Peak, he noticed from the aerial photographs some forest to the north-west, on the Tiba Plateau. Eventually (1961) the provincial forest officer, J.W.F. Chapman, succeeded in having this part of the Plateau (c. 47 km²) designated as Gangoro Forest Reserve (Appendix 1). We know that Tuley collected specimens on the Tiba Plateau during 1965, but are unsure from where.

Jim Chapman collected during February 1976/76, in Gangoro Forest Reserve, and in February 1977 on the Kiri Plateau and at Vogel Peak.

The Alantika Mountains (Appendix 2)

Nigel Hepper was the first to collect here, as part of his Vogel Peak expedition in 1957 (Hepper, 1961, 1963 & 1965). Jim Chapman visited the plateau in June 1978.

The Western Escarpment of Mambilla Plateau, Akwaizantar and Kop Nti forests (Chapter 6)

Jim Chapman, during 1978, was the first botanist to have collected here, as far as we know.

High Forest of the Middle Donga Valley (Chapter 7)

For Baissa Forest Reserve we are only aware of collections by Jim Chapman and Hazel Chapman. The forest was completely logged out by the 1980s.

Jim Chapman’s collections of over 170 numbers, made during 1978, are the first from the River Amboi area.

John Peal collected from Baissaula in 1960, and his collections are held at FHI. Jim Chapman added

to Peal's collections in 1974, and Hazel Chapman added to these in the same year.

High Forest Outliers in Lowland Gashaka, Gangumi and Wurkam River Forests (Chapter 8)

The first botanical collections from these areas were made in 1954/55 by Trappes-Lomax. His party included the collectors M.G. Latilo and B. Daramola from FHI. JDC collected here during 1977.

Methods

Profile data was collected according to Davis & Richards (1933) and Richards et al. (1939).

Narrow rectangular strips of forest were marked out using a prismatic compass, and the corners marked with substantial stone beacons. Each tree of 6 m and over in height was numbered and botanical specimens collected. With the taller trees this sometimes involved shooting down specimens with a charge of jagged slugs; otherwise a crook lashed to a pole was usually effective. The position of each tree relative to the base-line was recorded and the girth at breast-height (1.3 m) measured. Buttressed trees were measured above the buttresses, which were then measured for height and width at ground level.

Next the height of the tree was measured. For taller trees an Abney Level was used, unless the ground was too steep, when an extendable ladder and a climber with graduated bamboo poles was employed. Also measured was the height to the first main branch, or where the tree forked, and the crown spread. A rough sketch was then made of each tree with emphasis on the branching habit. From this data the profile diagrams were drawn to scale. The only trees felled were a very few which were less than 6 m tall. In drawing the profile diagrams it was necessary to omit some of the smaller (C storey) trees for the sake of clarity.

To be as representative as possible, the ten profile strips varied in length among sites. Two were the customary 61 m. The longest, at Ngel Nyaki (Mambilla Plateau), was 143 m and the shortest, on a 40° slope in Kurmin Dodo (Cabbal Wade) was only 45 m.

In the six sample plots all trees 30 cm and over in girth were enumerated in 30 cm girth classes. Plot corners were marked with large stone beacons with a central hardwood post.

Soils

At both profile strips and sample plots a soil pit was dug 1.5 m deep, 1.5 m long and 0.6 m wide, when possible. The soil profile was described, colour smears obtained and soil samples collected. Details are given in Chapman (1993-1997).

Botanical collections

Over 3000 plant collections were made in sets of up to six. Specimens were sent to FHI, the Daubaney Herbarium, Oxford (DHO (formally FHO)), and frequently to the Royal Botanic Gardens, Kew.

Determinations

Many of the fertile woody plant specimens were identified by F. White and S. Marner, and are housed in the DHO. World experts on particular families identified other numbers, such as Roger Polhill for the Viscaceae and Mike Lock for the Zingiberaceae. William Hawthorne identified much of the woody sterile material. Isobyl la Croix identified most of the orchids. Bryophytes were identified by experts at the British Museum of Natural History. However, many specimens, especially herbs, have yet to be identified.

Profile diagrams and enumeration plots

The ten profile diagrams and seven enumeration plots provide a detailed description of forest structure, physiognomy and floristic composition. They also help to describe aspects of forest ecology.

In future we aim to analyze the enumeration data in more detail, using the program TREMA, in collaboration with William Hawthorne and Cameroonian colleagues.

Red Data List Plant Species

The IUCN Red Data List of vascular plants attempts to summarise the conservation status of threatened plants in a global context. To do this Red List Categories (IUCN, 1994) are used to provide an easily and widely understood method for highlighting those species under higher extinction risk, so as to focus attention on conservation measures designed to protect them (IUCN, 2000).

There are seven categories: Extinct (EX), Extinct in the wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Lower Risk (LR) and Data Deficient (DD). A detailed explanation of each category is given in IUCN (1994 & 2000).

It is important to realise that IUCN categories are defined in a global context. This means that a species which is relatively common locally, but globally rare, could be classified as critically endangered or endangered. Cheek et al. (2000) gives examples of this from the Cameroon.

Although many threatened plant species are included in the IUCN List (roughly 12.5% of the world's vascular plants (IUCN, 1997)), many are missing because of lack of data. This is particularly true of many countries in Asia, South America and parts of Africa. These countries are continually adding to their botanical knowledge, reassessing taxonomic status and assessing conservation status. For example Cheek et al. (2000) have been able to combine field observation and herbarium specimens to designate IUCN categories to many species not yet on the official IUCN Red Data List.

In this work we have combined the latest IUCN List (2000) and Cheek et al. (2000) to identify Red Data List species from the forests of Taraba and Adamawa States.

Red Data species are listed below in alphabetical order, species within genera, genera within families and families within the Dicotyledons, Monocotyledons, and ferns and fern allies, following the example of Cheek et al. (2000).

Taxa which have been collected, or sight recorded, by the authors are identified with an asterisk. Those taxa without an asterisk have been collected in the area, but were not necessarily seen by JDC.

Threats

Plants can be under threat for many reasons. A common threat is habitat loss, but many taxa are specifically selected by humans for destruction.

The majority of Red Data List species recorded from the mid-altitude, submontane and montane forests of Taraba and Adamawa States are in danger of extinction through habitat loss. For example, *Eugenia gilgii*, recorded from Cabbal Wade, Gangirwal, Cabbal Hendu and Vogel Peak is categorised in the IUCN Red Data List as 'CR A1c'. That is, it is "critically endangered (CR), facing an extremely high risk of extinction in the wild in the immediate future, as defined by (A) population reduction in the form of (1) an observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat" (IUCN, 2000).

This illustrates the international importance of all mid-altitude and montane forest within Taraba and Adamawa States, where *Eugenia gilgii* was relatively common (see checklist). Many of these forests (and fragments) lie within Gashaka Gumti National Park. Unfortunately however, the largest, most diverse of these forests, Ngel Nyaki Forest Reserve, is currently outside the park boundaries. Ngel Nyaki is being eroded by farming, which is beginning to encroach within the Reserve boundaries. We can only hope that the recommendations of the Park Board will be adhered to, and that Ngel Nyaki will soon become part of Gashaka Gumti National Park.

A decline in species area (fragmentation) can affect taxa in different ways (Young et al., 1996). Typically fragmentation will be accompanied by a loss of genetic variation, increased homozygosity and increasing genetic drift, all the consequence of reduced gene flow. In these forests fragmentation may reduce gene flow as a direct consequence of spatial isolation, or by loss of pollinators and/or seed

dispersers. Consequently, fragments within Gashaka Gumti National Park which are safe from destruction may not be viable in the long term because of the loss of associated and co-evolved faunal mediated gene flow. However, in some instances fragmentation has been found to increase gene flow, by breaking down local genetic structure (Young et al., 1996).

The most threatened habitats are lowland rainforest lying outside the National Park. Farming and logging is rapidly destroying lowland forest such as that of the Donga Valley (Chapter 7) and the forests of the Western Escarpment of Mambilla Plateau (Chapter 6). Moreover, several taxa within these areas are being targeted by humans for destruction. For example the timber trees *Entandrophragma angolense* and *Khaya grandifoliola* are designated 'VU A1cd' (IUCN, 2000). That is, they are Vulnerable (VU), (not Critically Endangered or Endangered) but are facing a high risk of extinction in the wild in the medium-term future, as defined by (A), a population reduction in the form of (1), an observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat, and/or (d) actual or potential levels of exploitation (IUCN, 2000).

Fringing forest, especially on Mambilla Plateau, was already threatened during the 1970s (Chapter 2). The human population on Mambilla has grown since then, and so demands on fringing forest will have increased; their protection is of paramount importance.

Kurame and fetish groves are under increasing threat as superstitions (once responsible for their protection), lose their plausibility, and as the need for wood and food becomes greater. Another factor is the continuous burning and grazing of the upland grassland which must pose a threat to many species.

An explanation of all designated categories is given in IUCN (1994 & 2000), and at:

http://redlist.cymbiont.ca/categories_criteria.html

Red Data List Species

Taxa which have been collected, or sight recorded, by the authors are identified with an asterisk. Those taxa without an asterisk have been collected in the area, but were not necessarily seen by JDC.

Dicotyledons

APIACEAE

Peucedanum angustisectum (Engl.) Norman*
Red Data List category: LR/nt
Presence in Adamawa and Taraba States:

Gangirwal

Habitat: Rocky mountain grassland

CAMPANULACEAE

Lobelia columnaris Hook. f. *
Red Data List category: LR/nt
Presence in Adamawa and Taraba States: Cabbal
 Hendu and Cabbal Wade

Habitat: By streams in grassland, often close to the forest edge

Wahlenbergia ramosissima (Hemsley) Thulin subsp. *ramosissima*

Red Data List category: VU B1+2bc

Presence in Adamawa and Taraba States: Cabbal
 Wade and Mambilla Plateau

Habitat: Montane/submontane grassland

COMPOSITAE

Bafutia tenuicaulis C. D. Adams *

Red Data List category: LR/nt

Presence in Adamawa and Taraba States:
 Gangirwal and Mambilla Plateau

Habitat: Montane/submontane grassland

Helichrysum cameroonense Hutch. & Dalziel *
Red Data List category: LR/nt
Presence in Adamawa and Taraba States:
Gangirwal
Habitat: Montane/submontane grassland.

Vernonia bamendae C.D. Adams
Red Data List category: VU B1+2bc
Presence in Adamawa and Taraba States: Cabbal
Wade
Habitat: Montane/submontane grassland

LAMIACEAE

Stachys pseudohumifusa Sebsebe subsp. *saxeri* Y. B.
Harv.
Red Data List category: VU D2
Presence in Adamawa and Taraba States:
Mambilla Plateau
Habitat: Swamp/grassland

LEGUMINOSAE

Crotalaria bamendae Hepper
Red Data List category: VU D2
Presence in Adamawa and Taraba States:
Mambilla Plateau
Habitat: Montane/submontane grassland

Crotalaria ledermannii Baker f.
Red Data List category: VU D2
Presence in Adamawa and Taraba States:
Mambilla Plateau
Habitat: Montane/submontane grassland

Millettia conraui Harms*
Red Data List category: VU A1c, B1+2c
Presence in Adamawa and Taraba States: Cabbal
Wade, Cabbal Hendu, Ngel Nyaki Forest Reserve
Habitat: Montane/submontane forest

MELIACEAE

Entandrophragma angolense (Welw.) C.DC*
Red Data List category: VU A1cd
Presence in Adamawa and Taraba States: Cabbal
Hendu, Cabbal Wade, Gangoro, Ngel Nyaki
Forest Reserve
Habitat: Montane/mid-altitude forest

Khaya grandifoliola C. DC. *
Red Data List category: VU A1cd
Presence in Adamawa and Taraba States: Baissa
Forest Reserve, Baissola Forest Reserve, River
Amboi Forest Reserve, Cabbal Hendu, Vogel
Peak, River Nwum Forest Reserve
Habitat: Mid-altitude & lowland forest

Lovoa trichilioides Harms *
Red Data List category: VU A1cd
Presence in Adamawa and Taraba States: Cabbal
Hendu, Ngel Nyaki, Vogel Peak Forest Reserve
Habitat: Submontane / mid-altitude forest

MYRTACEAE

Eugenia gilgii Engl. & Brehm.*
Red Data List category: CR A1c
Presence in Adamawa and Taraba States: Cabbal
Wade, Gangirwal, Cabbal Hendu, Vogel Peak
Habitat: Montane/submontane forest

POLYGALACEAE

Polygala tenuicaulis Hook. f. subsp. *tayloriana* J.
Paiva.*
Red Data List category: LR/nt
Presence in Adamawa and Taraba States:
Mambilla Plateau, Vogel Peak, Gangirwal? JDC
3373
Habitat: Rocky grassland

ROSACEAE

Prunus africana (Hook. f.) Kalkman*
Red Data List category: LR/nt
Presence in Adamawa and Taraba States: Cabbal
Hendu, Gangirwal, Gangoro.
Habitat: Montane/submontane forest

RUBIACEAE

Chassalia laikomensis Cheek ined.
Red Data List category: CR A1
Presence in Adamawa and Taraba States:
Mambilla Plateau
Habitat: Understory of montane forests

SAPOTACEAE

Pouteria altissima (A. Chev.) Baehni *

Red Data List category: LR/cd

Presence in Adamawa and Taraba States: Cabbal Wade, Cabbal hendu, Gangoro Forest Reserve, Ngel Nyaki Forest Reserve

Habitat: Montane/submontane/mid altitude forests

STERCULIACEAE

Dombeya cf. *ledermannii* Engl.*

Red Data List category: CR A1c

Presence in Adamawa and Taraba States: Cabbal Wade, Cabbal Hendu, Akwaizantar Forest Reserve

Habitat: mid-low altitude forest / grassland margins

Monocotyledons

CYPERACEAE

Carex preussii K. Schum.

Red Data List category: LR/nt

Presence in Adamawa and Taraba States: Mambilla Plateau

Habitat: Gaps in submontane forest

ERIOCAULACEAE

Eriocaulon asteroides S.M. Phillips

Red Data List category: VU D2

Presence in Adamawa and Taraba States: Mambilla Plateau

Habitat: Basalt pavement, i.e., thin, peaty, seasonally waterlogged soils

Eriocaulon bamendae S.M. Phillips

Red Data List category: VU D2

Presence in Adamawa and Taraba States: Mambilla Plateau

Habitat: swampy grassland

PALMAE

Raphia mambillensis Otedoh*

Red Data List category: LR/cd

Presence in Adamawa and Taraba States: Mambilla Plateau

Habitat: swampy grassland

Other taxa which may well be threatened but which need taxonomic treatment include:

XYRIDACEAE

Xyris sp. From upland grassland on Gangirwal. Mike Lock from Kew, the expert on Xyridaceae, did not recognise this taxa.

Several ?nov. taxa appear in the checklist, these may well have narrow distributions and could therefore also be under threat.

The Checklist - First Edition

Most of the taxa referred to in the text have been included in the checklist. They have been grouped into Dicotyledons, Monocotyledons, Gymnosperms, fern allies and ferns, and bryophytes respectively, and then according to family, genus and species, following the general layout of the Mt Oku checklist (Cheek et al., 2000). In some cases the species name is not known, in which case a '?sp.' has been added after the generic name. Sometimes a tentative determination has been made, but if the specimen does not fit the species well, a 'cf.' prior to the species name has been used to intimate that further examination may prove illuminating. The abbreviation (nov?) suggests that a specimen may be new taxa. Information on collector, date of collection, altitude, location, habitat type, Red Data listing and phenology is presented.

Species names follow those of Lebrun & Stork (1991-1997). Their 'Énumération des Plantes à Fleurs D'Afrique Tropicale' is the most recently published research that is available and acceptable (Cheek et al., 2000).

Most of the species referred to in the checklist can be found in The Flora of West Tropical Africa (FWTA) (Keay & Hepper, 1954-1972). In several cases the names used in FWTA have been superseded and are therefore synonyms. A list of these is presented at the back of the checklist in Table 29.

While far from exhaustive, the checklist provides baseline data for future taxonomic, ecological

and evolutionary research in the area. So far, at least 16 trees new to Nigeria have been identified including several first records for West Africa, such as *Anthonotha noldeae* and *Pterygota mildbraedii* (Dowsett-Lemaire, 1989). It has also extended the known distribution of several 'narrow endemics' such as *Clutea kamerunica* and *Succisa trichotocephala* (Cheek, pers. comm.).

It will be important to determine whether, for example, *Ternstroemia polypetala* and *Kniphofia reflexa*, both Red Data listed, occur in the Taraba and Adamawa forests and upland grasslands respectively; they are both recorded from the nearby Mt Oku (Cheek et al., 2000).

Inevitably the taxonomy of some taxa will have been updated since Lebrun and Stork, and it is possible that an early synonym will have escaped detection and therefore updating. However the urgency for the publication of this book has not allowed for as much checking as the authors would have wished.

Most of the information comes from JDC's collections, although some numbers from Hepper (FNH), Hazel Chapman (HMC), Peal, and Latilo & Daramola (FHI) have been included. Time constraints have prevented us from conducting a more comprehensive search.

Several taxa not mentioned in the text, but collected by JDC, have been included in the checklist. Conversely, many species collected by JDC have not been included in the checklist, either because they have not yet been identified (and this is especially relevant to montane herbs), were not mentioned in the unpublished reports, or because they occurred outside the forest areas included in this text.

A more comprehensive checklist is currently under preparation.

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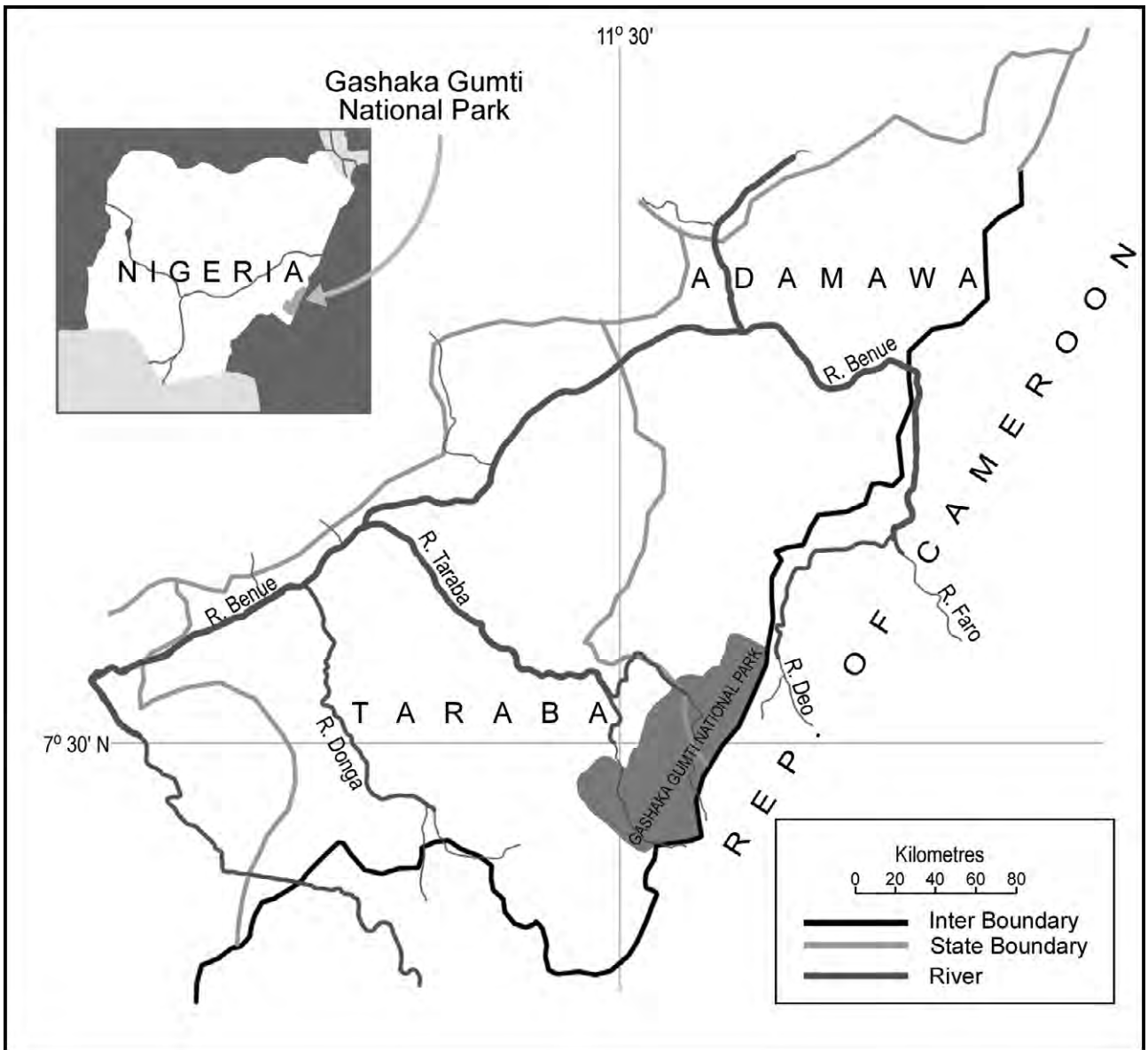
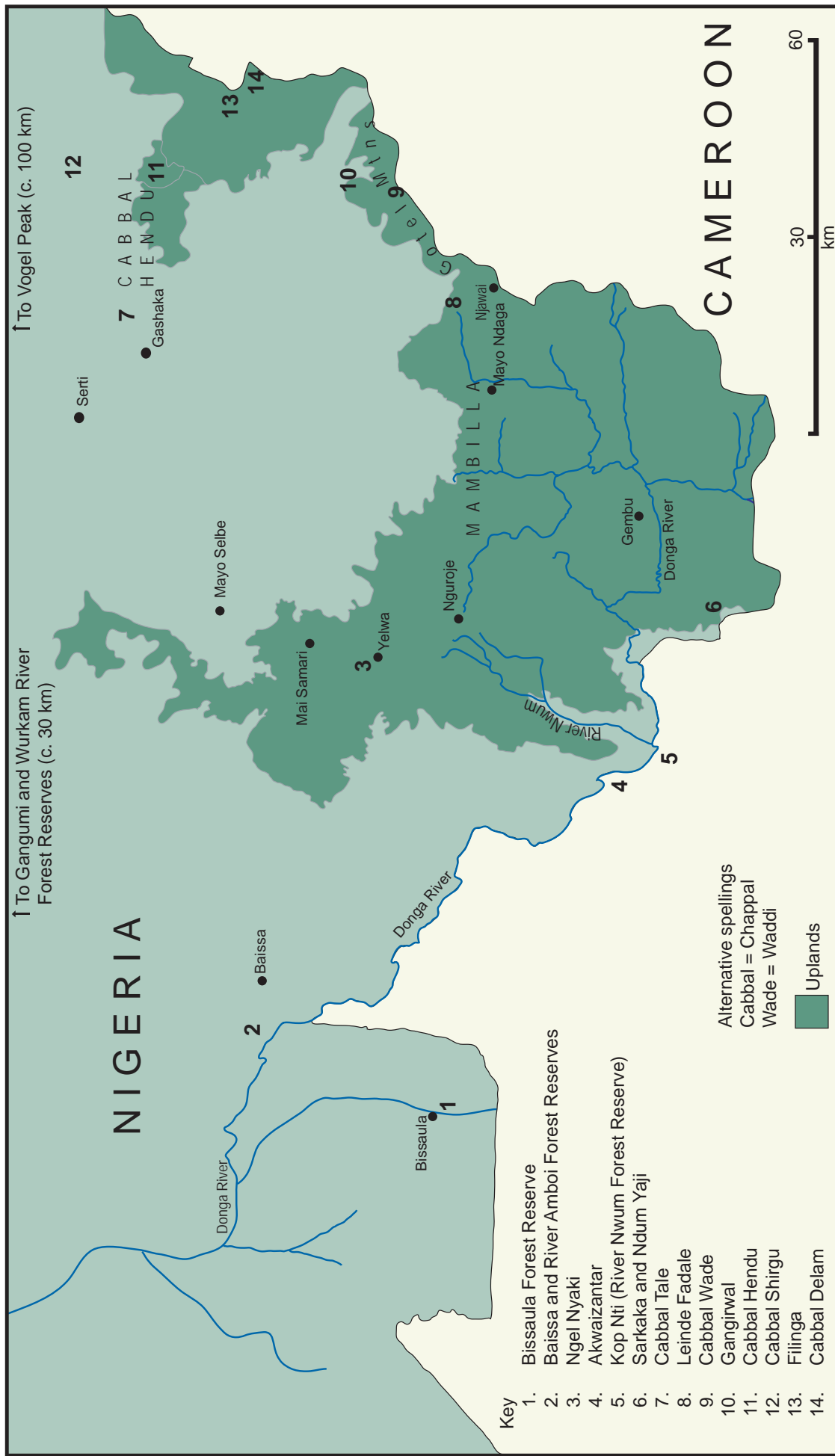


Figure 1. Map of Nigeria (after Dunn, 1999)

Figure 2. Map of the areas discussed in the text.



Chapter 2

Mambilla Plateau

Ngel Nyaki Forest Reserve:

mid-altitude, submontane forest; c.1400-1500 m; c. 46 km²

Red Data List Species: *Entandrophragma angolense*, *Lovoa trichilioides*, *Millettia conraui*, *Pouteria altissima*

Leinde Fadali:

mid-altitude, submontane forest; c.1220 – 1520 m; c. 10 km²

Red Data List Species: *Eugenia gilgii*, *Millettia conraui*, *Pouteria altissima*

Sarkaka and Ndum Yaji:

mid-altitude forest fragments; c.1070 –1220 m

Red Data List Species: *Entandrophragma angolense*, *Khaya grandifoliola*, *Lovoa trichilioides*, *Raphia mambillensis*

Fringing forests:

Red Data List Species: *Dombeya* cf. *ledermannii*, *Eugenia gilgii*, *Millettia conraui*, *Lobelia columnaris*, *Raphia mambillensis*

Village kurame and other relict forest patches

Extent, landscape and geology

Mambilla Plateau is in the south-east corner of Taraba State, between longitude 11° 00' and 11° 30' East, and latitude 6° 30' and 7° 15' North. The administrative headquarters is at Gembu (Figure 2).

The Plateau, with an area of approximately 3100 km² is mainly open grassland (Figure 3). Only fragments of forest remain. The plateau is drained by numerous water courses which unite to form the main rivers to discharge eventually into the Benue. It is delineated on its northern and western sides by a steep escarpment rising to 1070 m above the surrounding lowlands. To the east Mambilla is connected with the Cameroon highlands, which extend south-west towards Bamenda and north-east to the Massif de L'Adamaoua. Geologically, part of the Plateau (570 km²) is lava, and part is Basement

(2630 km²). Centred on Nguroje is a dissected lava upland at approximately 1520 m, with hills 300 m or higher. Nguroje Hill is 1910 m. This part of Mambilla, underlain by volcanic rocks, is characterised by rolling grassland, with more hills towards the western border where columnar jointing of the basalt gives rise locally to low cliffs and crags. Some of the hills have level summits strewn with polygonal basalt blocks.

Scenically the lava plateau is distinct from the hilly land along the escarpment east of Maisamari, and the great expanse of country stretching beyond the Donga headwaters to the Cameroon border. Over the latter, the geology consists of granites and gneisses of the Basement complex. The landscape is undulating, but the numerous dome-shaped hills rarely exceed 1680 m and the valleys are deeper. The river at the



Figure 3 Landscape south of the Donga River at Mayo Tolori showing slumping and landslips. From left to right on the skyline are a Fulani compound with the tall well-fertilised maize plot of a gynako (herdsman) and the relict forest patch Linedi Koyhi 1676 m, dominated by *Newtonia buchananii*, between Hainare and Dorofi (photo Sept. 1974).

Donga ferry is 300 m below Gembu. Weathered outcrops and smooth boulders are a feature. South of the Donga the country is more broken, with steep rocky hills. The Plateau terminates abruptly in a south-facing escarpment overlooking the Ndop plain in Cameroon.

Soils

The grassland soils of Mambilla are humic ferrisols, and are described by Mould (1960). The soils derived from volcanic rocks differ little in texture (mainly silty loams) or acidity (pH 6 - 5.6 decreasing with depth) from those derived from Basement rocks. However the former have a slightly better nutrient status and a higher clay content, with a greater ability to retain moisture. The soils of the Basement complex are a paler reddish brown, with a relatively high quartz content and correspondingly low base exchange capacity and little ability to hold nutrients or moisture. Both types of soil are strongly leached. Overgrazing and annual burning have reduced the vegetative cover, leading to further leaching, surface erosion and, to an increasing extent in the case of basement soils, gullyng and landslips.

Climate

The rain-bearing winds are from the south-west. The rainy season lasts for an average of 250 days, from March to October (Iyamabo et al., 1972).

Mean annual rainfall exceeds 1780 mm with peaks in June/July and September. The start of the rains is often marked by furious squalls.

Bawden & Tuley (1966) give monthly rainfall figures for 10 years for Gembu, Mayo Ndaga and Warwar. At Gembu (altitude 1570 m) the annual average was 1856 mm, with 1588 mm and 2130 mm for the driest and wettest years respectively. For Mayo Ndaga the figures are similar, with Warwar, 300 m lower, receiving less. No data were available for Nguroje, but observation would suggest that the rainfall on the lava plateau is somewhat higher.

The dry season lasts for about three months. The rains begin to slacken off early in November, and the dry season has usually begun by the second week in that month. Between December and February rainfall is normally minimal, at Gembu for example, the average for these three months was 80 mm. In the driest year, December and January were without any rain.

The daily mean temperature does not exceed 30°C. Frost has been recorded in February at Mayo Ndaga (Fox, 1976).

Locally reduced evapotranspiration and occult precipitation are caused by orographic cloud and mist.

Ecological notes

Altitude and soils indicate that much of Mambilla would once have been forested. Farming and burning have been responsible for most forest destruction. In the 1970s pressures were increasing and devastation widespread. Statutory protection as a forest reserve was not necessarily a deterrent. Undisturbed upland forests and river-fringing trees protect the headwaters, ensuring year-long streamflow and safeguarding the lower valleys from flash floods and silting. Section 48 of the (then) North-Eastern State

Forestry Ordinance empowered local government councils to make rules under Section 46 “for the general protection and management of forests and forest produce, exclusive of Government forest reserves in the area within its jurisdiction.” A draft law for the protection of forests and streambank trees was presented to the Mambilla Local Authority in 1974. It was however, rejected by the Council.

Description of the Forests / Kurame

Ngel Nyaki

Diversity

Kurmin Ngel Nyaki is the most diverse forest on Mambilla Plateau. Over 146 vascular plant species were collected from Ngel Nyaki by JDC. Many of these were trees, and (near-) endemic to the Afromontane Region of White (1983) (Dowsett-Lemaire, 1989). Four tree species are Red Data Listed (see above). Several tree species, including *Pterygota mildbraedii*, *Anthonotha noldeae* and *Apodytes dimidiata* were new to West Africa, and others, such as *Isolona cf. deightonii*, and *Ficus chlamydocarpa*, new to Nigeria. The high floristic diversity is reflected in the high number of primate and other animal species (Hall, 1970; Dunn, 1993). There is a small, but thriving population of the Red Data Listed chimpanzee (*Pan troglodytes* subsp. *vellerosus*), as well as putty-nose monkeys (*Cercopithecus nictitans*, cf. subspecies *martini*), and black-and-white colobus (*Colobus guereza occidentalis*) (Oates, 2000 pers. comm.) The forest is also rich in bird life, and home to the white crested tauraco, *Tauracus leucolophus*.

Location

Ngel Nyaki forest is located towards the western escarpment of Mambilla Plateau (Figure 2). It comprises approximately 46 km² of impressive submontane to mid-altitude forest, lying between 1400-1500 m and can be reached on foot from Yelwa village (Figure 2). Here the track crosses the Mayo Jigawal, from where it is less than an hour's walk to

the upper edge of the forest. The single path down a spur in the forest leads to Gidan Sabo and Dujere, at a lower level of the Plateau.

Forest vegetation is confined to this south-west facing slope (Figures 4 and 5) where mist may lie for days, and sometimes weeks at a time. In a fortnight, from late July to early August 1976, the mist lifted twice, for an hour. The trees never ceased dripping.

Conservation status

Ngel Nyaki is currently gazetted a Local Authority Forest Reserve under Gashaka-Mambilla Native Authority Forest Reserve Order of 24 April 1969, but the Nigerian Conservation Foundation have recommended that it become part of Gashaka Gumti National Park (Hall, pers. comm.).

Structure, physiognomy and floristic composition

The forest is a physiognomic mosaic. There are three principal emergent species at Ngel Nyaki. *Pouteria altissima* (Figure 6) reaches a maximum height of 46 m, with a diameter above the buttresses of 1.8 m. *Entandrophragma angolense* reaches 36.6 m in height, with a pillar-like bole 1.5 m in diameter above the buttresses, and a crown spread of 27 m. The buttresses develop at ground level into massive surface roots radiating 15-20 m. *Newtonia buchananii* can reach a height of 38 m, but is typically about 31 m tall. It too is buttressed, with narrow plank buttresses to a height of 3 m.

Figure 4 Profile strip in Ngel Nyaki Forest Reserve, c. 1500 m.

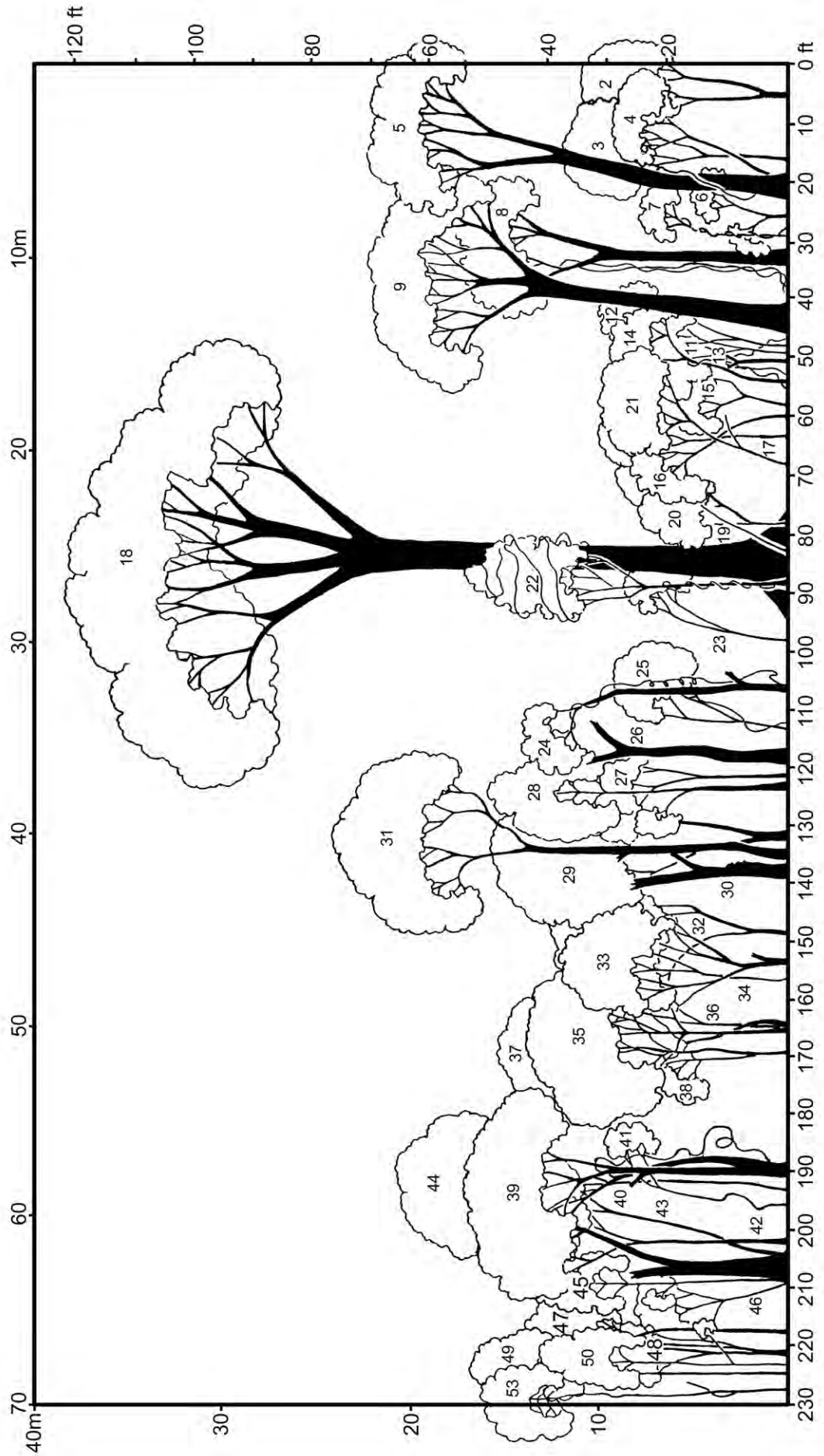


Table 1 Key to Ngel Nyaki forest profile strip (Figure 4).

No.	Botanical name	Stratum	Height (m)
1	Dead - snapped off	C	10.4
2	<i>Leptaulus zenkeri</i>	C	11.0
3	<i>Oxyanthus speciosus</i>	C	11.6
4	<i>Strombosia scheffleri</i>	C	8.5
5	<i>Cordia millenii</i>	B	21.4
6	<i>Leptaulus zenkeri</i>	C	6.1
7	<i>Leptaulus zenkeri</i>	C	7.6
8	<i>Chrysophyllum albidum</i>	B	18.3
9	<i>Polyscias fulva</i>	B	21.3
10	<i>Carapa procera</i>	C	8.2
11	<i>Oxyanthus speciosus</i>	C	7.6
12	<i>Leptaulus zenkeri</i>	C	10.0
13	<i>Oxyanthus speciosus</i>	C	7.6
14	<i>Dasylepis racemosa</i>	C	9.0
15	JDC 3323	C	7.6
16	<i>Oxyanthus speciosus</i>	C	8.5
17	<i>Leptaulus zenkeri</i>	C	9.0
18	<i>Entandrophragma angolense</i>	A	36.6
19	<i>Drypetes</i> ? sp. 3324	C	9.0
20	<i>Oxyanthus speciosus</i>	C	7.6
21	<i>Oxyanthus speciosus</i>	C	9.7
22	<i>Leptaulus zenkeri</i>	B	17.0
23	<i>Pleiocarpa pycnantha</i>	C	10.0
24	<i>Carapa procera</i>	C	14.0
25	<i>Oxyanthus speciosus</i>	C	9.0
26	Dead - crown broken off	C	12.2
27	<i>Oxyanthus speciosus</i>	C	10.0
28	<i>Leptaulus zenkeri</i>	B	16.2
29	<i>Leptaulus zenkeri</i>	B	15.2
30	Dead - crown broken off	C	9.0
31	<i>Drypetes</i> sp. (nov) aff <i>afraensis</i>	B	24.4
32	<i>Leptaulus zenkeri</i>	C	12.2
33	<i>Strombosia</i> ? <i>scheffleri</i>	C	12.2
34	<i>Xylopia acutiflora</i>	C	10.0

No.	Botanical name	Stratum	Height (m)
35	<i>Leptaulus zenkeri</i>	C	13.7
36	<i>Leptaulus zenkeri</i>	C	12.8
37	<i>Carapa procera</i>	B	15.2
38	<i>Drypetes gossweileri</i>	C	12.8
39	<i>Carapa procera</i>	B	17.1
40	<i>Leptaulus zenkeri</i>	C	13.1
41	<i>Cuviera longiflora</i>	C	9.0
42	<i>Leptaulus zenkeri</i>	B	15.5
43	<i>Leptaulus zenkeri</i>	B	15.2
44	<i>Strombosia scheffleri</i>	B	20.0
45	<i>Leptaulus zenkeri</i>	C	13.4
46	<i>Oxyanthus speciosus</i>	C	7.6
47	<i>Leptaulus zenkeri</i>	C	13.7
48	<i>Leptaulus zenkeri</i>	C	11.3
49	<i>Leptaulus zenkeri</i>	B	17.1
50	<i>Leptaulus zenkeri</i>	C	12.8
53	<i>Margaritaria discoidea</i>	B	15.8

Figure 4 (Cont.) Profile strip in Ngel Nyaki Forest Reserve, c. 1500 m.

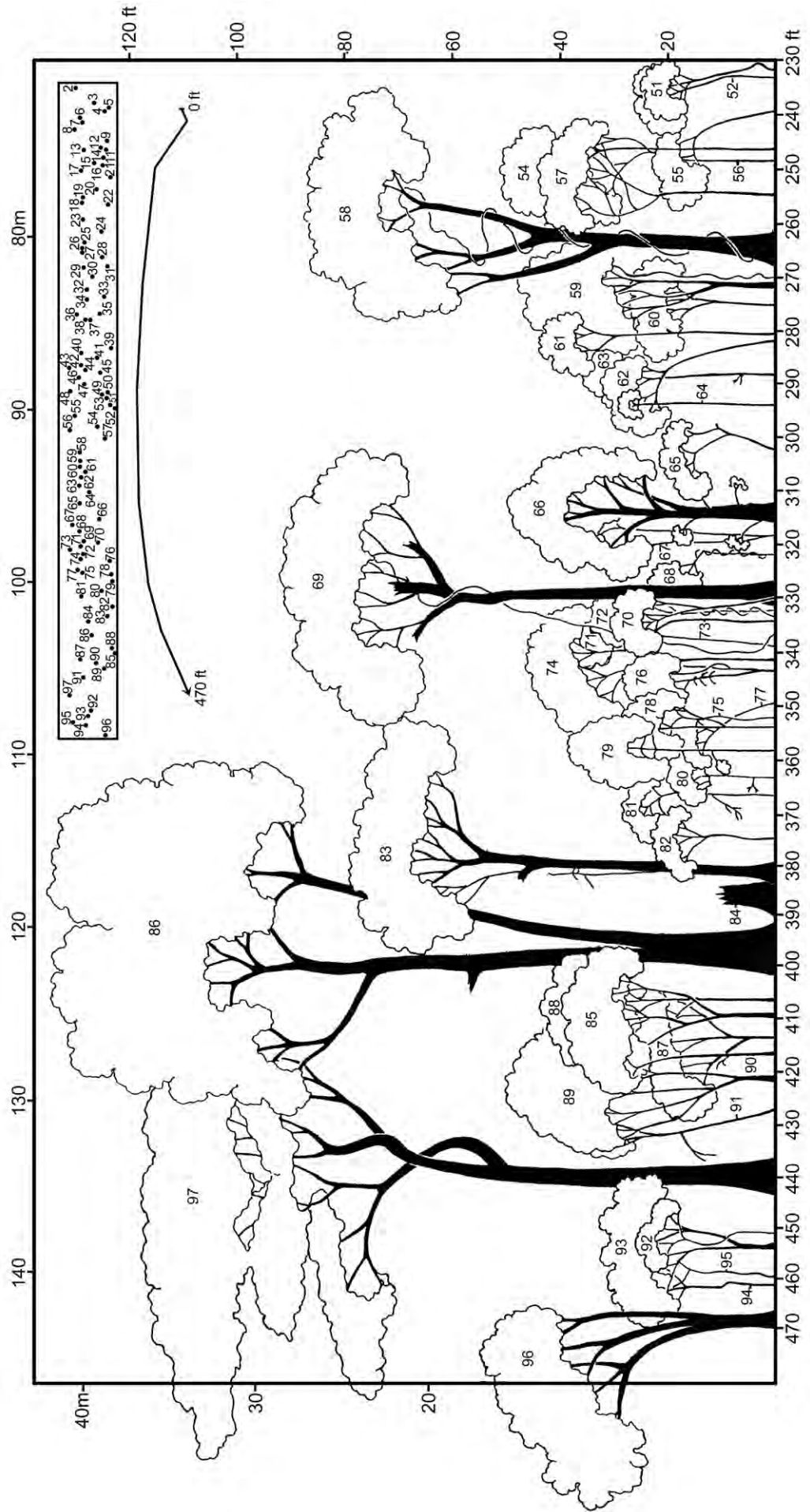


Table 1 (Cont.) Key to Ngel Nyaki forest profile strip (Figure 4).

No.	Botanical name	Stratum	Height (m)
51	<i>Drypetes gossweileri</i>	C	8.5
52	<i>Drypetes gossweileri</i>	C	7.6
54	<i>Margaritaria discoidea</i>	B	15.5
55	<i>Oxyanthus speciosus</i>	C	6.1
56	<i>Cuviera longiflora</i>	C	12.2
57	<i>Voacanga bracteata</i>	C	13.7
58	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	B	27.4
59	<i>Leptaulus zenkeri</i>	C	14.9
60	<i>Oxyanthus speciosus</i>	C	8.5
61	<i>Voacanga bracteata</i>	C	14.3
62	? <i>Gardenia</i> sp.	C	11.0
63	<i>Anthonotha noldeae</i>	C	11.3
64	<i>Cuviera longiflora</i>	C	9.4
65	<i>Microdesmis puberula</i>	C	7.0
66	<i>Strombosia</i> ? <i>scheffleri</i>	B	16.2
67	<i>Leptaulus zenkeri</i>	C	12.2
68	<i>Chionanthus africanus</i>	C	7.9
69	<i>Entandrophragma angolense</i>	B	29.9
70	<i>Strombosia</i> ? <i>scheffleri</i>	C	9.7
71	<i>Drypetes gossweileri</i>	C	13.7
72	<i>Drypetes gossweileri</i>	C	10.7
73	<i>Drypetes gossweileri</i>	B	17.7
74	<i>Dasylophis racemosa</i>	B	15.2
75	<i>Ritchea albersii</i>	C	7.9
76	<i>Leptaulus zenkeri</i>	C	9.0
77	<i>Dicranolepis grandiflora</i>	C	6.1
78	<i>Oxyanthus speciosus</i>	C	9.0
79	JDC 3339	C	12.2
80	<i>Oxyanthus speciosus</i>	C	6.1
81	<i>Oxyanthus speciosus</i>	C	9.4
82	<i>Microdesmis puberula</i>	C	7.0
83	<i>Santiria trimera</i>	B	24.4
84	<i>Entandrophragma angolense</i>	Stump	3.0
85	<i>Leptaulus zenkeri</i>	C	12.2
86	<i>Pouteria altissima</i>	A	45.7
87	<i>Oxyanthus speciosus</i>	C	10.7
88	<i>Carapa procera</i>	C	13.7
89	<i>Leptaulus zenkeri</i>	B	15.5
90	<i>Carapa procera</i>	C	13.1
91	<i>Carapa procera</i>	C	14.6
92	<i>Cuviera longiflora</i>	C	7.9
93	<i>Disocloa xylohexandrum</i>	C	8.5
94	<i>Parkia filicoidea</i>	C	9.0
95	<i>Chionanthus cf africanus</i>	C	9.0
96	Leafless not collected	B	16.8
97	<i>Newtonia buchananii</i>	A	38.1



Figure 5 Ngel Nyaki. Looking down from the grassland edge onto the forest depicted in the profile drawing (Figure 4). The leafless emergent is *Entandrophragma angolense*. Other canopy species include *Newtonia buchananii*, *Pouteria altissima*, *Lovoa trichilioides* (rare) and *Parkia filicoidea*. The forest covers the upper part of the steep escarpment forming the western edge of the dissected lava plateau (photo 1973).



Figure 6 *Pouteria altissima* in Ngel Nyaki Forest Reserve.

Profile strip

Details are presented in the profile diagram (Figure 4). The profile diagram depicts an area of 0.15 ha, a strip of 'climax' forest 143 m x 10.5 m. Thirty species were recorded, excluding trees less than 6 m tall, and shrubs.

There were three tree layers, *sensu* Richards (1952); the tallest A storey (emergent) trees, a middle B storey, and a lower C storey. The trees of the C storey (± 9 m high), form a continuous canopy, in contrast to those of the B stratum (15–30 m tall). The crowns of the emergent trees are seldom in lateral contact and are raised well above stratum B.

Of the 91 trees present on the profile strip (five small dead trees were ignored), 77 (84.6%) belonged to the C stratum. *Leptaulus zenkeri* (average height 12.8 m) and *Oxyanthus speciosus* (average height 8 m) together accounted for half this number.

The shrub layer (D) included tree seedlings, shrubs and pigmy trees. There is no clear division between this layer and the lowest tree storey. *Psychotria peduncularis* and *Dracaena fragrans* are common, with patches of an ?*Acanthaceae* (JDC 3314) up to 2 m tall occurring sporadically. The treelet *Dicranolepis grandiflora* with horizontally spreading branches and white flowers is locally abundant.

The ground layer (E) consists of plants from a few centimetres to 1 m high, i.e., smaller tree seedlings, herbs, ferns and bryophytes.

Lianes, slender or massive, are numerous throughout the forest. Species include *Acacia ?pentagona* (JDC 4597) and members of the Apocynaceae (*Saba thompsonii* and ?*Pararistolochia leonensis* (JDC 4606). Where the crown of a big tree has become enveloped in climbers, a large branch, or the whole tree, may collapse under the load. Stranglers include figs and *Schefflera abyssinica*. Of many epiphytic ferns, *Asplenium dregeanum* was especially abundant, covering rocks and fallen logs, growing amongst moss on the stems of climbers or massed on tree trunks with *Trichomanes mannii* and *Vittaria guineensis* subsp. *camerooniana*. *Arthropteris monocarpa* climbed on rocks and tree trunks, *Selaginella* sp. (JDC 4517) was locally frequent on rocks and the bases of trees. Other species inhabit the crowns of B stratum trees, where *Lycopodium mildbraedii* and a *Begonia* sp. (JDC 4609) could be seen pendent from high branches. *Anthonotha noldeae*, thickly padded with bryophytes, supported many ferns and epiphytic orchids. *Streptocarpus elongatus* grew on mossy boulders, *Peperomia fernandopoiana* on tree trunks and branches, *Utricularia mannii* and the orchids *Polystachya cooperi* and *Aerangis gravenreuthii* on small moss-draped trees at the edges of forest glades. Among a profusion of lichens, *Usnea articulata* draping the uppermost crowns of the tallest trees or festooning bushes along the forest edge, was characteristic.

Herbaceous undergrowth was well developed, with several gregarious *Acanthaceae*, and abundant ferns, some species of which, including *Bolbitis* sp. (JDC

4586), are dominant locally. The forest grasses *Leptaspis zeylandica* and *Oplismenus hirtellus* were present. The herb *Palisota mannii*, stemless but with rosettes of leaves up to 1.5 m long was typical, as in other mountain forests.

Palms (*Phoenix reclinata*) are restricted at Ngel Nyaki to a rocky hill at the foot of the escarpment. The common streambank tree fern *Cyathea dregei*, was not seen. *C. manniana*, much less common, with a slender, prickly stem up to 5 m tall, was found in a sedgy hollow deep within the kurmi.

Enumeration plot

The 1 ha enumeration plot, a quadrat 101 x 101 m, was located on a 25° slope, at ± 1520 m, approximately 1 km from the upper edge of the forest and 200 m to the south of the path through the forest to Gidan Sabo. The plot corners and the turn-off point on the path were marked with big piles of stones. The results appear in Table 2. Of 587 trees (including five dead) consisting of 44 species, 72 (13%) were 1.2 m or more in girth. C storey trees accounted for 87% (cf. 84.6% at the profile strip). *Leptaulus zenkeri*, abundant at the profile strip, was not found.

Ecological notes

Phenology

In the dry season epiphytic ferns and bryophytes become completely desiccated. Several upper canopy trees lose their leaves for differing periods. In February 1977 *Pouteria altissima*, *Albizia gummifera* subsp? and *Anthonotha noldeaea* were leafless. *Entandrophragma angolense* varied, some trees having lost all their leaves, and others none. *Parkia filicoidea* was deciduous for two months. While leafless, the tree flowers and the red, pendent inflorescences contrast with the bare branches. The flowers of the tall evergreen tree *Symphonia globulifera* also appear at this time, crowded on short horizontal branches at the top like clusters of red berries.

Table 2 Enumeration plot in Ngel Nyaki forest.

Botanical name	Storey	Girth Class																Total 30 cm & over	Total 1.22 m & over			
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p			q	r	
<i>Albizia gummifera</i>	C	6	2																	8		
<i>Allophylus africanus</i>	C	2	1																	3		
<i>Pouteria altissima</i>	A,B,C	2				1	2	1		1	1					1	1			10	8	
<i>Anthonotha noldeae</i>	B,C	13	2	2	1		1	1												20	3	
<i>Belschmiedia mannii</i>	B			1																1		
<i>Trilepisium madagascariense</i>	C	1	1																	2		
<i>Carapa procera</i>	B,C	10	7	4	7	1														29	8	
<i>Celtis gomphophylla</i>	B,C	2		1	1															4	1	
<i>Discoclaoxylon hexandrum</i>	C	8	4																	12		
<i>Pterygota mildbraedii</i>	B,C		1			1		1	1	1										5	4	
<i>Voacanga bracteata</i>	C	35	30	4																69		
<i>Entandrophragma angolense</i>	A,B,C	1	3		1		1	1		1										8	4	
<i>Fagara leprieurii</i>	C	1																		1		
<i>Ficus sur</i>	B,C	2	2							1	1	1								7	3	
<i>Ficus polita</i>	C	1																		1		
(Not collected) <i>Ficus</i> sp.																	2			2	2	
<i>Garcinia smeathmannii</i>	C	13																		13		
<i>Leptaulus daphnoides</i>	C	5		1																6		
<i>Chionanthus africanus</i>	C	2	1	2																5		
<i>Chionanthus africanus</i>	C	3	1																	4		
<i>Macaranga occidentalis</i>	C	4	7	4	1															16	1	
<i>Newtonia buchananii</i>	C	6	1																	7		
<i>Campylospermum</i> sp.	C	7																		7		
<i>Oxyanthus speciosus</i>	C	15	3																	18		
<i>Ritchiea albersii</i>	C	1	1	1																3		
<i>Sapium ellipticum</i>	C		1																	1		
<i>Strombosia scheffleri</i>	B,C	18	10	3	4	5														40	9	
<i>Symphonia globulifera</i>	B,C	4	2							1	1									8	2	
<i>Syzygium guineense</i> subsp. <i>bamendae</i>	B				1						1									2	2	
<i>Memecylon fosteri</i>	C	19	3	2																24		
JDC 4560 ? <i>Trichilia</i>	B,C	3	2	2		3	2	4												16	9	
<i>Xylopia acutiflora</i>	C	6																		6		
<i>Xymalos monospora</i>	C	2	2																	4		
Dead trees	A,B,C	13	2	1	1	1		1									1			20	4	
?	C	6	1																	7		
JDC 4543 <i>Isolona</i> cf <i>deightonii</i>	C	31	17	5	3	2	1	1												60	7	
<i>Microdesmis puberula</i>	C	19	1																	20		
JDC 4550 <i>Deinbollia</i> sp.	C		2	2	1															5	1	
<i>Newbouldia laevis</i>	C	1	1																	2		
JDC 4559 <i>Cuviera</i> cf <i>longiflora</i>	C	29	10	7																46		
<i>Rothmannia urcelliformis</i>																						
<i>Drypetes gossweileri</i>	C	31	7	2	1															41	1	
<i>Pleiocarpa pycnantha</i>	C	5	2																	7		
<i>Drypetes gossweileri</i>	B,C	1			1															2	1	
<i>Dasylepis racemosa</i>	C	6	3	1	1															11	1	
<i>Newbouldia laevis</i>	B									1										1	1	
Total		337	133	45	24	14	7	10	3	5	3	1	-	-	-	1	2	-	2	587 (567)	72 (68)	

(living trees in brackets)

The number of species does not exceed 44

Key to girth classes:

a 0.30 - 0.60 m	f 1.81 - 2.10 m	k 3.31 - 3.60 m	p 4.81 - 5.10 m
b 0.61 - 0.90 m	g 2.11 - 2.40 m	l 3.61 - 3.90 m	q 5.11 - 5.40 m
c 0.91 - 1.20 m	h 2.41 - 2.70 m	m 3.91 - 4.20 m	r 5.41 - 5.70 m
d 1.21 - 1.50 m	i 2.71 - 3.00 m	n 4.21 - 4.50 m	
e 1.51 - 1.80 m	j 3.01 - 3.30 m	o 4.51 - 4.80 m	

Regeneration

There is ample evidence of regeneration within Ngel Nyaki. *Pouteria altissima* (the fruit of which is a berry), is present in every tree stratum. There appears to be an abundance of saplings and seedlings of most species. It is likely that the tauraco (*Tauracus leucolophus*), and the red river hog (*Potamochoerus porcus*) play a significant role in fruit dispersal.

Newtonia buchananii, which has seeds well adapted to wind dispersal, is widely distributed. The seeds of *Entandrophragma angolense* are also wind disseminated, although being heavier they do not travel long distances. This tree has a sporadic distribution, possibly because most seeds are eaten when they fall. Regeneration of *Lovoa trichilioides*, which also has winged seeds and belongs to the same family, was rarely seen. Among B stratum trees *Anthonotha noldeae*, *Chrysophyllum albidum*, *Parkia filicoidea*, *Symphonia globulifera* and *Trichilia* sp. were present as seedlings, saplings, and smaller trees. There was plentiful regeneration of C stratum trees.

If the forest is left undisturbed and protected from fire it should maintain its present form indefinitely, although “tropical forests are dynamic communities with a continuous sequence of events and ceaseless development” (Longman and Jenik, 1974).

Leinde Fadali

Diversity

Leinde Fadali resembled Ngel Nyaki, although it was much smaller and therefore less diverse. At least three Red Data List species were present; *Pouteria altissima* as an emergent, and *Millettia conraui* and *Eugenia gilgii*, both forest edge species. Dowsett-Lemaire (1989) noted that there were more lianes here than at Ngel Nyaki. Chimpanzees, probably *Pan troglodytes* subsp. *vellerosus*, noted in 1977, were still present in 1988, as were black and white colobus monkeys (*Colobus guereza occidentalis*) (Dowsett-Lemaire, 1989).

Location

Leinde Fadali is a small, isolated forest, high on the slopes overlooking Mayo Sabere at c. 1680-1300 m (Figure 2). Access is by road to Mayo Ndaga,

followed by a 16 km trek to Dundere, on the plateau lip. Unless one has seen it from Gangirwal, this fine forest comes as a surprise. It covers a series of steep ridges and gullies, facing north-west. From the escarpment edge at 1520 m, a steep sided hollow falls away 300 m, the sides converging to form a gorge. A narrow grassy spur divides the upper part.

Conservation status

Leinde Fadali is not reserved. Up to 1988 inaccessibility and local custom had served to protect it, but even then villages were moving in towards the southern edge of the forest (Dowsett-Lemaire, 1989).

Structure, physiognomy, and floristic composition

Floristically Leinde Fadali resembles Ngel Nyaki. Large trees included *Pouteria altissima* (the most abundant canopy species), with *Entandrophragma angolense* common. Other tree species included *Anthonotha noldeae*, *Cordia millenii*, *Newtonia buchananii*, *Parkia filicoidea*, *Pterygota mildbraedii*, *Symphonia globulifera* and *Trilepisium madagascariense*.

Medium sized trees included *Carapa procera*, a ?*Chrysophyllum* sp. (JDC 4639), *Strombosia scheffleri*, *Tabernaemontana* sp. (JDC 4672) and *Xymalos monomospora*.

Sarkaka and Ndum Yaji

(Reduced to several small fragments, each with its own name.)

Diversity

As remnants of the once more extensive forests of Sarkaka and Ndum Yaji, these patches were not exceptionally diverse. They did however, have an interesting species composition, combining mid-altitude and low-altitude species (see below). This was reflected in the presence of Red Data Listed species, which included *Entandrophragma angolense* (mid-altitude submontane) with *Khaya grandifoliola* and *Lovoa trichilioides*, both associated with lowland forest (Keay et al., 1964).

Location

Several forest remnants were to be found c. 22 km south-west of Gembu, in valleys surrounding stream heads and in landslips on the escarpment, and extending down to the Mayo Gartogal (Mbori River), at 1070 m on the valley floor. The spurs and slopes between the fragments were typically wooded grassland with *Combretum molle*, *Entada abyssinica* and *Terminalia schimperiana*.

Conservation status

Neither Sarkaka or Ndum Yaji were protected by Forest Reserve status. While there was some pit-sawing, especially of *Entandrophragma angolense* for the Gembu market, it was farming which had reduced them to their depleted (1970s) state. In 1973 the largest, least disturbed relicts, from north to south, were as follows:

<u>Sarkaka</u>	<u>Ndum Yaji</u>
Gun Mantem	Kom Minkin
Gun Majoon	Kom Buk
Gun Manbuuva	Kom Izumgur
Gun Manka	Kom Izak
Kom Ijomjom	

Gun Manka and Kom Minkin are different names for the same valley forest. It divides the two communities, an undisputed “buffer zone” and the only patch of forest for which reservation proposals were not vehemently rejected. Most accessible was Kom Izumgur, near the school at Ndum Yaji, and the most distant Gun Mantem, below the hills between Sarkaka and Tepkwar. Most fragmented were Kom Izak and Kom Ijomjom on the Ndum Yaji/Warkaka border. In Kom Buk, one of the smaller patches, at the centre of a grove of tall *Entandrophragma angolense*, *Khaya grandifoliola*, *Newtonia buchananii* and *Parkia filicoidea*, is a bat-haunted cave. The grove was respected by local custom and undisturbed.

Structure, physiognomy, and floristic composition

The resemblance of these forests to Ngel Nyaki is superficial. For example, the liane *Piper guineense*, common in these fragments, appeared to be absent at Ngel Nyaki. There were fewer epiphytes and the shrub stratum was locally more dense. *Marantochloa* sp. (JDC 2801), a semi-erect bamboo-like plant up to 3.6 m tall formed thick brakes. In the ground

layer *Palisota* sp. was conspicuous, rather than Acanthaceae. Ground ferns were less abundant and found mainly along streams, especially *Asplenium preussii*. The elegant *Adiantum patens* subsp. *oatesii* was massed on steep banks. Characteristic of these shady ravines and fringing streams was the tree fern *Cyathea manniana*, with abundant epiphytic mosses and ferns. The epiphytes *Drynaria volkensii* and *Platyserium elephantotis* were common in the crowns of tall trees. *Rhipsalis baccifera* was present. This fleshy shrub with cylindrical shoots belongs to the Cactaceae and is the sole indigenous representative in Africa. Other, smaller epiphytes in the upper canopy were *Peperomia fernandopoiana*, and numerous species of orchids including *Ancistrochilus rothschildianus* and *Bulbophyllum colubrinum*.

Two large trees not found at Ngel Nyaki were *Canarium schweinfurthii* and *Piptadeniastrum africanum*. Both are deciduous. Other species absent from Ngel Nyaki were *Myrianthus arboreus*, common in the understorey, and *Spathodea campanulata* at the forest edge.

While several of the larger trees (e.g., *Entandrophragma angolense*, *Lovoa trichilioides*, *Newtonia buchananii*) were also found at Ngel Nyaki, a lowland forest element was evident here. Examples include *Ceiba pentandra*, *Elaeis guineensis*, *Khaya grandifoliola*, and *Pycnanthus angolensis*. All of these were common trees in the lowland forest of Baissa (Chapter 7). *Marantochloa* sp. (see above) is a lowland forest plant, as is *Rhipsalis baccifera*.

More detailed species lists for the Sarkaka/Ndum Yaji forest fragments appear in the unpublished reports, Chapman (1993-1997).

Ecological notes

At both Sarkaka and Ndum Yaji slash and burn farming was the norm. Patches of forest were clear felled, and the trees burnt shortly before the rains. Topsoil was soon washed away. The land was farmed until only grass could grow, and the fire-hardy savanna trees moved in.

Fringing Forests

The following description of fringing forest is based on wide ranging treks across Mambilla Plateau. This includes a summary and botanical description of every forest or forest fragment investigated.

Diversity

A total of 151 vascular plant species were recorded from fringing forest on Mambilla; 67 trees, eight woody climbers, 29 shrubs, 30 herbs and 17 ferns and fern allies. Many are described below. The remainder are in the checklist. Red Data List species included *Dombeya* cf. *ledermannii*, *Eugenia gilgii*, *Millettia conraui* and the herb, *Lobelia columnaris*.

Conservation status

No fringing forest was reserved. By the 1970s streambank trees had largely disappeared in the vicinity of Gembu and other main centres. Elsewhere they remained as a welcome contrast to a landscape otherwise virtually treeless. Stands of *Hallea stipulosa*, which occurred at Mayo Tolori, at Hainare near the

Local Authority plantation, and at Kabri (see below), were especially endangered. *H. stipulosa* was much sought after for timber.

Summary

The most characteristic streambank trees were *Syzygium guineense* subsp. *guineense* 'sumsum' in the upper canopy, and *Ilex mitis* (Figure 7). *Raphia mambillensis* called 'tukuruwa' in Hausa, which occurs gregariously in swampy stream-source hollows, was retained when other trees were felled (Figure 8).

Other common streambank species included the larger trees *Anthocleista vogelii*, *Dracaena arborea*, *Hallea stipulosa*, *Polyscias fulva*, *Symphonia globulifera* and *Vitex doniana*.

Smaller trees included *Allophylus africanus*, *Neoboutonia velutina*, *Phoenix reclinata* and *Psychotria succulenta*. Tree ferns and herbs included *Cyathea dregei* and *Aframomum angustifolium*, both of which were common.



Figure 7 *Hallea stipulosa* grove at a stream source nea Mayo Tolori.



Figure 8 *Phoenix reclinata* and *Raphia mambillensis* at the head of a stream between Dorofi and Labari. Wild bananas (*Ensete gillettii*) occur along the edge and there is an emergent *Polyscias fulva*.

Typical forest edge species were *Bridelia speciosa*, *Canthium subcordatum*, *Croton macrostachyus*, *Dombeya* cf. *ledermannii*, *Ensete gillettii*, *Harungan madagascariensis*, *Maesa lanceolata* and *Psorospermum aurantiacum*.

Many streams originate in marshy hollows. On the lava plateau, where valleys tend to be broad and shallow, marshy conditions may persist for several kilometres. Tree lined streams “may often pass into or out of broader depressions with slow moving or stagnant water supporting a thick herbaceous marsh vegetation” (Hepper, 1966). On occasion these stream-source “sponges” are tree-filled. Whatever the criteria - hydrological or otherwise - there are two variants of riverine forest which merit strict conservation; *Hallea stipulosa* and *Syzygium guineense* subsp. *guineense* can form more or less pure stands.

Mayo Tolori, Hainare and Kabri

At Mayo Tolori, in the bottom of a small valley

head bowl, *Hallea stipulosa* was dominant, with knee roots conspicuous in the swampy ground. These pneumorhizae grow up from the main root to leave the soil and then enter it again (Jenik, 1967). Beyond, where the valley narrows, *Symphonia globulifera* and *Syzygium guineense* subsp. *guineense* lined the stream. Below the tall *H. stipulosa*, above a dense undergrowth of the herb *Aframomum angustifolium*, trees and shrubs included *Allophylus africanus*, *Piper capense*, *Psychotria peduncularis* and *P. succulenta*. There was no *H. stipulosa* regeneration. In a narrow belt round the edge of the clump were *Ensete gillettii*, *Canthium subcordatum*, *Maesa lanceolata*, and shrubby *Neoboutonia velutina*, with scrambling *Agelaea pseudobliqua*, *Smilax anceps* and *Solanum terminale* subsp. *sanaganum*.

At Hainare (Figure 2) *Hallea stipulosa* and *Syzygium guineense* subsp. *guineense* were co-dominant. In the understory *Raphia mambillensis* was abundant with *Boehmeria macrophylla*, *Piper capense*, *Psychotria peduncularis*, *P. succulenta*. The herb *Aframomum*

angustifolium filled the gaps between the palms.

Raphia mambillensis occurred in the understorey of a *Hallea stipulosa* stand at Kabri, with *Dracaena arborea*, *Garcinia smeathmannii*, *Phoenix reclinata*, *Trichilia* sp. (JDC 2794) and *Voacanga thouarsii*. Most abundant in the shrub layer were *Leea guineensis* and *Piper guineense*, among dense stands of *Aframomum angustifolium*, *Costus* sp. and *Palisota* sp.

In a 5 m wide transition zone the principal trees were *Allophylus africanus*, *Anthocleista vogelii*, *Croton macrostachyus*, *Harungana madagascariensis*, *Phoenix reclinata* and *Polyscias fulva*, with shrubby *Psorospermum aurantiacum*, the climber *Adenia cissampeloides*, tall, dense *Pteridium aquilinum* and scrambling *Smilax anceps*.

Hosere Shiguru

The most impressive *Syzygium guineense* subsp. *guineense* stands were at the north-east corner of the Plateau, on the lower slopes of Hosere Shiguru (Figure 9). Near the trekking path from Njawai and Dunderere to Gandwa in Cameroon, several streams

have their source in bowl-shaped hollows. Some of these were as much as 400 m across, occupied almost entirely by *S. guineense* subsp. *guineense* which extended downwards along the banks. In 1977 these forests had been little, if at all disturbed. At Kocheho Dawadi, between Yelwa and Gurgu, a smaller *S. guineense* subsp. *guineense* stand filled a stream-source “sponge” close to the road.

On Mambilla, *Syzygium guineense* subsp. *guineense* is frequently attacked in the dry season by a processionary caterpillar which may defoliate trees over a wide area.

Njawai and Kan Iyaka

Stream-source forests represent only one aspect of riverine forest on Mambilla. In 1972 along a stream between Njawai and Kan Iyaka, tall trees included *Anthocleista vogelii*, *Dracaena arborea*, *Hallea stipulosa*, *Polyscias fulva* and *Syzygium guineense* subsp. *guineense*. Smaller trees were *Allophylus africanus*, *Psychotria succulenta* and *Raphia mambillensis*.



Figure 9 *Syzygium guineense* subsp. *guineense* fringing forest as yet (1977) undisturbed, towards the north-east corner of Mambilla, near the path from Dunderere to Jauro Hamasale and Gangirwal. Dry season aspect.

Shrubs included *Boehmeria macrophylla*, *Piper capense* and *Psychotria peduncularis*. A more detailed account of species composition is given in the unpublished reports, Chapman (1993-1997).

Dorofi

Where Dorofi comes in sight after climbing the hill from Ndarup, scattered trees, mostly *Raphia mambillensis*, marked the course of the stream in the shallow valley to the left of the road. The banks were well wooded with tall trees and thick undergrowth. The large trees *Newtonia buchananii* and *Symphonia globulifera* were prominent, with *Polyscias fulva* and *Syzygium guineense* subsp. *guineense*. Smaller trees included *Allophylus africanus*, *Psychotria succulenta* and *Sakersia calodendron*. *Aframomum angustifolium* formed a dense ground cover towards the edge, with beyond a c.10 m wide fringe of *Harungana* and *Psorospermum*.

Barup and Tepkwar

In a narrow valley between Barup and Tepkwar, where *Raphia* palms crowded close along the stream, tall trees included (1973) *Albizia* sp. (probably *A. gummifera*), *Croton macrostachyus*, *Dracaena arborea*, *Newtonia buchananii*, *Polyscias fulva*, *Stereospermum acuminatissimum* (sole record in fringing forest) and *Symphonia globulifera*. Understorey trees were *Allophylus africanus* and *Ficus exasperata* with *Bridelia speciosa* and the climbers *Mussaenda erythrophylla* and *Paullinia pinnata* at the edge. At about the same altitude (c.1370 m) also near Barup, where well-developed fringing forest had recently been destroyed by farming, a few big trees still stood, including *Canarium schweinfurthii*, *Parkia filicoidea* (no other record from fringing forest), *Sorindeia juglandifolia* and *Vitex doniana*.

Dujire 'shelf'

The streambank vegetation on the Dujire 'shelf' below Kurmin Ngel Nyaki and Kurmin Danko is interesting, reflecting the lower altitude, c. 460 m below the general level of the Plateau. Besides widely distributed trees including *Hallea stipulosa*, *Polyscias fulva*, *Syzygium guineense* subsp. *guineense*, and *Vitex doniana*, there were also *Baphia laurifolia*, *Pandanus candelabrum*, *Piptadeniastrum africanum*, *Spondianthus preussii* and *Uapaca* sp. (perhaps =

JDC 3116, *U. heudelotii*). A *Marantachloa* sp. was prominent in the undergrowth. Epiphytes included *Platyserium* sp. (prob. *P. elephantotis*) and *Rhypsalis baccifera*.

The north-western corner of Mambilla

Finally, referring to riverine forest at the north-western corner of the Plateau, Hepper (1966) remarked, "Thick riverine forest has developed in places such as Bellel where the broken hills form steep-sided valleys. In this part of the country cattle grazing is not so intensive hence incursion by fire into the forest margins is not too frequent. Trees, among them, *Bersama abyssinica* subsp. *paullinioides* var. *engleriana* and *Neoboutonia velutina* are surrounded by thick, shrubby vegetation including *Combretum racemosum* and *Psychotria succulenta*, together with tall bracken (*Pteridium aquilinum*), *Aframomum angustifolium* and the climbers *Zehneria scabra* and *Sabicea efulenensis*."

Ecological notes

Reference has been made to *Raphia mambillensis*, which is invariably preserved no matter where. Until *Eucalyptus* was introduced (Nash, 1961 & 1962; Fox, 1976), *Raphia* midribs, up to 9 m long, were the principal source of rafters for house building. They are used also for bed frames, furniture, ladders, chicken houses, even coffins. Kwara kwara screens for doorways and verandahs are made from *Raphia*. Finally, but not least important, *Raphia* was tapped for palm wine. Not surprisingly, although the other trees in fringing forest may be cut out, the palms were left to increase in number until they filled the valley bottom. The *Raphia* groves between Dorofi and Labare were good examples.

Hallea stipulosa resembles *H. ciliata*, a principal species in freshwater swamp forest and source of the well-known timber 'abura'. The timber of *H. stipulosa* is similar and goes under the same (Yoruba) name. A tree of swampy places in forest outliers, and fringing forest in inland areas, the latter species has a wider distribution than *H. ciliata*, from Senegal to Sudan, Zambia and Angola. Pitsawyers on Mambilla called *H. stipulosa* 'wawan kurmi'. At Baissa, where it was also common, *H. stipulosa* was known as 'ganyen goro'. There the name 'wawan kurmi' was reserved for *Ricinodendron heudelotii*, a species confined in

Taraba State to lowland forest outliers. The use of the same Hausa word for two different trees can cause confusion.

unpublished reports of Chapman (1993-1997). The only Red Data List species we are aware of is *Dombeya* cf. *ledermannii*. *Casearia battiscombei*, was however a new species to West Africa (see below). At least one of the kurame had black-and-white colobus (*Colobus guereza occidentalis*) present, while in another there were putty nosed monkeys (*Cercopithecus nictitans*).

Village kurame and other relict forest patches

Diversity

The isolated hilltop relicts and village kurame were not as floristically rich as the escarpment forests. However, when species were 'pooled' from all kurame, much diversity was exposed: 147 species were collected; 64 trees, 11 woody climbers, 52 shrubs and 20 ferns and fern allies. Detailed species lists of all hilltop relicts and kurame appear in the

Location and conservation status

Hilltop relicts were rare and none compared with Binka mountain forest in Bamenda, a landmark from Gembu. The three hilltop remnants known to the writer in the 1970s were being whittled away by farming and the removal of big *Newtonia buchananii* trees for canoes.

Table 3 Eighteen village kurame and other relict forest patches on Mambilla excluding fetish groves

Kurame	Location	Altitude c. metres	Ecological Notes and Conservation Status
1	Njeke - 7.2 km W of Mayo Ndaga	140	Colobus monkeys present
2	Kuma - 5.5 km SW of Mayo Ndaga	1520	Guinea fowl roosting
3	Mbaso - 21 km NNE of Gembu	1370	
4	Gono - 6.5 km S of Mayo Ndaga	1520	Partly intact, vultures from a wide area roosting in the big <i>Newtonia</i> trees.
5	Yana - 11 km SW of Mayo Ndaga	1500	
6	Jabu - 10.5 km SSE of Mayo Ndaga	1520	
7	Njana - 1.5 km SE of Jabu	1500	Well protected*
8	Titong - 19 km ENE of Gembu	1370-1520	Of three kurame, only the smallest, in a landslip hollow 1.2 km on the track to Kuma, was intact. Well protected*
9	Leinde Bona Bene - 8 km S of Kanlyaka and 2.5 km W of Hosere Murba	1585	Well protected*
10	Tem - 9 km NNE of Gembu	1520	Well protected*
11	Leinde Deng & Leinde Bene Kerke between Titong and Kara	1525	Well protected*
12	Bene Kune - Luggungo valley 17.5 km NNE of Dorofi	1310	Well protected*
13	Kara - Luggungo valley 5 km from the Donga ferry at Dembe Ninge	1280	Well protected*
14	Kabri - 18 km ESE of Gembu	1520	Well protected*
15	Mbamnga - 10.4 km S of Gembu	1460	Well protected*
Village Kurame-Fetish Grove Complexes			
16	Linde Belleri - Ndarup to Leinde Koyhi	1645	Hilltop. Well protected*
17	Linde Burum - About 2 km N of Tamnya	1520	Well protected*
18	Leinde Koyhi - overlooking Mayo Tolori, Dorofi to Hainare	1670	Hilltop. Well protected*

*meaning firewood collection was confined to gathering dead wood and fallen branches. No trees were cut down except for the occasional Fuh (*Cordia millenii*) or Lhun (*Polyscias fulva*) for making drums.

The presence of old platforms and grinding stones show that once people lived close to, even within the forests. Today the houses are usually on high ground, often out of sight of the kurmi. At Mbaso the kurmi is in a hillside hollow formed by slumping. The entrance is at the bottom, between steep-sided gulleys enclosing it on both sides. At the top a defensive rampart and ditch were discernible at the grassland edge.

A further reminder of the days when the Fulani raided for slaves was the regard in which the forest tauraco (*Tauracus leucolophus*, the white-headed tauraco) was still held by the Mambilla. Elsewhere this beautiful, raucous, fruit-eating forest bird was hunted for its plumage. Moving about in small parties of three or four, as Bannerman (1952) remarks, “The noise they make is considerable, one bird uttering a loud “qua qua qua” which continually becomes more rapid as it is repeated, to be answered by all the tauracos in the neighbourhood.”

The kurami at Yana (Figure 10) remained unscathed up to 1973. The Jauro (village headman) despite pressure from the Local Authority, refused to allow removal of sangow (*Newtonia buchananii*) for canoes. His own people were permitted to take only dead

wood for fuel, thus ensuring a permanent supply. Eucalyptus poles for building houses had to be grown or bought.

At Leinde Burum, in a valley below the long-abandoned site of Nando village, a sangow had been cut down some years before, but the forest was otherwise undamaged. Leinde Bong Bene, in a hidden, steep-sided valley, was still undisturbed in 1978. Other kurame still largely intact were Jabu, Kuma, Njana and Njeke.

Not every village headman took such a courageous stance as Jauro Yana against the Local Authority Forestry Dept., whose sole purpose was to maximise revenue. In 1972 the Mbaso kurmi was comparable to Yana. The following year a *Newtonia* was felled, the biggest tree in the kurmi. In its fall it broke off several smaller trees, creating a huge gap, which increased when sawyers cut down more trees for sawing platforms.

Forests so small cannot survive such massive disturbance. At Tem, few trees remained and creeper tangles prevented regrowth. The hilltop forests were under heavy pressure. At Leinde Deng one of the biggest *Newtonia* trees had been taken for a canoe. At



Figure 10 The village kurmi at Yana, 12 kilometres south-west of Mayo Ndaga, as it was in 1973. The then Jauro (village headman) was a staunch character who refused all pressures and bribes from local government and other persons to allow the exploitation of *Newtonia buchananii* trees for making canoes. Yana village kurmi was in a class of its own.

nearby Leinde Bene Kerke farmers were encroaching. South of the Donga river, where Leinde Koyhi had long been reduced to a clump, Leinde Belleri faced a similar threat. At Mbamnga the former extensive kurmi was a mosaic of juju groves with clumps and isolated trees in cultivated land.

The majority of village forests are at an altitude of c. 1520 m. The difference between the highest, Leinde Koyhi near Dorofi, and the lowest at Kara in the Luggungo valley is c. 400 m. With few exceptions (see below) the trees listed in Table 4 occur throughout.

Table 4 Trees recorded from one-third or more of the 18 village kurame listed in Table 3. *Nuxia congesta*, present at the forest edge at Tem and Leinde Kumba, was not found below 1320 m. *Sterculia tragacantha*, normally a lowland species, was

Species	Kurame
<i>Polyscias fulva</i>	17
<i>Dracaena arborea</i>	15
<i>Croton macrostachyus</i>	14
<i>Albizia</i> spp.	13
<i>Newtonia buchananii</i>	13
<i>Ficus</i> sp. (strangling epiphytes)	12
<i>Cordia millenii</i>	9
<i>Kigelia africana</i>	9
<i>Psychotria succulenta</i>	9
<i>Pittosporum</i> "mambillae"	8
<i>Trichilia</i> sp.	8
<i>Synsepalum cerasiferum</i>	6
<i>Allophylus africanus</i>	6
<i>Garcinia smeathmannii</i>	6
<i>Phoenix reclinata</i>	6
<i>Symphonia globulifera</i>	6

noted at the forest edge at Leinde Bene Kune at 1300 m, and in the Warwar valley between Ndarup and Vakkude. The presence at Mang, Kara and Leinde Deng of *Detarium macrocarpum* was unexpected, as was the size of the trees. Normally c. 9 m high, these were up to 20 m tall with massive widely spreading branches. A savannah species, it was presumably planted for its fruits.

The Mbamnga kurmi included four trees not present in other village forests. Of these, *Casearia battiscombei* was (1972) a new record for West Africa. *Parkia filicoidea*, represented by one tree, is a canopy species at Ngel Nyaki and Leinde Fadali. *Khaya*

grandifoliola normally occurs at lower altitudes, for example Ndum Yaji and Sarkaka. The fourth, *Stereospermum acuminatissimum*, was also recorded from Ndum Yaji/Sarkaka, from fringing forest between Barup and Tepkwar, and also occurred in fetish groves where it was thought to have been planted.

Fetish trees and groves

The customary fetish tree is *Erythrina senegalensis*, called 'tagum' or 'gum' in the Mambilla language. Truncheons root easily and like *Dracaena arborea* it is used as support for compound fences. There are few villages or hamlets without one tagum shrine. Frequently the large epiphyte *Platyserium elephantotis*, with dimorphic fronds, encircles the stem 1.5 m from the ground. Occasionally other trees are used. At one compound in Mbamnga, *Erythrina* and cactus-like *Elaeophorbia drupifera* (Figure 11) were growing with crowns interlaced. At a compound in Titong, *Steganotaenia araliaceae*, similarly girdled by *Platyserium*, replaced tagum. The prickly pear (*Opuntia vulgaris*) was a fetish object at Mbamnga, Ngel Nyaki (now deserted) and Yurum.

Stereospermum acuminatissimum is one of the most characteristic trees of fetish groves. The Mambilla name is 'ngub' or 'goop'. Because of the attractive pink or pale purple flowers ngub is sometimes planted in villages. In a reference to witchcraft, Schwartz (1977) mentioned that often "the bark of the ngub tree is used to protect one's self (from witchcraft) through *sympathetic magic*". Likewise Kirk-Greene (1969) referring to judicial oaths in Adamawa writes: "One of the most sacred oaths is said to be sworn on ngub shoa (shoa = fetish), which in its first instance is a charm against witchcraft." Mambilla farmers say that when the flowers of the ngub begin to fade it is time to plant guinea corn. Another stiking fetish tree is *Elaeophorbia drupifera* (Figure 11). One fetish grove on the hilltop above Vakkude, at 1430 m, was dominated by *Ceiba pentandra*, the silk cotton tree.

Smaller trees in fetish groves include *Clausena anisata*, *Erythrina senegalensis*, *Eugenia* sp. (JDC 3042), *Garcinia* sp. (JDC 3041), *Kigelia africana*, *Trema orientalis* and at the edge, *Vernonia amygdalina* and *Vitex doniana*. *Kigelia*, like *Erythrina* is easily propagated from stakes. The hard wood is valued for tool handles. At the river below Jabu the bush bridge



Figure 11 *Elaeophorbia drupifera* at Mbamnga, a fetish shrine.

on the Njana path had living *Kigelia* anchor posts. Mambilla people call *K. africana* ‘dap’, or ‘dembe’.

Where the undergrowth at Vakkude had not been cleared *Aframomum angustifolium* alternated with patches of *Acanthus montanus*. The tall, prickly-stemmed forest aroid, *Anchomanes difformis*, was conspicuous. In gaps *Laportea mooreana* occurred. This robust stinging nettle, up to 2 m tall, was formerly cultivated for its fibre. It has been recorded from Bang, Kara, Mbamnga, Mbamnga Petel, Ndarup, Nkuh, Sarkaka, Tamnya, Vakkude, Warwar and Yurum. Other than the epiphytic *Platyserium* the only fern noted was *Pteris togoensis*.

At Gembu, the equivalent of the Vakkude grove was a clump near the Baptist Mission. At the centre were *Cordia millenii*, surrounded by *Clausena anisata*, *Dracaena arborea* and a small fruited *Ficus* sp. (JDC 3029). *Adenia lobata* interlaced the tree crowns, with *Dracaena fragrans* in the undergrowth. The latter shrub is frequently used for compound hedges, for example at Hainare near the village centre.

Ecological notes

Degradation

Whatever the pre-existing vegetation of Mambilla may have been, man’s activities have had a profound influence, more so in recent decades. Degradation of the vegetation through destructive farming practices and chronic over-stocking with cattle has affected the water regime, especially the Donga (Wukari) river catchment. This is intensified by the removal of streambank trees.

Permanent farming with the soil improving shrub Yom (*Tephrosia vogelii*) as a fallow is a notable aspect of Mambilla farming, however immigrant groups, such as the Ndoro, practice shifting cultivation. Any kurmi that is not a “village kurmi” is at risk. Most of the forest in Kurmin Danko was destroyed in the early 1970s before it was constituted a Forest Reserve. There were abortive attempts to farm in Kurmin Ngel Nyaki. Although farms are abandoned within a few years, the forest seldom became re-established. Subsequent fires destroyed the early stages of succession although a few fire resistant trees may persist. The rough, fissured bark of *Synsepalum cerasiferum* is a protection from scorching. Trees of this species, isolated in grassland, were the last remnants, other than a few scattered fire-damaged *Hallea stipulosa*, and tree-ferns (*Cyathea dregei*), of stream-source forest between Titong and Kuma, and near the “Premier’s Farm” at Gembu. More surprising, since the bark is not particularly thick, was the presence of a solitary *Trichilia* sp. (JDC 4626) on a ridge near Tekobi on the Mayo Ndaga-Dundere track, in 1977. One reputed kurmi, Leinde Modare near the Cameroon border north of Labare, had vanished utterly when the writer went in search of it.

Reference has been made to cutting of trees for sawing into planks or for making canoes. At Bene Kune, where several big *Newtonia* trees had been felled within a few years, climber tangles were smothering regrowth and fire had encroached along the forest edge.

Nevertheless, on Mambilla fires spreading from grassland are not usually a serious hazard to undisturbed forest with a shrubby ecotone and often protected by the relief. *Hyparrhenia* grassland, which burns fiercely, is restricted to areas near the escarpment edge which are shunned from fear of

tsetse flies, to farmland, thatching grass reserves, or decoy areas for bushbuck and duiker. Wherever there are cattle an almost pure community of *Sporobolus africanus* has replaced the tall *Hyparrhenia*. Hawkins & Brunt (1965) from their work in Bamenda concluded that the main cause of this dramatic change in the composition of the grassland over 1520 m was the continual trampling as the cattle graze. The Fulfulde call *Sporobolus africanus* “pagame”. It is a coarse, tufted grass rarely over 1 m high, resistant to annual burning and trampling. *Sporobolus* generates a less intense fire than *Hyparrhenia* and as the graziers adopt a patchwork burn starting early in the dry season, fires rarely extend far.

Succession

On Mambilla, areas underlain by rocks of the Basement complex are prone to landslips and slumping, and it is possible to observe the earliest stages of succession. Fragmentary patches of forest regrowth occur sporadically in open grassland, and forest precursors appear in *Eucalyptus* plantations.

In landslips at Kuma Hillside Afforestation Area and between Gikau and Njeke, *Erica mannii* with the scrambling fern *Gleichenia linearis* and *Lycopodium cernuum*, had colonized the cliff-like walls, with occasional stunted *Psorospermum febrifugum* var. *ferrugineum*). From the cliff foot *Agarista salicifolia*, *Cyathea dregei*, *Harungana madagascariensis*, and saplings of *Anthocleista vogelii* and *Polyscias fulva* formed a closed canopy. The seeds of *E. mannii* and *A. salicifolia* are very small and, like the fern spores, are disseminated by wind. For other species, fruit and seed eating birds as well as bats, are dispersal agents.

A later stage in succession was seen near the Mbuu ferry, at the Donga river below Gembu. A few minutes walk downstream, on the north bank of the river, a deep gully had cut back into the hillside. The walls were almost vertical. A small stream has its source at the bottom and passes through a narrow opening between high banks to join the Donga. Although the valley slopes adjoining were burnt every year, fire had not penetrated into the gully, which was then (1973) a well developed “mini kurmi”, some 37 m across.

Canopy trees included *Albizia zygia*, *Polyscias fulva* and *Sorindeia juglandifolia* (one of each) with several *Vitex doniana*. Except for one *Ilex mitis* by the stream,

the only understorey trees were *Allophylus africanus*. Shrubs comprised *Dracaena laxissima*, *Pavetta* sp. (JDC 2663) and *Piper capense*. *Aframomum angustifolium* with leafy stems up to 2 m tall was dominant in the herb layer. There were also a few ferns including *Bolbitis acrostichoides*, and *Asplenium inaequilaterale*. *Culcasia falcifolia* climbed on tree trunks. By the stream, at the edge of the kurmi, were *Cyathea dregei* and abundant *Brillantaisia bauchiensis*, a tall perennial herb, densely glandular-pubescent and with showy blue purple flowers.

Subsidence holes provide a niche for forest species. At the Veterinary Department’s Gembu South Ranch a subsidence hole 8 m deep and about as wide was occupied by dense *Aframomum angustifolium* from which emerged a *Polyscias* to overtop the hole. Only the periphery of the crown was scorched by the fires which swept past.

Isolated clumps and groves of trees may indicate the sites of former compounds, or villages; for example the old location of Tem, visible across the hills from Lekitaba. At least two species of *Ficus*, *Dracaena arborea*, and occasionally *Polyscias fulva*, are used as live supports for zana matting fences in compounds, round mosques, for cattle corrals, and so on; likewise the fetish tree tagum (*Erythrina senegalensis*) and *Kigelia africana*, referred to above.

Thus when a settlement is vacated there is always a nucleus of trees to attract seed and fruit-eating birds, bats and small mammals, which bring with them the seeds of other species. The new arrivals soon colonize the bare spots. At Kuma, under a *Ficus* tree beside a house abandoned two years before, the following were observed: Trees - *Croton macrostachyus*, *Maesa lanceolata*, *Phoenix reclinata* and *Rauwolfia vomitoria*. Shrubs - *Clausena anisata* and scrambling *Solanum terminale* subsp. *sanaganum*. Herbs - *Impatiens* sp. (= JDC 2819 & HMC 15). The nearest seed source is Kuma village kurmi, 200 m away.

In a clump of trees 1.6 km west of Mayo Ndaga, large *Ficus* spp. were co-dominant with *Trichilia* sp. (= JDC 2843). Smaller trees included *Antidesma vogelianum*, *Bersama abyssinica*, *Clausena anisata*, *Maesa lanceolata* and *Phoenix reclinata*. *Solanum terminale* scrambled along the edge. The forest herb *Acanthus montanus* was present, there were epiphytic orchids, several epiphytic ferns, mainly *Asplenium* spp., and moss in abundance. There was virtually no

ecotone; at a step one passed from forest vegetation to tightly grazed grassland.

Invasion of grassland by light tolerant trees

The invasion by forest precursors of *Sporobolus* grassland was observed between Hainare and Leinde Koyhi. An assemblage of trees and shrubs included:

Trees - *Allophylus africanus*, *Antidesma vogelianum*, *Clausena anisata*, *Croton macrostachyus*, *Ficus exasperata*, *Maesa lanceolata*, *Polyscias fulva* and *Psychotria succulenta*.

Woody climbers/scramblers - *Jasminum dichotomum*, *Paullinia pinnata* and *Smilax anceps*.

A clump 37 m across near Wah, contained the following:

Trees - *Bridelia speciosa*, *Croton macrostachyus*, *Ficus* sp., *Garcinia smeathmannii*, *Pittosporum* "mambillae", *Polyscias fulva*.

Shrubs - *Psychotria peduncularis*, *Solanecio manni*, *Dracaena fragrans*, *Jasminum dichotomum*.

Herbs - *Aframomum angustifolium*, JDC 2993 (? *Acanthaceae*).

Near Mayo Solare, between Hainare and Dorofi, a single *Millettia conraui* 8 m tall, with dense rounded crown showing no signs of scorching, stood in open grassland 46 m up a slope from stream-fringing forest. Between Mayo Ndaga and Njawai, for 2 km along the road, *Harungana madagascariensis* was common with a scattering of larger trees; mostly *Albizias* and *Croton macrostachyus* but also *Zanthoxylum leprieurii*.

Fire-sensitive trees and shrubs, which were also usually light tolerant species, were to be found in rocky places such as Kocheho Dawadi where broken columns and piles of basalt blocks strew the steep hillside. The Basement hills between Tepkwar and Mbamnga are also unusually rugged. Some of the tree species associated with this specialised habitat include *Bersama abyssinica*, *Bridelia speciosa*, *Eugenia* sp., *Ochna afzelii*, *Phoenix reclinata*, and *Trema orientalis*. Shrubs include *Alchornea laxiflora*, *Dalbergia lactea*, *Dracaena fragrans* and *Solanum terminale* subsp. *sanaganum*. *Ensete gillettii* and *Nephrolepis undulata* were unusual herbs. Further details of species composition are recorded in the unpublished reports of Chapman (1993-1997), and in the checklist.

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Chapter 3

The Gotel Mountains

Cabbal Wade and Gangirwal

Albizia gummifera - *Nuxia congesta* forest:

montane, 1830 m; c. 10 km²

Red Data List Species: *Eugenia gilgii*, *Entandrophragma angolense*, *Milletia conraui*, *Pouteria altissima*

Pouteria altissima forest:

montane; 1830 m; c. 10 km²

Red Data List Species: *Dombeya* cf. *ledermannii*, *Eugenia gilgii*, *Entandrophragma angolense*, *Millettia conraui*, *Pouteria altissima*

Prunus africana - *Syzygium guineense* subsp. *bamendae* - *Podocarpus latifolius* forest:

montane; 2090 m; c. 10 km²

Red Data List Species: *Eugenia gilgii*, *Prunus africana*

Syzygium guineense subsp. *bamendae* stream source forest:

montane; 2130 m; c. 2 km²

Red Data List Species: *Eugenia gilgii*, *Prunus africana*

Montane forest & outliers above 2290 m:

Red Data List Species: *Succisa trichotocephala*, *Bafutia tenuicaulis*, *Lobelia columnaris*

Additional notes on low escarpment forest, open woodland and forest grassland ecotone.

Extent, landscape and geology

The Gotel Mountains lie along the Nigeria-Cameroon border, c. 56 km NE of Gembu and 32 km WNW of Banyo (Figure 2). The massif comprises the small plateau of Cabbal Wade 1525 – 1830 m with Gangirwal, Nigeria's most lofty upland, connected to it by a narrow col. The international boundary passes through the highest part of Gangirwal (2420 m) at 7° 02' North and 11° 43'

East. Most of the forest and the spectacular scenery is within Nigeria. Dominating the Cabbal Wade escarpment is a pinnacle-like volcanic intrusion called Dutsin Dodo (Figure 12).

Both Cabbal Wade and Gangirwal are erosion surfaces on the underlying Basement complex, with Gangirwal c. 610m higher (Tuley & Jackson, 1971). Except on the slopes overlooking Cabbal Wade, Gangirwal rises abruptly 910 – 1220 m above the surrounding country. The north-south



Figure 12 Dutsin Dodo, the volcanic intrusion NNW of Cabbal Wade, within Kurmin Dutsin Dodo.

axis is about 6.4 km long. Nowhere very wide, the total area of the summit plateau is approximately 21 km². Bawden & Tuley (1966) suggest that the gently undulating summit areas originate, at least in part, from near horizontal lava flows. Elsewhere are rough outcrops, cliffs and granite boulders. The drainage is principally westwards to the headwaters of the Mayo Gashaka and from the south end to the Mayo Banyo.

Location

The most extensive forests are on the west facing slopes. From the Cabbal Wade escarpment, to the north end of Gangirwal, the forest is continuous except for cliffs and rocky outcrops (Figure 13). The forest extends from Kurmin Lugapa on the valley floor upwards for approximately 910 m to a shelf below the upper surface. Along incised stream lines it persists, in diminished form, to c. 2290 m in a setting of open grassland with scattered boulders, low cliffs, bold rock outcrops and rock pavement.



Figure 13 A mid-November view, from Gangirwal over the forests on the north-west facing escarpment of Cabbal Wade. About 14 kilometres to the west, almost in line with the top of Dutsin Dodo, is Leinde Fadali. The leafless trees in the foreground are *Albizia gummifera* (photo 1974).



Figure 14 This gully forest, at 2286 m on the upper western slopes of Gangirwal must be the highest forest in Nigeria. In 1975 fire appeared never to have penetrated here. The trees c. 9 m high, their crowns packed close together, padded thickly with bryophytes and lichens, include *Podocarpus latifolius*, *Prunus africana*, *Ixora foliosa* and *Rapanea neurophylla*.

On the east side of Gangirwal, Kurmin Mayo Ngiti occupies a north-north-east facing amphitheatre below a line of cliffs which sweep down from the plateau. Tantalisingly near but accessible only from below the mountain, from the north, this forest has yet to be explored.

At the south-west end of Gangirwal, overlooking Cabbal Wade, forest vegetation is restricted to stream lines and stream-source bowls (Figure 14).

Eastwards along the international boundary, to Cabbal Delam, forest reaches to the crest of the ridge on the west (Nigerian) side. On the dry (Cameroon) side, seen from Gangirwal, there appears to be little forest.

The forests of Cabbal Wade have not yet been reduced by slash and burn cultivators, although fires set by Fulani graziers represent the greatest hazard (Barnwell, 1993). The nearest farming community is Mayo Sabere, which dates from 1910, and appears to be the first permanent settlement in this area (Matthew, 1980, pers. comm.).

The usual approach is by the road to Njawai and then on foot to Jauro Hamasale, below Cabbal Wade, in Cameroon. A longer route, through Nigeria is via Mayo Sabere.

Climate

The west facing slopes of Gangirwal and the Cabbal Wade escarpment attract a high rainfall, conceivably in excess of 2500 mm, and are often shrouded in mist when the plateau grassland is in sunshine. Shade temperatures recorded for the Cabbal Wade grassland by Menefy (1974) and the writer (1974-75), were as follows:

Date	Year	Min °C	Max °C
November (whole month)	1974	11	23
December (several days)	1973	8	23.5
February (whole month)	1975	10	24

The transition from the rains to the dry season is abrupt. In 1974 the last rain fell on November 11, a furious thunder-storm with hail, lasting three hours. Within a week Fulani graziers had begun to burn the *Loudetia* grassland on the southern slopes of Gangirwal. By mid-February 1975 streams had either ceased to flow or were reduced to a trickle. Leaves on the forest floor near the edge were dry enough to carry fires, which had penetrated the shrubby buffer zone.

Description of Forests / Kurame

Cabbal Wade

Albizia - *Nuxia* forest

montane; c.1830 m

Diversity

A total of 70 vascular plant species were recorded from within the profile plot for the *Albizia gummifera* forest, eight large (15-26 m) trees, 24 smaller (6-14 m) trees, four woody climbers, eight shrubs, 27 herbs and eight fern and fern allies. Many are described below, and the remainder are in the checklist. There was an abundance of epiphytic herbs and ferns. Red Data List species included the trees *Entandrophragma angolense*, *Eugenia gilgii*, *Millettia conraui* and *Pouteria altissima*.

Conservation status

The forest falls within the boundaries of Gashaka Gumti National Park.

Profile strip

The profile diagram (Figure 15) depicts a strip of forest 109 m long by 10.7 m wide, at an altitude of 1830 m. From a point 90 m inside the forest, level with and approximately 400 m from Dutsin Dodo, the strip follows the contour for 60 m before dropping steeply 50 m to a stream bank.

Structure, physiognomy, floristic composition

There were no emergents. The tallest (B stratum) trees did not form a complete canopy and the forest floor was chequered with sun flecks whenever the sky was clear. The C stratum merges imperceptibly with the smaller trees and shrubs (Figure 15).

Eleven trees were too small to include in the diagram (mostly *Pavetta corymbosa*), and disregarding two dead trees, the total number of stems 4.6 m tall and above was 88.

In the B stratum were 20 trees representing eight species. Their height varied from 14.6 m (*Nuxia congesta*) to 25.9 m (*Albizia gummifera*). *N. congesta* accounted for 45% and *A. gummifera* for 27% of the total number of trees. *N. congesta* had a deeply fluted, frequently crooked bole, some trees forking at ground level (shown as separate trees on the profile diagram) while the steeply ascending branches formed a narrow crown. *A. gummifera* has a stout, cylindrical bole and an umbrella-shaped crown with a spread of up to 24 m. The last B stratum tree at the profile strip, at the bottom of the slope, was a five-stemmed *Millettia conraui*. There were no buttressed trees.

There were 54 trees in the C stratum, from 6 m to 13.7 m tall. Excepting six numbers not identified, 16 species were present. *Bridelia speciosa* (average height 11.2 m) made up 21% of the trees in this stratum. *Nuxia congesta* (three individuals) would eventually grow into the B stratum. There was also a 9 m tall *Entandrophragma angolense*, a potential emergent (A stratum) species. *Pavetta corymbosa* was the smallest tree.

The D (shrub) stratum was fairly open with *Dracaena fragrans*, *Piper capense*, *Psychotria peduncularis* locally dominant, and a scattering of young trees, including *Pavetta corymbosa*, *Garcinia smeathmannii*, *Rothmannia urcelliformis* and *Newtonia buchananii*, another potential emergent.

In the ground layer (E), the grass *Oplismenus hirtellus* was prominent, as were many fern species. *Hypoestes forskalei*, common at the forest edge, occurred where the canopy was open. Seedling trees (i.e., up to 90 cm tall) included *Albizia gummifera*, *Clausena anisata*, *Millettia conraui* and *Pittosporum viridiflorum*.

There were many lianes, some with cable-like stems up to 8.5 cm in diameter, others slender and pliable; only *Paullinia pinnata* did not reach the crowns of the tallest trees.

The plasticity of *Carapa procera* has been commented on (Tuley & Jackson, 1971). It was a tree on the profile strip, but nearby grew as a scandent shrub. *Schefflera abyssinica*, growing as a B stratum tree, was

also a strangling epiphyte enveloping the bole of a big *Albizia gummifera*.

Half of the B stratum species at the plot were deciduous for a period. *Alangium chinense* and *Millettia conraui* (a Red Data List species) were leafless for two to three weeks, *Schefflera abyssinica* a month, and *Albizia gummifera* for up to two months.

An abundance of epiphytic ferns included several *Asplenium* spp., *Drynaria volkensii*, *Trichomanes melanotrichum* and *Vittaria guineensis*. Epiphytic orchids were prominent and *Lycopodium brachystachys*, a *Begonia* cf. *mannii* (JDC 3567) and *Piper* spp. occurred.

Ecological notes

The canopy trees *Albizia gummifera*, *Nuxia congesta*, and *Croton macrostachyus* were all light demanding species. Likewise in the C stratum; *Bridelia speciosa*, the most abundant tree, is typically associated with forest margins, as are *Clausena anisata*, *Pittosporum viridiflorum* and *Rauwolfia vomitoria*. The presence of more shade tolerant species such as *Entandrophragma angolense*, and in the shrub layer, saplings of *Pouteria altissima*, *Newtonia buchananii* and *Strombosia scheffleri*, suggested that this was an advanced stage in a succession which, in the absence of further disturbance would progress to the *Pouteria* forest described below.

Figure 15 Profile strip in *Albizia gummifera*-*Nuxia congesta* forest at c. 1830 m on Cabbal Wade.

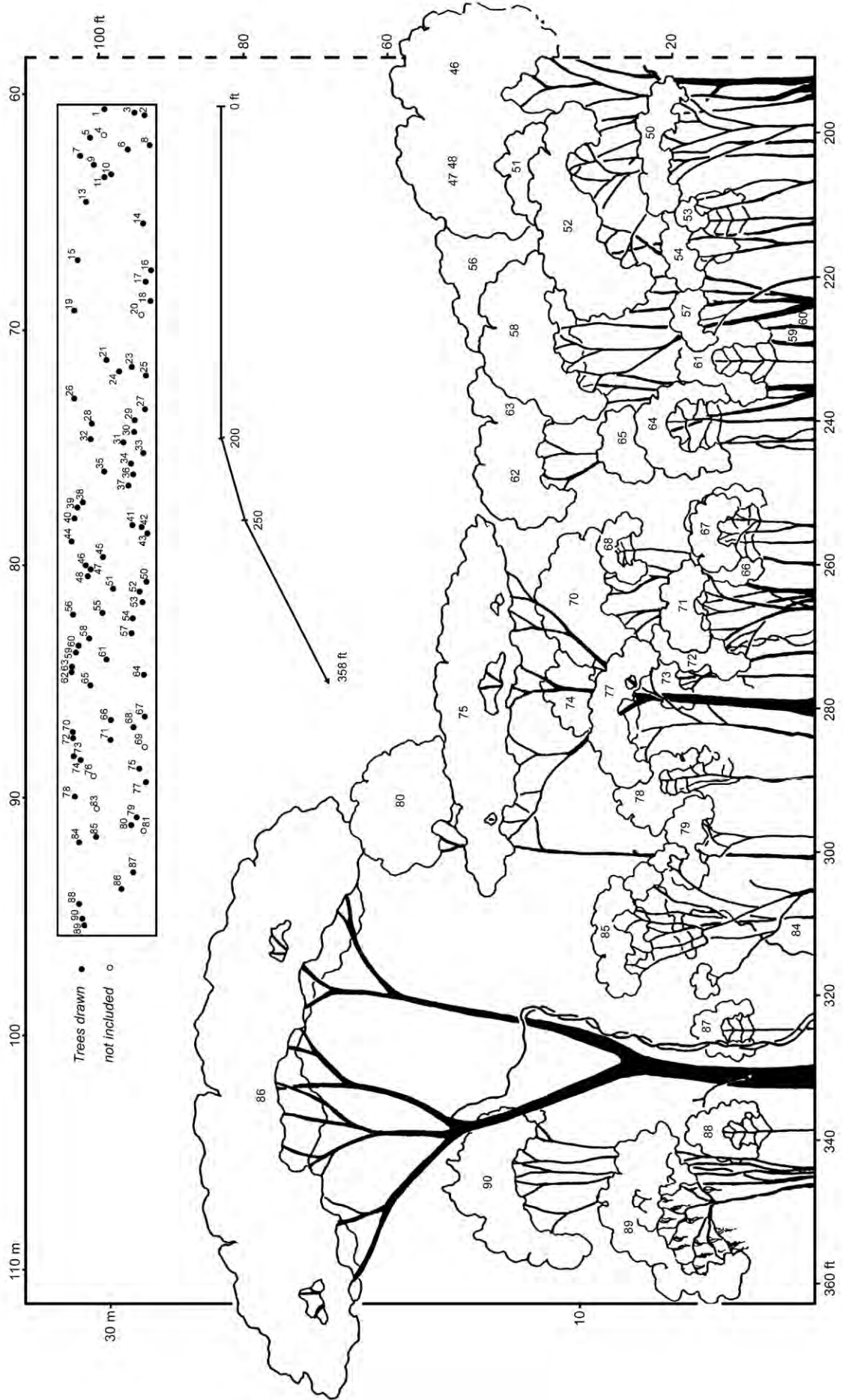


Table 5 Key to Cabbal Wade *Albizia gummifera*- *Nuxia congesta* forest profile strip (Figure 15).

No.	Botanical Name	Stratum	Height (m)
1	JDC 3459	C	6.0
2	Rubiaceae	C	6.0
3	<i>Albizia gummifera</i>	B	24.0
4	JDC 3470	X	4.5
5	<i>Xymalos monospora</i>	C	8.0
6	<i>Bridelia speciosa</i>	C	10.0
7	<i>Bridelia speciosa</i>	C	13.0
8	<i>Pavetta corymbosa</i>	C	6.0
9	<i>Pittosporum viridiflorum</i>	C	10.5
10	<i>Clausena anisata</i>	C	9.0
11	<i>Bridelia speciosa</i>	C	8.5
12	<i>Pavetta corymbosa</i>	X	5.5
13	<i>Eugenia gilgii</i>	C	13.5
14	<i>Rauvolfia vomitoria</i>	C	9.0
15	<i>Bridelia speciosa</i>	C	13.5
16	<i>Rothmannia urcelliformis</i>	B	15.0
17	<i>Croton macrostachyus</i>	B	21.0
18	<i>Carapa procera</i>	C	9.0
19	<i>Bridelia speciosa</i>	C	8.5
20		Dead	
21	<i>Bridelia speciosa</i>	C	13.5
22	<i>Pavetta corymbosa</i>	X	5.5
23	<i>Nuxia congesta</i>	B	15.0
24	JDC 3483	C	6.5
25	JDC 3483	C	8.5
26	<i>Albizia gummifera</i>	B	19.5
27	<i>Albizia gummifera</i>	B	19.0
28	<i>Bridelia speciosa</i>	C	11.5
29	<i>Rauvolfia vomitoria</i>	C	7.5

No.	Botanical Name	Stratum	Height (m)
30	<i>Bridelia speciosa</i> (partially enveloped by a strangling <i>Ficus</i>)	C	10.5
31	<i>Eugenia gilgii</i>	C	7.5
32	<i>Bridelia speciosa</i>	C	6.0
33	<i>Xymalos monospora</i>	C	7.0
34	JDC 3470	C	8.5
35	<i>Rauvolfia vomitoria</i>	C	10.5
36	<i>Rothmannia urcelliformis</i>	C	6.0
37	<i>Cassipourea congoensis</i>	C	6.0
38	<i>Bridelia speciosa</i>	C	13.5
39	<i>Nuxia congesta</i>	B	15.0
40	<i>Albizia gummifera</i>	B	15.0
41	<i>Eugenia gilgii</i>	C	7.0
42	<i>Nuxia congesta</i>	B	16.5
43	<i>Cassipourea congoensis</i>	C	10.0
44	<i>Pavetta corymbosa</i>	X	5.5
45	<i>Croton macrostachyus</i>	B	16.5
49	<i>Albizia gummifera</i>	B	18.0

(An X means the tree is not included in the diagram)

Figure 15 (Cont.) Profile strip in *Albizia gummifera*-*Nuxia congesta* forest at c. 1830 m on Cabbal Wade.

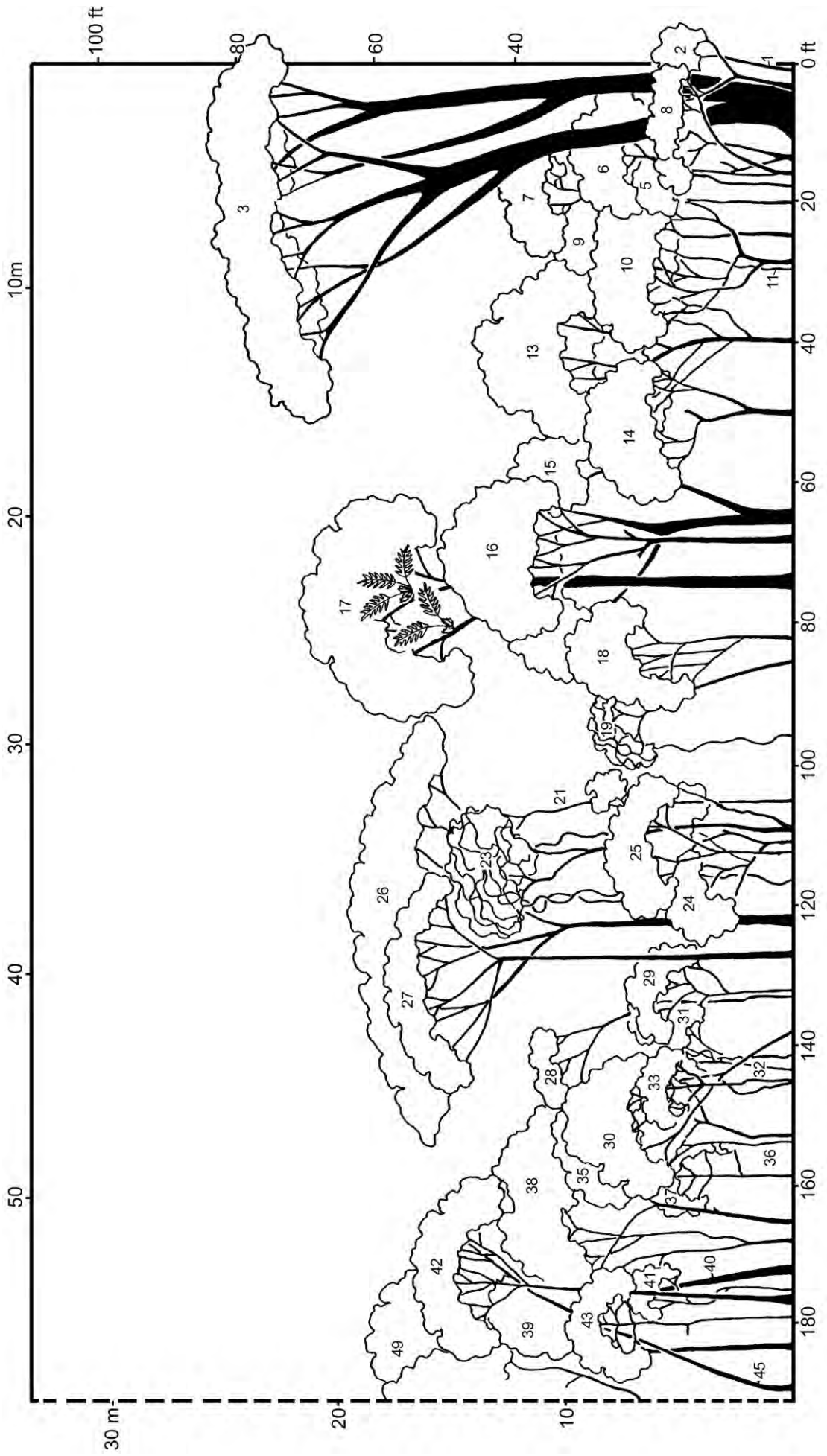


Table 5 (Cont) Key to Cabbal Wade *Albizia gummifera*- *Nuxia congesta* forest profile strip (Figure 15).

No.	Botanical Name	Stratum	Height (m)
46	<i>Schefflera abyssinica</i>	B	18.0
47	<i>Nuxia congesta</i>	B	18.0
48	<i>Nuxia congesta</i>	B	18.0
50	<i>Carapa procera</i>	C	7.5
51	<i>Bridelia speciosa</i>	C	13.5
52	<i>Rauvolfia vomitoria</i>	C	13.5
53	<i>Pavetta corymbosa</i>	C	6.0
54	JDC 3470	C	6.5
55	<i>Cassipourea congoensis</i>	C	6.0
56	<i>Nuxia congesta</i>	B	16.0
57	JDC 3470	C	6.0
58	<i>Nuxia congesta</i>	B	14.5
59		Dead	
60	<i>Pavetta corymbosa</i>	C	6.0
61	<i>Garcinia smeathmannii</i>	C	6.0
62	<i>Nuxia congesta</i>	B	14.5
63	<i>Nuxia congesta</i>	B	14.5
64	<i>Rothmannia urcelliformis</i>	C	7.5
65	<i>Cassipourea congoensis</i>	C	9.0
66	<i>Rothmannia urcelliformis</i>	X	5.5
67	<i>Pavetta corymbosa</i>	X	5.5
68	<i>Entandrophragma angolense</i>	C	9.0
69	<i>Eugenia gilgii</i>	X	5.8
70	<i>Nuxia congesta</i>	C	12.0
71	<i>Xymalos monospora</i>	C	6.0
72	<i>Nuxia congesta</i>	C	7.0
73	<i>Nuxia congesta</i>	C	6.5
74	<i>Rothmannia urcelliformis</i>	C	12.0
75	<i>Polyscias fulva</i>	B	16.5
76	<i>Pavetta corymbosa</i>	X	5.5
77	<i>Pittosporum viridiflorum</i>	C	9.5
78	<i>Cassipourea congoensis</i>	C	8.5

No.	Botanical Name	Stratum	Height (m)
79	<i>Pavetta corymbosa</i>	C	6.0
80	<i>Alangium chinense</i>	B	20.0
81	<i>Rothmannia urcelliformis</i>	X	4.5
82	<i>Pavetta corymbosa</i>	X	5.5
83	<i>Rothmannia urcelliformis</i>	C	9.0
84	<i>Rothmannia urcelliformis</i>	C	9.0
85	<i>Clausena anisata</i>	C	9.0
86	<i>Albizia gummifera</i>	B	26.0
87	<i>Garcinia smeathmannii</i>	X	4.5
88	<i>Garcinia smeathmannii</i>	C	9.0
89	<i>Rauvolfia vomitoria</i>	C	9.0
90	<i>Milletia conraui</i>	B	10.5

(An X means the tree is not included in the diagram)

Pouteria forest

montane; c.1830 m

Diversity

A total of 78 vascular plant species were recorded from within the the profile plot for *Pouteria altissima* forest, three very large (>30 m) trees, 14 large (14-30 m) trees, 29 small (<14 m) trees, 12 woody climbers, 10 shrubs, 17 herbs and 13 fern and fern allies. Many are described below, and the remainder are in the checklist. Red Data List species included the trees *Dombeya* cf. *ledermannii*, *Entandrophragma angolense*, *Eugenia gilgii*, *Millettia conraui* and *Pouteria altissima*.

Conservation status

The forest falls within the boundaries of Gashaka Gumti National Park.

Profile strip

The profile diagram (Figure 16) depicts a strip of montane forest at 1830 m as illustrated in Figure 17. It is 45.1 m long and 15.3 m wide, on a 40° - 45° slope, in the forest on the north-west face of the Cabbal Wade escarpment, opposite Dutsin Dodo. It is c. 150 m below the lip of the plateau.

Structure, physiognomy, and floristic composition

The allocation of upper canopy trees to different strata was subjective. Arguably, they could be regarded as forming a continuum.

The tallest tree was a *Pouteria altissima* (35 m), and this species accounted for over 33% of the 25 trees. Next tallest was a single *Entandrophragma angolense*. Further down the slope, out of the profile strip, *P. altissima* attained a height of 46 m. The smooth, tapering boles of *P. altissima*, *Trilepisium madagascariense* and *Pterygota mildbraedii* were free of branches to a great height; 29 m in the case of one *P. altissima*.

Pouteria altissima and *Entandrophragma angolense* are strongly buttressed. *P. altissima* had plank buttresses which extend up to 3 m, and exceptionally 4.8 m, with the bole fluted above the buttresses. The *E. angolense* in the profile diagram was buttressed to 7

m. Huge surface roots extended from the buttresses for 9 m along the slope on each side, and for 3 m downhill. This tree had a clear bole of 21 m with very little taper, measuring 5.26 m girth above the buttresses. Ground level on the uphill side, where it had formed a platform the size of a big table, was 4.6 m higher than on the downhill side. The crown extended 30 m. *Strombosia scheffleri* tended to fork low down or at ground level, with two or three stems and a crown spread of up to 18 m. This was in contrast to *Pterygota mildbraedii* which has a narrow almost conical crown.

In the shrub stratum (D), *Piper capense* and *Dracaena fragrans* reduced visibility to c. 18 m. Other shrubs, less common, were *Pothomorphe umbellata*, *Achyrospermum oblongifolium* and *Boehmeria macrophylla*. A few saplings of *Pouteria altissima* and *Pterygota mildbraedii* were observed.

The ground layer (E) was well developed. In the early dry season the flowers of *Acanthus montanus* were conspicuous, white with purplish veining. Other robust acanths merging with the shrub layer were *Dicliptera faxata* and *Hypoestes rosea*. *Dracana aubryana* was common and there was a *Palisota* sp. Locally, an *Impatiens* sp. (JDC 3524), heavily browsed by bushbuck, formed a dense cover. Where the canopy was open *Aframomum angustifolium* tended to be dominant. *Amphiblemma mildbraedii* occupied windfall gaps.

Among an abundance of terrestrial ferns *Pteris togoensis* and *Tectaria fernandensis* were the most common. Also noted were *Asplenium preussii*, *Bolbitis* sp. (JDC 3547) and *Doryopteris concolor* var. *kirkii*.

The stream in the ravine below Dutsin Dodo never entirely dried up. The air was always still, and with only scattered sun flecks reaching the ground there was little, even in February, to suggest the dry season. Here were more ferns including the robust *Pteris pteridioides*, and *Adiantum poiretii*. Also present were the shade-loving herbs *Sanicula elata* and *Thalictrum rhynchocarpum*, with *Streptocarpus elongatus* beside the water.

Numerous lianes and creepers were found, including *Clerodendrum bucholzii*, JDC 3582 (an unidentified liane) and *Thunbergia* sp. (JDC 3543), with showy purple flowers.

Strangling epiphytes included *Schefflera abyssinica*, *Ficus artocarpoides*, *F. oreodryadum* and *F. sansibarica* subsp. *macrosperma*.

Other than *Asplenium dregeanum*, common on tree trunks, and *Drynaria volkensii* in the crowns of tall trees, few epiphytic ferns were noted. *Drynaria*, which has a creeping rhizome and humus-collecting bracket fronds, occurred to 1 m above the ground in scrub woodland further down the escarpment.

Other high epiphytes included *Lycopodium brachystachys*, pendent 18 m up, and a *Bulbophyllum* sp. massed along the bigger branches of *Pouteria altissima* and *Entandrophragma angolense*. There must have been many more epiphytic orchids and ferns unrecorded. Trees with smooth, flaking bark such as *Strombosia scheffleri*, support few epiphytes. A species of lichen (*Usnea* sp.) occurred sparingly in the tops of the tallest trees.

Palms (*Phoenix reclinata*) were rare, and wild bananas (*Ensete gillettii*) were only recorded from the ravine below Dutsin Dodo. Giant lobelias (*Lobelia columnaris*) were common along the forest edge.

Entandrophragma angolense was leafless for three weeks in November and *Pouteria altissima*, intermittently for a little longer. *Cordia millenii* was briefly deciduous.

Ecological notes

The principal upper canopy trees produced abundant seed in most years. Seedlings, saplings and young trees were not hard to find, except for *Entandrophragma angolense*, which releases its seeds several weeks before conditions are right for germination. About mid-February the segments split apart, either to fall separately or joined at the apex, leaving the winged seeds packed along each face of the central column. They stay until a gust of wind brings them showering down, rotating as they fall. Few are carried far beyond the parent tree. Predation, presumably by small rodents, ensures that very few seeds survive until the rains begin. Nonetheless, some do travel considerable distances and manage to germinate and establish. The young tree in Figure 15 (*Albizia - Nuxia* forest) is proof; the nearest seed tree was 0.8 km away and 150 m lower down the escarpment.

The fruit of *Pouteria altissima*, which ripens in the rains, has a single, large seed. Frugivorous birds, tauracos particularly, must aid dissemination of this species, as well as *Cordia millenii*, among others.

Newtonia buchananii fruits prolifically during the rains and the light, winged seeds are well adapted for wind dispersal, likewise *Pterygota mildbraedii*.

While these are not the only factors affecting regeneration, provided the forest and its wildlife are left undisturbed and fire does not encroach further, it would seem likely that it will maintain its present form until a natural disturbance.



Figure 17 On a 40° slope the forest in Kurmin Dutsin Dodo is dominated locally by *Pouteria altissima*. The tallest trees are almost 30 m to the first branch and up to 3.5 m gbh, the boles fluted to a height of 10 m. Nearby trees include *Entandrophragma angolense*, *Cordia millenii*, and *Pterygota mildbraedii*. The break in slope at the plateau lip is so abrupt that the over-hanging branches of trees growing up from below may be scorched by grass fires.

Figure 16 Profile strip in *Pouteria altissima* forest at c. 1830 m on Cabbal Wade.

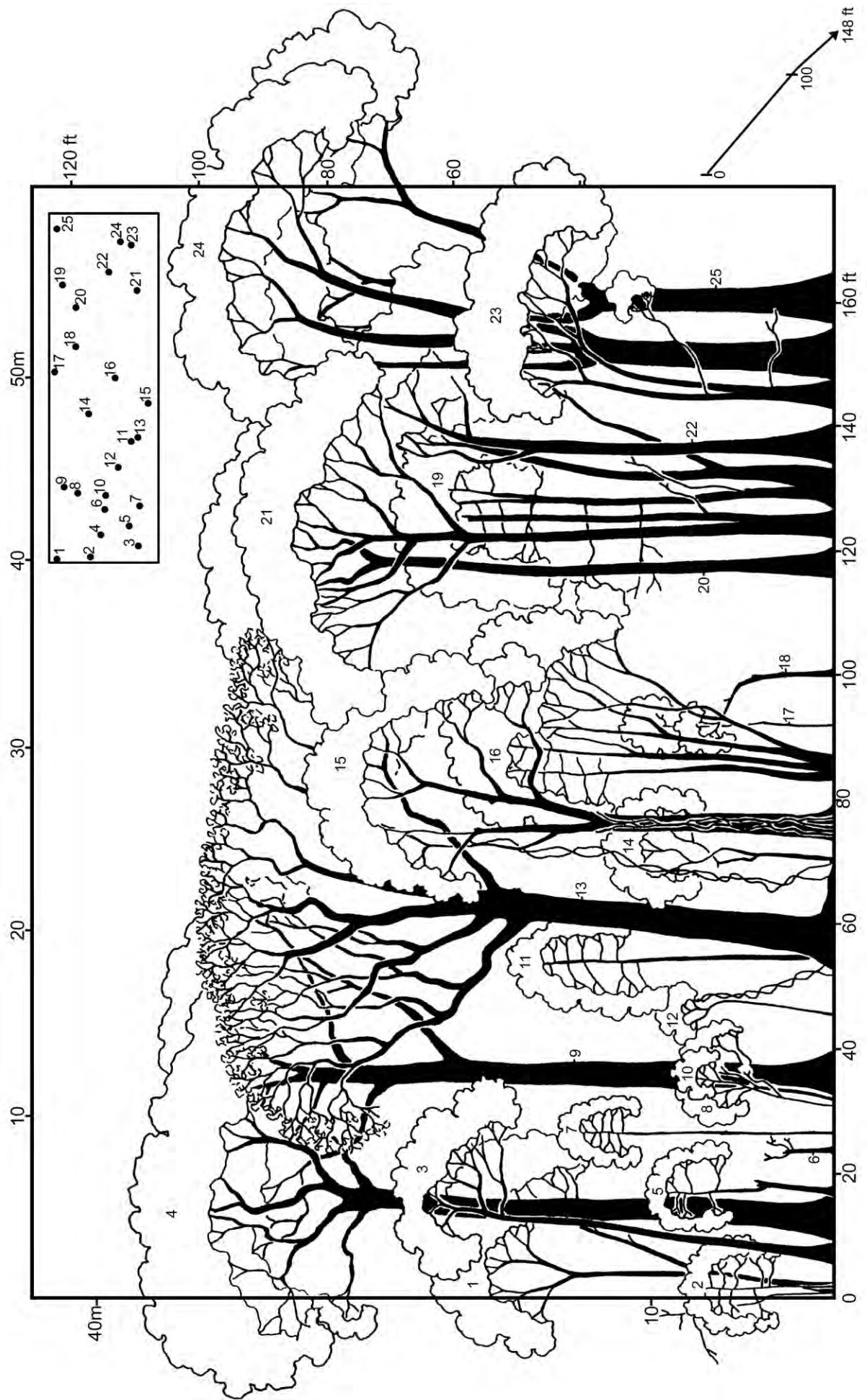


Table 6 Key to Cabbal Wade *Pouteria altissima* forest profile strip (Figure 16).

No.	Botanical Name	Stratum	Height (m)
1	<i>Strombosia scheffleri</i>	B	19.8
2	<i>Pterygota mildbraedii</i>	C	7.3
3	<i>Pouteria altissima</i>	B	21.3
4	<i>Pouteria altissima</i> (broken off)	A	33.5
5	<i>Cassipourea congoensis</i>	C	8.8
6	<i>Pouteria altissima</i>		3.0
7	<i>Pterygota mildbraedii</i>	C	13.4
8	<i>Rothmannia urcelliformis</i>	C	7.6
9	<i>Pouteria altissima</i>	A	32.0
10	<i>Ritchiea albersii</i>	C	7.9
11	<i>Pterygota mildbraedii</i>	B	16.2
12	<i>Rothmannia urcelliformis</i>	C	13.7
13	<i>Entandrophragma angolense</i>	A	32.0
14	<i>Ritchiea albersii</i>	C	11.6
15	<i>Pouteria altissima</i>	B	27.4
16	<i>Strombosia scheffleri</i>	B	19.8
17	<i>Pterygota mildbraedii</i>	C	10.7
18	<i>Albizia gummifera</i>	C	7.6
19	<i>Strombosia scheffleri</i>	B	23.0
20	<i>Pouteria altissima</i>	B	29.0
21	<i>Strombosia scheffleri</i>	B	28.0
22	<i>Pouteria altissima</i>	B	24.0
23	<i>Strombosia scheffleri</i>	B	17.7
24	<i>Pouteria altissima</i>	A	33.5
25	<i>Pouteria altissima</i>	B	29.0

Forest on the spurs

Notes

On the narrow, sometimes rocky spurs along the Cabbal Wade escarpment the trees are shorter than in the *Pouteria altissima* forest, and floristically more akin to the *Albizia* - *Nuxia* community described earlier.

Of the larger trees, seldom more than 9-12 m high, *Nuxia congesta* was the most common, followed by *Albizia gummifera*, *Bridelia speciosa*, *Croton macrostachyus* and *Dombeya* cf. *ledermannii*, with densely massed white flowers, conspicuous in February. Less common were *Garcinia smeathmannii*, *Polyscias fulva* and *Prunus africana*, of which one 2 m sapling was noted.

Smaller trees included *Clausena anisata*, *Erythrococca* sp. (JDC 3596), *Psychotria* sp. (JDC 3595) and *Rauwolfia vomitoria*. Among the woody climbers were *Byrsocarpus* ?*coccineus* or *dinklagei* (JDC 3602 and 3752), *Gouania longispicata*, and *Paullinia pinnata*. The most frequent shrubs were *Dracaena fragrans*, *Leea guineensis*, *Piper capense* and *Psychotria peduncularis*. Shrubby herbs included *Hypoestes forskalei* and *H. rosea*.

Open woodland

c. 1400 - 1500 m

Notes

At approximately 305 m below the plateau lip the slopes are less extreme. Deep hollows, ravines and steep rocky spurs are replaced by shallow valleys separated by parallel low ridges, leading down to the wide valley floor at the foot of Gangirwal. The forest on the spurs becomes increasingly stunted, giving way lower down to open woodland, with trees not more than 6 m high, and finally wooded grassland. *Bridelia speciosa* persisted as one of the most common trees to the foot of the slope. *Combretum molle* was abundant and *Clausena anisata*, *Harungana madagascariensis*, *Vitex doniana* and *Entada abyssinica* occurred. Scandent shrubs and climbers included *Canthium henriquesianum*, *Mussaenda arcuata* and *Paullinia pinnata*. Patches of bracken (*Pteridium aquilinum*) were frequent. Saplings of *Canthium*

subcordatum and *Polyscias fulva* were noted. *Drynaria volkensii*, a tree-top epiphyte in forest, grew here about a metre above the ground.

In wooded grassland were *Vitex*, *Annona senegalensis*, *Cussonia arborea*, *Ficus vallis-choudae*, *Hymenocardia acida* (the flowers attracting enormous numbers of small bees), *Ochna afzelii*, *Piliostigma thonningii*, *Psorospermum febrifugum* and occasionally *Terminalia schimperiana*. The shrubs *Kotschya strigosa* and *Sida rhombifolia* up to 2.4 m high were common, and *Echinops amplexicaulis* was conspicuous.

Escarpment foot forest

c. 1300 - 1400 m

Notes

Descending, wooded grassland gave way to tall bracken (*Pteridium aquilinum*) and scrub, merging into secondary forest hung with itch bean (*Mucuna poggei*) and prickly *Smilax anceps*, until the forest itself was reached. There were (1975) numerous buffalo paths through this 'jungle'. In the forest, *Newtonia buchananii*, over 40 m tall, was the most abundant species. *Aubrevillea kerstingii* and *Parkia filicoidea*, equally lofty, were common, with *Albizia* sp. and *Polyscias fulva*. Understorey trees included *Sorindeia* cf. *juglandifolia* 18-21 m tall, with *Fagara leprieurii*, *Xylopiac acutiflora*. *Dracaena arborea* occurred sparingly, with *Raphia* palms beside the stream. Regeneration of *N. buchananii* and *A. kerstingii* was plentiful, from seedlings to pole-size trees.

Forest / grassland boundary

c. 1300 m

Notes

Where a break in relief is most pronounced the ecotone was barely 2 m wide. Trees along the forest edge included *Nuxia congesta*, the most common, with *Bridelia speciosa*, *Eugenia gilgii*, *Dombeya* cf. *ledermannii*, *Maesa lanceolata*, and *Agarista salicifolia*. Among the shrubs were *Erythrococca* sp.

(JDC 3596 (sometimes a small tree)), *Hypericum roeperanum* with showy flowers, *Psorospermum ?aurantiacum* (JDC 3586) and *Tephrosia vogelii* with scandent shrubs and climbers such as *Canthium henriquesianum* and *Gouania longispicata*.

Two robust acanths, *Hypoestes forskalei* and *H. rosea*, were also present in the forest. The erect flowering stems of *Lobelia columnaris* were conspicuous in December/January. There were patches of bracken (*Pteridium aquilinum*) and *Kalanchoe* sp. (JDC 3527) with reddish-orange flowers was noted frequently.

Where the slope was more gradual, the transition zone may be several metres wide. Besides many of the above, there were, among the woody plants, *Albizia gummifera*, *Clausena anisata*, *Clematis simensis*, *Solanecio mannii*, *Microglossa densiflora*, *Pittosporum viridiflorum*, *Sida rhombifolia* and *Solanum indicum* subsp. *distichum*. Perennial herbs included *Aframomum angustifolium*, *Eremomastax cf. speciosa* (JDC 3554) with handsome purple flowers, *Platostoma rotundifolium*, the white or mauve-tinged bracts conspicuous, *Satureja robusta* and (JDC 3485), a labiate, gregarious in stands 3 m high. Creepers and herbaceous scrambling plants included *Achyranthes aspera*, *Dolichos sericeus*, *Ipomea tenuirostris* and *Mikania* sp. (JDC 3504).

Gangirwal

Notes

Between Dutsin Dodo (Figure 12) and the col, the top of the escarpment merges more gradually with the plateau surface, and the forest is not as tall. Of the upper canopy trees *Albizia gummifera* is the largest and *Nuxia congesta* the most abundant species.

Along the western flank of Gangirwal, tall forest extends from the valley floor at c. 1350 m to approximately 1680 m. Above this the escarpment is typically much steeper and locally craggy. Nonetheless, although the trees are shorter, with a compact canopy, forest persists to the lip of the upper plateau at c. 2200 m, and in diminished form and fringing streams, well on to the plateau.

With the help of buffalo paths it was possible to

descend the escarpment from the plateau lip to the foot of the cliffs, approximately 300 m lower. The transition from plateau grassland to forest was abrupt; forest trees reached to the very top of the scarp, with only a narrow fringe of small trees, including *Adenocarpus mannii*, *Gnidia glauca* and *Psorospermum aurantiacum*, and the shrubs *Erica mannii* and *Clutia kamerunica*. A variant of the tree fern *Cyathea dregei* with a slender, smooth, often crooked stem (JDC 3609) was also recorded. Only a few species reached over 9 m in height, and these included *Albizia gummifera*, *Cassipourea congoensis*, *Clausena anisata*, *Ilex mitis*, *Maesa lanceolata*, *Nuxia congesta*, *Pittosporum viridiflorum*, *Podocarpus latifolius*, *Rapanea melanophloeos*, *Syzygium guineense* subsp. *bamendae*, *Tarenna thomasi* and *Xymalos monospora*. Typically their branches were festooned with moss and lichens (*Usnea* sp.), and boles padded with bryophytes. Shrubs included *Psychotria peduncularis*, which locally may be the only species, *Dracaena fragrans* and *Piper capense*.

Prunus - *Syzygium* - *Podocarpus* forest c. 2090 m

Towards the north-west end of Gangirwal, where the slope is less abrupt, at an altitude of c. 2090 m, a small shelf backs up to a low cliff below a rocky hillside (Figure 18). The forest here, while floristically similar, is better developed than it is on the steep escarpment.

Diversity

A total of 32 vascular plant species were recorded from within the profile strip for the *Prunus* - *Syzygium* - *Podocarpus* forest including six large (c.14-30 m) trees, 17 small (<14 m) trees, four woody climbers, two shrubs, six herbs and five fern and fern allies. There were three epiphytes. Many are described below, and the remainder are included in the checklist. Red Data List species were the trees *Eugenia gilgii* and *Prunus africana*.

Profile strip

The profile diagram (Figure 19) depicts a strip of forest 61.3 m long and 13.7 m wide, 150 m below the general level of the upper plateau (Figure 18). The soil, over decomposed rock, was stony, and never deeper than 90 cm. The tallest trees were 18-29 m high, the height reducing as the soil became shallower and increasingly stony.

Structure, physiognomy, and floristic composition

There were two canopy levels, an upper stratum (B) and a lower stratum (C). Trees up to 15 m tall were considered part of the C stratum. For the sake of clarity not all these trees are shown in the profile diagram.

The total number of living trees was 85 (Figure 19, Table 7). The B stratum comprised 24 trees belonging to six species. In the C stratum the remaining 61 trees represented 15 (possibly 16) species.

The tallest species in the B stratum was *Syzygium guineense* subsp. *bamendae* (16-29 m high), and the most common species, *Prunus africana*, with an

average height of 22.3 m, followed by *Podocarpus latifolius* (two trees) (Figure 19).

In the C stratum *Tarenna thomasi* and JDC 3702 ?*Allophylus africanus* comprised 51% of all the trees. Their normally crooked stems, with light open branching, contrasted with the compact, upright habit of *Cassipourea congoensis* and *Rapanea melanophloeos*.

The shrub layer (D) was characterised by head high thickets of *Psychotria peduncularis*, with sapling trees.

The ground layer (E) was restricted to sparse *Oplismenus hirtellus*, *Carex chlorosaceus*, *Thalictrum rhynchocarpum* and *Pteris togoensis*. Abundant tree seedlings included *Clausena anisata*, *Podocarpus latifolius*, *Prunus africana*, *Rapanea neurophylla*, *Xymalos monospora* and JDC 3702 ?*Allophylus africanus*.

Among the few lianes *Carapa procera* was locally dominant, forming intricate tangles and arbours where buffalo would spend the day. *Psydrax acutifolia* reached the crowns of C stratum trees. *Combretum* sp. (JDC 3732) with massive, deeply grooved stems,



Figure 18 *Prunus africana* - *Syzygium guineense* supsp. *bamendae* - *Podocarpus latifolius* forest on Gangirwal, at c. 2090 m.

coiled over the forest floor before looping up into the tree tops. The strangling epiphyte *Schefflera abyssinica* was common, with *Podocarpus latifolius* often the host-tree.

Most of the B stratum trees were briefly deciduous or, like *Albizia gummifera*, leafless for a month or more. Notable exceptions were *Podocarpus latifolius*, *Syzygium guineense* subsp. *bamendae* and *Prunus africana*.

Among epiphytes, *Bulbophyllum* spp., *Drynaria volkensii* and *Lycopodium mildbraedii* were present in the crowns of *Prunus africana*. All the tree boles including smooth-barked *Nuxia congesta* and *Podocarpus latifolius* were mossy. Most common were JDC 3502 and, festooning smaller trees, *Pilotrichella* sp. (JDC 3446). There were many smaller epiphytic ferns, but shrivelled beyond recognition in February.

Ecological notes

Along the top (eastern) edge where the trees abutted directly on the rock face, there was no trace of fire damage. On the south side there was no such break in relief, an 18 m wide buffer zone was inadequate protection in 1975, when in January, exceptionally fierce fires swept the mountain. The scrub was burnt through and an inner belt of *Nuxia congesta* scorched before the flames petered out.

Syzygium fringing forest

Notes

At the south-west end of the mountain, overlooking Cabbal Wade, the relief above approximately 1980 m is less pronounced than on the western side. Only along deeply incised stream-lines does the topography afford some check to fire and allow limited development of forest. For the rest, fires sweep unhindered up the mountain. There are two streams which rise halfway up the slopes at approximately 2130 m, and unite lower down to descend by a seasonal cataract into the valley separating the lower slopes of Gangirwal and Cabbal Wade. One stream originates in a hollow where the forest was sufficiently extensive to lay out a profile plot.

Syzygium stream source forest 2130 m

Diversity

A total of 25 vascular plant species were recorded from within the the profile plot for *Syzygium guineense* subsp. *bamendae* streamside forest. The largest trees were only 12-21 m tall (eight species), and there were a further seven between 6-12 m tall. One woody climber, five shrubs, two herbs and two fern and fern allies were collected. This is an underestimate of species diversity, especially for the herbs and ferns, because the forest was so dry that many were shrivelled beyond recognition. Many of the gatherings are described below, and the remainder are in the checklist. Red Data List species included *Eugenia gilgii* and *Prunus africana*.

Conservation status

The forest falls within the boundaries of Gashaka Gumti National Park.

Profile strip

The profile diagram (Figure 20) depicts a section through the forest 64.3 m long and 15 m wide, at c. 2130 m, in a steep sided bowl at the south-west end of Gangirwal. From the upper edge, where the ecotone of small trees and shrubs is c. 7.6 m wide, the profile descends steeply to the stream source and beyond to where, between rocky banks, the extent of the trees is reduced to a narrow strip. There were 61 trees 6 m tall and over.

Structure, physiognomy, and floristic composition

For convenience, trees over 12 m tall were considered part of the topmost (B) stratum. There were 21 trees, comprising eight species. *Syzygium guineense* subsp. *bamendae* was the most characteristic tree, up to 21.3 m tall and present the length of the profile. *Nuxia congesta*, with six trees (average height 16 m) was almost confined to the top end of the profile near the forest edge. *Prunus africana* and *Schefflera abyssinica* were each represented by two trees, and *Albizia gummifera*, by one 20.4 m high. *Ilex mitis* grew close to the stream; four trees close together, the tallest 20.1 m high. Less tall than the others, arguably

Figure 19 Profile strip in *Prunus africana* - *Syzygium guineense* subsp. *bamendae* - *Podocarpus latifolius* forest on Gangirwal, at c.2090 m.

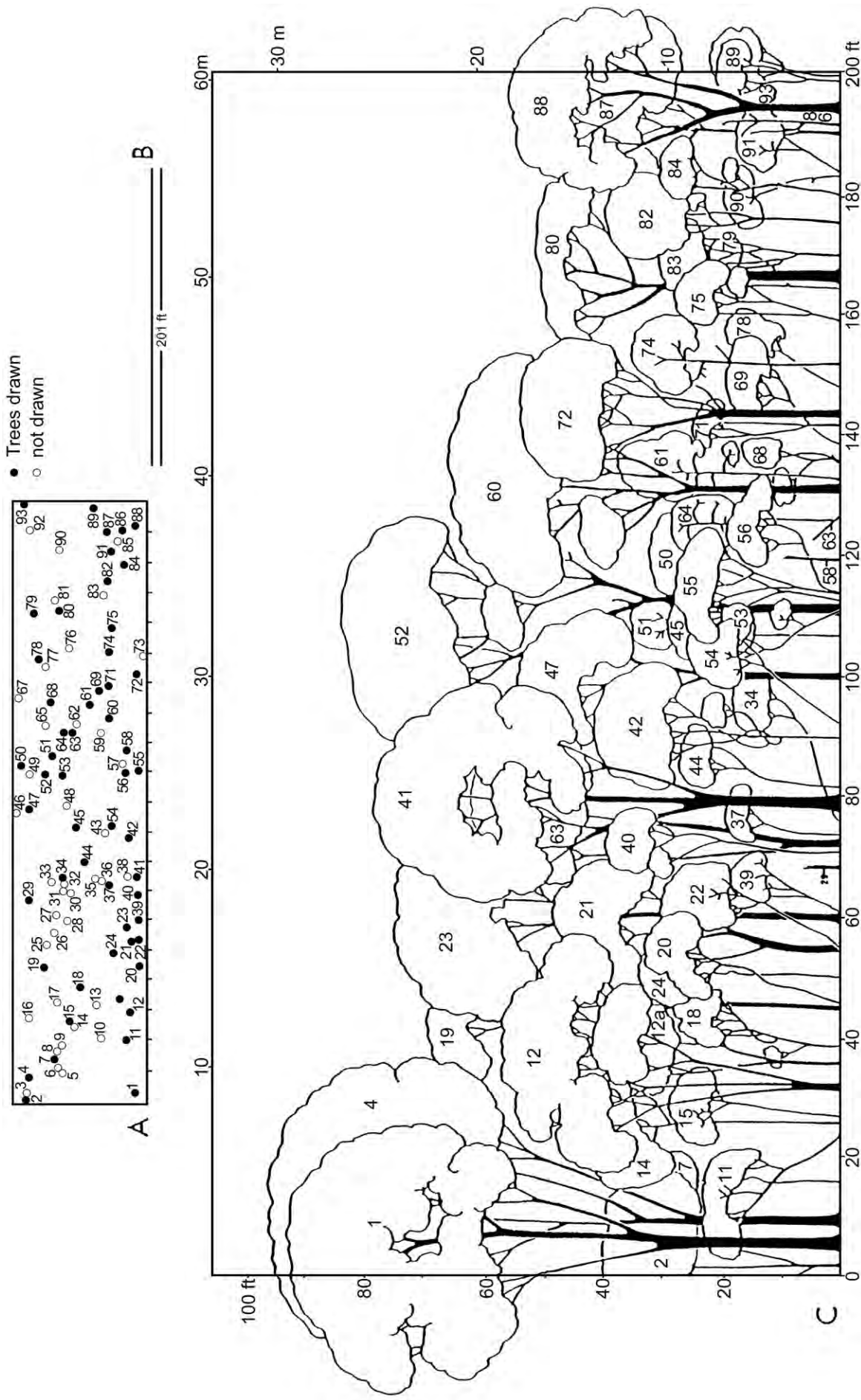


Table 7 Key to Gangirwal *Prunus-Syzygium-Podocarpus* forest profile strip (Figure 19).

No.	Botanical Name	Stratum	Height (m)	No.	Botanical Name	Stratum	Height (m)	No.	Botanical Name	Stratum	Height (m)
1	<i>Prunus africana</i>	B	28.3	36	<i>Prunus africana</i>	B	20.4	72	<i>Nuxia congesta</i>	B	16.7
2	<i>Ixora foliosa</i>	C	12.2	37	<i>Tarenna thomasii</i>	C	6.0	73	<i>Nuxia congesta</i>	C	13.7
3	<i>Rapanea melanophloeos</i>	C	12.8	38	<i>Allophylus africanus</i>	C	7.9	74	<i>Allophylus africanus</i>	C	11.2
4	<i>Prunus africana</i>	B	28.9	39	JDC 3700	C	6.0	75	<i>Tarenna thomasii</i>	C	8.5
5	<i>Ixora foliosa</i>	C	10.9	40	<i>Pittosporum mannii</i>	C	12.1	76	<i>Tarenna thomasii</i>	C	7.9
6	<i>Cassipourea congoensis</i>	C	13.7	41	<i>Syzygium guineense</i>	B	24.3	77	<i>Tarenna thomasii</i>	C	9.0
7	<i>Allophylus africanus</i>	C	12.2	42	subsp. bamendae	C	9.7	78	<i>Tarenna thomasii</i>	C	6.0
8	<i>Allophylus africanus</i>	C	7.9	43	<i>Tarenna thomasii</i>	C	9.7	79	<i>Tarenna thomasii</i>	C	7.6
9	Dead	C	9.0	44	<i>Syzygium guineense</i>	B	20.7	80	<i>Polyscias fulva</i>	B	15.8
10	<i>Allophylus africanus</i>	C	7.6	45	subsp. bamendae	C	8.5	81	<i>Ficus</i> sp.	C	8.5
11	<i>Tarenna thomasii</i>	C	7.0	46	<i>Allophylus africanus</i>	C	8.5	82	<i>Prunus africana</i>	C	12.0
12	<i>Syzygium guineense</i>	B	18.0	47	<i>Tarenna thomasii</i>	C	8.2	83	<i>Tarenna thomasii</i>	C	9.0
13	subsp. bamendae "	B	28.9	48	<i>Nuxia congesta</i>	C	8.5	84	<i>Albizia gummifera</i>	C	9.0
14	<i>Podocarpus latifolius</i>	C	12.8	49	<i>Nuxia congesta</i>	B	16.7	85	<i>Albizia gummifera</i>	B	19.2
15	<i>Allophylus africanus</i>	C	8.2	50	Dead stump: ignored	C	13.1	86	Dead stump	C	6.4
16	<i>Podocarpus latifolius</i>	B	22.8	51	Dead	C	9.7	87	<i>Prunus africana</i>	C	14.9
17	<i>Ixora foliosa</i>	C	6.4	52	<i>Tarenna thomasii</i>	C	9.7	88	<i>Nuxia congesta</i>	B	17.3
18	JDC 3700	C	8.5	53	<i>Nuxia congesta</i>	C	10.9	89	JDC 3700	C	6.4
19	<i>Prunus africana</i>	B	19.8	54	<i>Albizia gummifera</i>	B	25.6	90	<i>Allophylus africanus</i>	C	6.0
20	<i>Tarenna thomasii</i>	C	10.3	55	<i>Allophylus africanus</i>	C	7.3	91	JDC 3700	C	6.4
21	<i>Pittosporum mannii</i>	C	15.2	56	<i>Allophylus africanus</i>	C	8.2	92	JDC 3700	C	6.0
22	<i>Allophylus africanus</i>	C	15.2	57	JDC 3700	C	8.5	93	JDC 3700	C	8.9
23	<i>Prunus africana</i>	B	22.8	58	<i>Allophylus africanus</i>	C	6.0	85 live trees, 2 dead standing trees and 6 dead stumps			
24	<i>Albizia gummifera</i>	C	10.3	59	<i>Clausena anisata</i>	C	6.0				
25	<i>Albizia gummifera</i>	B	19.8	60	Dead stump	C	3.3				
26	<i>Prunus africana</i>	B	17.6	61	<i>Tarenna thomasii</i>	C	7.6				
27	<i>Syzygium guineense</i>	B	19.1	62	<i>Prunus africana</i>	B	20.4				
28	subsp. bamendae	C	9.0	63	<i>Podocarpus latifolius</i>	C	12.8				
29	<i>Cassipourea congoensis</i>	C	9.0	64	<i>Podocarpus latifolius</i>	C	9.0				
30	Dead stump	B	21.0	65	Dead stump	C	2.4				
31	<i>Nuxia congesta</i>	C	19.2	66	<i>Podocarpus latifolius</i>	C	8.8				
32	<i>Pittosporum mannii</i>	C	15.2	67	<i>Nuxia congesta</i>	B	16.4				
33	<i>Tarenna thomasii</i>	C	9.0	68	Dead stump: ignored	B	18.6				
34	<i>Nuxia congesta</i>	B	18.3	69	<i>Podocarpus latifolius</i>	C	7.3				
35	<i>Allophylus africanus</i>	C	9.0	70	<i>Tarenna thomasii</i>	C	6.0				
	<i>Allophylus africanus</i>	C	7.9	71	<i>Syzygium guineense</i>	C	12.0				
					subsp. bamendae	C	7.6				
					JDC 3700	C					

Figure 20 Profile strip in *Syzygium guineense* subsp. *bamendae* stream source forest on Gangirwal, at c. 2130 m.

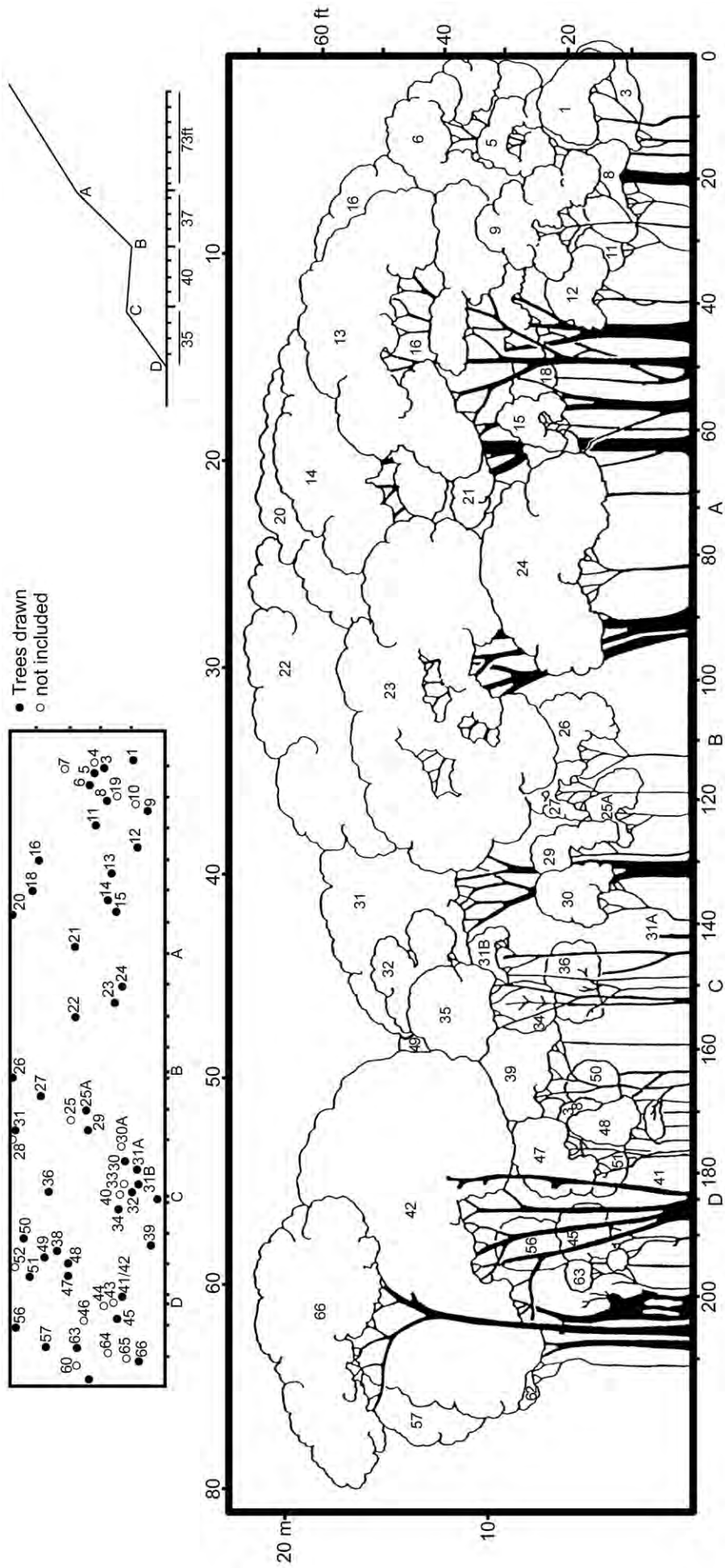


Table 8 Key to Gangirwal *Syzygium* stream- source forest profile strip (Figure 20).

No.	Botanical Name	Stratum	Height (m)
2	<i>Maesa lanceolata</i>	C	7.6
3	<i>Maesa lanceolata</i>	C	8.5
4	<i>Pittosporum viridiflorum</i>	C	6.7
5	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	C	10.7
6	<i>Nuxia congesta</i>	B	15.0
7	<i>Nuxia congesta</i>	B	14.0
8	<i>Clausena anisata</i>	C	6.0
9	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	C	10.4
10	<i>Nuxia congesta</i>	C	12.2
11	JDC 3691 <i>Psychotria</i> sp.	C	6.0
12	<i>Rapanea melanophloeos</i>	C	7.0
13	<i>Prunus africana</i>	B	19.2
14	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	B	20.1
15	<i>Rapanea melanophloeos</i>	C	9.4
16	<i>Nuxia congesta</i>	B	17.7
18	<i>Schefflera abyssinica</i>	B	17.4
19	JDC 3700	C	7.0
20	<i>Nuxia congesta</i>	B	20.4
21	<i>Eugenia gilgii</i>	C	11.3
22	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	B	21.3
23	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	B	18.5
24	<i>Allophylus africanus</i>	C	10.4
25	<i>Ilex mitis</i>	B	16.8
25A	<i>Clausena anisata</i>	C	6.7
26	<i>Xymalos monospora</i>	C	8.2
27	<i>Prunus africana</i>	C	9.4
28	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	C	12.2
29	<i>Rapanea melanophloeos</i>	C	9.1
30	<i>Schefflera abyssinica</i>	C	7.6
30A	<i>Rapanea neurophylla</i>	C	6.7
31	<i>Ilex mitis</i>	B	18.3
31A	Dead stump	C	1.5
31B	<i>Rapanea melanophloeos</i>	C	9.7
32	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	B	15.8
33	<i>Rapanea melanophloeos</i>	C	10.4
34	<i>Rapanea melanophloeos</i>	C	12.2
35	<i>Eugenia gilgii</i>	B	14.0
36	<i>Maesa lanceolata</i>	C	7.3
37	JDC 3691 <i>Psychotria</i> sp.	C	6.0
38	JDC 3691 <i>Psychotria</i> sp.	C	6.0
39	<i>Xymalos monospora</i>	B	12.5
40	Dead-broken off	B	6.0
41	Dead	B	12.2
42	<i>Ilex mitis</i>	B	20.1
43	<i>Ilex mitis</i>	C	9.1
44	<i>Ilex mitis</i>	B	18.3
45	<i>Ilex mitis</i>	C	7.0
46	<i>Xymalos monospora</i>	C	10.7
47	<i>Ixora foliosa</i>	C	8.8
48	JDC 3691 <i>Psychotria</i> sp.	C	6.0
49	<i>Prunus africana</i>	B	14.3
50	JDC 3691 <i>Psychotria</i> sp.	C	6.0
51	JDC 3691 <i>Psychotria</i> sp.	C	6.4
52	JDC 3669 <i>Eugenia gilgii</i>	C	11.9
53	Below 20ft: not recorded		
54	JDC 3691 <i>Psychotria</i> sp.	C	7.3
55	Not measured: over the line		
56	<i>Pittosporum mannii</i>	C	9.1
57	<i>Schefflera abyssinica</i>	B	49.8
58 & 59	Not included: hidden		
60	<i>Albizia gummifera</i>	B	20.4
61	Not included: hidden		
62	<i>Nuxia congesta</i>	B	13.4
63	<i>Xymalos monospora</i>	C	6.4
64	<i>Allophylus africanus</i>	C	8.5
65	<i>Xymalos monospora</i>	C	6.4
66	<i>Syzygium guineense</i> subsp. <i>bamendae</i>	B	21.3

understorey (C stratum) trees were a *Eugenia gilgii* and *Xymalos monospora*.

In the C stratum there were 40 trees, with an average height of 8.5 m; also one dead tree and two stumps. C stratum trees (not including young individuals of upper canopy trees) included *Clausena anisata*, *Ixora foliosa*, *Maesa lanceolata*, *Pittosporum viridiflorum* and the few *Psychotria peduncularis* tall enough to qualify.

Apart from young trees and *Maytenus undatus*, the shrub layer (D) consisted entirely of *Psychotria peduncularis*.

The scanty ground layer (E) was made up of *Oplismenus hirtellus*, with one species of fern and a few tree seedlings.

The boles of *Syzygium guineense* subsp. *bamendae* and *Ilex mitis* were short, frequently forking or dividing low down. Two *Nuxia congesta* trees forked at 4.8 m, and a *Schefflera abyssinica* at 1.2 m from the ground. *Albizia gummifera* and *S. abyssinica* are leafless for a month or more. In February the new leaves appear and the evergreen trees put out fresh shoots, contrasting with the blackened stubble of the adjoining grassland. Most C stratum trees are evergreen. The erect habit and light symmetrical branching of *Rapanea melanophloeos* were noticeable, as were the small purple fruits which are borne in closely spaced clusters along the branchlets.

Schefflera abyssinica, while normally a strangling epiphyte, may on occasion develop independently into a sizeable tree. *Prunus africana*, the bole and larger branches mossy and fern covered, supported more epiphytes than most other species. *Usnea articulata* festooned *Nuxia congesta* crowns. *Lycopodium mildbraedii* and epiphytic orchids were restricted to the crowns of big trees. On tree trunks lichens were common and included *Parmelia eunita* and *U. submollis*.

Besides plants already listed, the following grew along the stream below the profile strip: *Garcinia smeathmannii*, *Pavetta hookeriana* and *Rytigynia umbellulata*, with the climbers *Psydrax acutifolia*, *Embelia schimperi*, *Securidaca welwitschii* and JDC 3480, (fruit collected).

Epiphytes included *Asplenium aethiopicum*, *A. theciferum*, *Loxogramme lanceolata*, *Pleopeltis* sp.

and *Peperomia* cf. *vulcanica* (JDC 3451). Where the stream ran through a deep gully, the tree fern *Cyathea dregei* and *Agarista salicifolia* overhung the water.

The forest/grassland boundary

Notes

More usual than the narrow ecotone surrounding the *Syzygium guineense* subsp. *bamendae* streamhead forest was a belt at least double this width - exceptionally up to 46 m, with *Hypericum roeperanum* dominant, and swept at intervals by fire. Members of this community included the trees *Gnidia glauca* (but much less common than on the high plateau), *Maesa lanceolata* and *Nuxia congesta*. Shrubs and climbers included *Adenocarpus mannii* (occasionally a tree up to 6 m tall and 30 cm DBH), *Clematis simensis*, a climber, *Clutia kamerunica*, *Crotalaria orthoclada*, *Eriosema montanum* and *H. roeperanum* (see check-list for other species).

Vegetation of the high plateau

Notes

Above the 2130 m contour short grassland predominated, with occasional boulders, rock outcrops and fire-trimmed trees or shrubs. Montane forest, restricted to narrow stream-fringing strips or small woods where the topography afforded protection, persisted in diminishing form up the slopes. Higher still, in hollows or sheltered by rocks, were scattered outliers floristically akin to the fire-adapted fringing community described above. At the highest level the surface was rocky; either smooth outcrops with shallow depressions, or rough and fissured supporting a sparse herbaceous flora.

Montane forest

above 2130 m

The principal trees, 15-20 m tall, were *Ilex mitis*, *Prunus africana*, *Schefflera abyssinica* and *Syzygium guineense* subsp. *bamendae*. *Podocarpus latifolius* and *Nuxia congesta*, trees characteristic of the montane zone (White, 1983) were present in several forest types (Figure 21). Among smaller trees *Rapanea melanophloeos* was the most prominent. In the understorey *Psychotria peduncularis* was frequently dominant, with *Desmodium repandum*, a sub-shrub. Woody climbers were few, with only *Mikaniopsis paniculata* recorded. *Schefflera mannii* (JDC 3747), elsewhere a tree 12-15 m tall (FWTA) was here a non-strangling epiphyte. *Carapa procera* was parasitised by a *Loranthaceae* (JDC 3740). Shade-loving herbs included *Cryptotaenia africana*, *Diodia scandens*, *Elatostema monticola*, *Sanicula elata* and *Thalictrum rhynchocarpum*. By the water, among mossy boulders, were *Impatiens kamerunensis* subsp. *obanensis*, *Pilea rivularis*, *Plectranthus sylvestris* and *Selaginella abyssinica*. Also present was *Impatiens sakerana* with a scrambling habit and sub-woody stem.

High up the south-western slopes was a forest in a narrow ravine which was reminiscent of Cameroon montane forest described by Letouzey (Sayer et al., 1992). It contained *Podocarpus latifolius*, *Prunus africana*, *Ixora foliosa* and *Rapanea melanophloeos*, c. 9 m tall. The most prominent lichen was *Heterodermia leucomela* subsp. *boryi*. Above, at the foot of a bluff leading to the summit beacon and protected from fire, *Erica mannii* and *Cyathea dregei* flourished.

Outliers

above c. 2290 m

Isolated in the grassland, these small outliers are inevitably burnt from time to time. The fact that they remain reflects the capacity of the community to regenerate after seemingly devastating fires.

Gnidia glauca was the most abundant tree species, with *Agarista salicifolia*, *Hypericum revolutum* (occasionally up to 13.7 m tall), *Maesa lanceolata*, *Nuxia congesta*, *Pittosporum viridiflorum* and *Rapanea melanophloeos* common associates. *A. salicifolia* is



Figure 21 *Podocarpus latifolius* with a breast-height-girth of 3.8 m in the forest at the north-west end of Gangirwal, c. 2130 m. Common here, associated species include *Prunus africana* and *Syzygium guineense* subsp. *bamendae*.

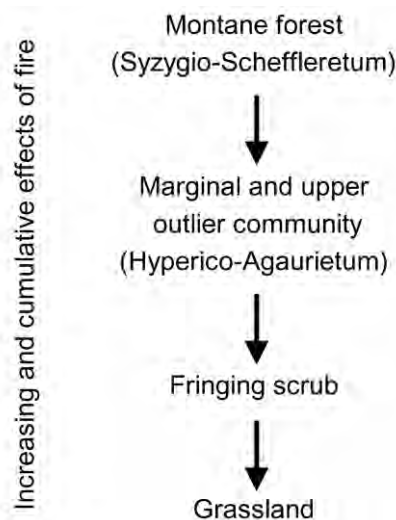
extremely resistant to fire, as isolated fire-trimmed specimens testify. *H. revolutum* survives because of its ability to sucker freely after the aerial parts succumb to burning. *N. congesta* regenerates from epicormic shoots. *Mimulopsis solmsii*, a weak-stemmed semi-scrambling Acanthaceae, up to 3 m tall, common at the grassy forest edge and conspicuous in flower late in December, was restricted to this community. Also recorded here but not lower down were *Brachypodium flexum* (FHI 2035), *Eragrostis volkensisii*, *Helichrysum odoratissimum*, *Kalanchoe crenata* (JDC 5146, flowers pinkish-purple, not yellow to red as described in FWTA), *Panicum hochstetteri*, *Poa schimperana* (FHI 2036). *Satureja pseudosimensis* and *S. punctata*, the latter a heath-like perennial with small, deep pink flowers, were also present in the open grassland.

Ecological notes

Relationship between forest and grassland

Discussing the ecological relationships of tall montane forest, fringe communities, forest outliers and grassland in a comparable environment to Gangirwal, between 1800 m and 2650 m on the

slopes of Cameroon Mountain, Richards (1963) was in no doubt that the sharply defined forest/grassland boundary was determined by fire. He suggested that much of the grassland had been derived from forest and scrub, that formerly the grassland was probably confined to exposed rocky sites and had spread at the expense of woody communities, mainly as a result of burning (Richards, 1963). He summarised this relationship as:



Richards might have been describing the situation on Gangirwal where the present pattern of vegetation has also been shaped by fire, a continuing process.

Grassland, seasonal aspects

Seen from a distance, in June the waist-high herb rich grassland was colourful. As the season advanced the ripening grass took on a tawny hue. By late November (1974), within two weeks of the last rain, the gynakos (Fulani herdsman) had burnt scattered patches, and by mid-December fires were advancing up the slopes (Figure 22). Very little grassland remained unburnt by the end of January. Within a week or two of burning the charred bases of many grasses and perennial herbs had begun to green over and some to flower, including colourful geophytes. The intensive network of cattle and buffalo tracks, the extent of sheet erosion occurring and the absence of the small termitaria characteristic of *Sporobolus* grassland on Cabbal Wade and Mambilla had by then become apparent.

Floristic composition and phenology

Loudetia simplex was the dominant late-phase grass with *Andropogon* cf. *schirensis* (JDC 3387) one of few other species. By June/July they were flowering, as were *Protea madiensis*, dwarfed by fire, along with the sub-shrub *Thesium tenuissimum* and numerous herbs, including the orchids *Disa welwitschii*, locally abundant, and *Habenaria mannii*.

In November, clumps of tall *Helichrysum cameroonense*, with lemon-yellow flowers, and the bright yellow of *Coreopsis* spp. (JDC 3583, sp. ?nov. and *Coreopsis* JDC 3385) were a feature. Lending variety were *Polygala* sp. (JDC 3373), *Solenostemon* cf. *mannii* and *Sopubia ramosa*, tall perennials with purple, blue and pinkish-mauve flowers respectively.

In scattered localities which were ungrazed by cattle and at c. 2130 m, plants flowering in mid-November in the unburnt grassland included *Blaeria spicata*, a small heath with pinkish flowers, *Crassula vaginata* (JDC 3429 – not in FWTA ed 2), *Delphinium dasycaulon*, *Succisa trichotocephala* and *Wahlenbergia krebsii* var *arguta*.

Among the first post-fire grasses to flower were *Rhytachne rottboellioides*, *Sporobolus nauritianus* and JDC 3698, with the small sedge *Bulbostyles oritrephes* rooted in the grass bases. *Eupatorium africanum* and *Vernonia* spp. including *V. guineensis*, perennials with a woody rootstock, characteristic of montane grassland, also flowered and set seed within a few weeks. Among the many geophytes and small perennial herbs *Moraea schimperi* and *Cyanotis caespitose* were especially prominent. The dwarf orchid *Holothrix aphylla*, with white flowers, was also common. A representative list of shrubs and herbs from upland grassland appears in the checklist.

Micro habitats

Besides the grassland flora there were the plants of specialised habitats.

Midway along the upper plateau, at the foot of a west-facing bluff, was a small cave, screened by the tree ferns *Cyathea manniana* and *C. dregei*. In June the dripping rock face was covered with the moss *Sphagnum davidii*. *Asplenium quintasii* grew at the cave entrance and, just inside, *Impatiens kamerunensis* subsp. *obanensis*. A thicket of *Erica mannii* with scrambling *Gleichenia linearis* and



Figure 22 Montane grassland with forest persisting in the hollow, at c. 2130 m on the upper slopes of Gangirwal. The strips of unburnt grass are *Loudetia simplex*, which is the dominant wet season species.

Lycopodium cernuum occupied a subsidence hollow.

In an erosion gully *Agarista* and *Ilex* lined the stream, with *Dissotis bambutorum*, *Crotalaria caudata*, the fern *Osmunda regalis*, *Alchemilla kiwuensis* and *Lycopodium clavatum*. Where the stream emerged to flow between rocks before cascading down the cliff, *Blechnum tabulare* grew close to the water; and in crevices, submerged after heavy rain, the sedge *Pycneus atrorubidus* and a *Deschampsia* sp. (JDC 5154).

Around cattle camps between 2130 and 2290 m *Sporobolus africanus* had replaced *Loudetia simplex*. Kikuyu Grass, *Pennisetum clandestinum*, often with the thorny shrub *Solanum aculeastrum*, surrounded the temporarily abandoned herdsman's shelters.

At approximately 2290 m, towards the north-west end of the high plateau, where buffalo grazed at night, were small patches of forest fringe and grassland plants growing together. In one patch were *Eriosema montanum*, *Hypericum roeperanum*, grasses *Eragrostis volkensii*, and *Helictotrichon elongatum*, *Pteridium aquilinum*, *Platostoma rotundifolium*,

scrambling *Geranium arabicum* and *Satureja robusta*, with *Helichrysum cameroonense* and *Succisa trichotocephala*. The ecological status of these little "islands" was unclear.

Plants growing in the proximity of boulders and rock outcrops included *Adenocarpus mannii*, *Delphinium dasycaulon* and *Verbascum ledermannii*.

In the rocky terrain above c. 2380 m, lichens, particularly *Usnea submollis*, were ubiquitous. In the rains this habitat supported an abundance of the yellow flowered *Utricularia* sp. (JDC 3564, ? *U. scandens* subsp. *schweinfurthii*), *Bafutia tenuicaulas*, a Red Data List species and *Swertia mannii*, massed with *Polytrichum commune*.

In shallow depressions on rock pavement were *Ctenium ledermannii*, with *Alectra sessiliflora* var. *monticola*, *Crassula vaginata* and *Xyris* sp. nov?. (JDC 3560), all found also in grassland. Tuley and Jackson (1971) noted "tufts of *Aira caryophylla* and *Abildgaardia abortiva* in wet crevices with *Aira pusillus* spreading over rocks". Other plants rooted in crevices were *Cyanotis barbata*, the small orchid

Liparis suborbicularis, and a labiate (JDC 3530A and JDC 3532), with bluish-lavender flowers, up to 10 cm tall.

Ecological notes

Hawkins and Brunt (1965) observed that in Bamenda, the composition of grassland over approximately 1520 m grazed by Fulani cattle changed from *Hyparrhenia* sp. to *Sporobolus* sp. dominance with a corresponding reduction in the diversity of herbs in the sward, by c. 75%. They concluded that the main cause for this was the continuous trampling by cattle as they graze.

In 1965, *Hyparrhenia* sp. was dominant in the grassland on Cabbal Wade. Although there was moderate to intense grazing the *Sporobolus africanus* disclimax had become apparent only at the foot of

the col (Tuley & Jackson, 1971). By 1974 *S. africanus* had become the dominant species. Among the few scattered shrubs and perennial herbs were *Hypericum roeperanum* and *Echinops gracilis*. Small annuals such as *Trifolium baccarinii* acted as “fillers” between *S. africanus* tufts during the rains, but in the dry season much of the ground was exposed.

Over 1830 m, while *Sporobolus africanus* was conspicuous on and just above the col, on Gangirwal *Loudetia simplex* was still dominant in 1974. Nonetheless, the replacement of *L. simplex* by *S. africanus* at cattle camps on the upper slopes, and its presence at the col, were a clear indication that unless Fulani graziers can be permanently excluded this diverse grassland community, unique probably in Nigeria, must disappear in the not too distant future.

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Chapter 4

Cabbal Hendu

Dutsin Lamba:

montane/submontane forest; c. 1830 m; 10 km²

Red Data List Species: *Entandrophragma angolense*, *Prunus africana*, *Pouteria altissima*

Syzygium guineense subsp. *guineense* - *Albizia gummifera* forest:

riparian/montane and submontane forest; c. 1830 m

Red Data List Species: *Prunus africana*

Symphonia globulifera - *Garcinia smeathmannii* forest:

riparian montane and submontane forest; 1680 m; 5km²

Red Data List Species; *Prunus africana*, *Pouteria altissima*

Cabbal Hendu Grassland:

c. 1680 m-1980 m

Red Data List Species; *Lobelia columnaris*

Cabbal Hendu upland forest:

c. 1670 - 1900 m

Red Data List Species: *Dombeya* cf. *ledermannii*, *Prunus africana*, *Khaya grandifoliola*, *Millettia conraui*, *Pouteria altissima*

Extent, landscape and geology

An extensive area of upland country lies to the north of Mambilla and the Gotel mountains (Figure 2). It is bounded to the west by the Serti Plain and to the east and north by the Mayo Yim river. The character of this highland varies. Broadly speaking, five main areas may be distinguished. From south to north they are:

1. The Sabere 'Platform'
2. Filinga Plateau
3. Hendu uplands
4. Cabbal Mai Dobi
5. The very broken thickly wooded country between Cabbal Mai Dobi and the Mayo Yim at the Gumti Plain.

A description of each of these areas, and their forest composition is given in Chapman (1993-1997). Here we describe the forests associated with area 3, the Hendu uplands.

Cabbal Hendu is 32 km north of Gangirwal. It includes Cabbal Tale and Dutsin Lamba to the west (Figure 2), so that the total area above 1680 m² is 280 km². The area on Cabbal Hendu over 1830 m is 28.5 km². The highest part is Dutsin Lamba, c. 1980 m. This elevated grassland, well watered, and with forest fringing the streams, (and more extensively developed on the steep west-facing escarpment above the Yakuba Plain), is an important grazing tract. Although the local Fulani are suspicious of tsetse fly infestation in certain localities, which are therefore

grazed only intermittently (such as parts of Cabbal Tale and Dutsin Lamba) the greater part of Cabbal Hendu is tsetse-free and regularly grazed.

Although Cabbal Hendu has previously been mapped in the Basement complex, it is probably underlain, at least in part, by more recent volcanic rocks (Bawden & Tuley, 1966). The grassland soils have not been examined, but by analogy with adjacent areas humic ferrisols and lithosols are likely to occur (Bawden & Tuley, 1966).

Climate

No meteorological data were available. From observation, the weather patterns appeared to be the same as those for Gangirwal. A greater luxuriance

of bryophytes and lichens on Cabbal Hendu could indicate more orographic cloud and mist, but the dry season is as severe as it is on Gangirwal.

Conservation status

Cabbal Hendu is a grazing enclave within Gashaka Gumti National Park. Therefore cultivators used to practising slash and burn farming are present. Inevitably this introduces a risk to wildlife as evidenced by their decimation at Shirgu (Figure 2) where a similar situation exists. Richard Barnwell (pers. comm.) saw minimal wildlife at Filinga in May 1991, in stark contrast to their abundance noted by JDC in the same area in 1976. Without a constant and adequate game guard presence no patch of forest is safe.

Description of the Forests / Kurame

Dutsin Lamba

c. 1830 m



Figure 23 Looking from Cabbal Shirgu to Dutsin Lamba, the highest part of the highland. The Fulani have tended to shun this area, believing that tsetse flies occur. Because of this the grassland at Dutsin Lamba was particularly interesting, with little of the *Sporobolus* disclimax evident. Parts of Gangirwal excepted, this could not be said of any other highland area in Taraba or Adamawa States.

Most of the forest on Chappal Hendu is in the valleys. Only on Dutsin Lamba did a small forest area resemble the upper escarpment forest at Kurmin Ngel Nyaki (Mambilla) or Kurmin Dodo (Cabbal Wade). At Dutsin Lamba the forest faces south-west across the Yakuba Plain (Figure 23). It is difficult to approach, and extends downwards along stream banks. It was the bush cow's refuge; they emerged from here at dusk to graze.

The tallest trees, with a height in excess of 30 m were *Pouteria altissima*, which is common, and *Entandrophragma angolense* and *Newtonia buchananii*, with a more sporadic distribution. Other trees included *Albizia gummifera*, *Ixora foliosa*, *Warneckea acutifolia*, *Pterygota mildbraedii*, *Prunus africana*, *Schefflera abyssinica*, *Strombosia scheffleri*, and *Syzygium guineense* subspecies *bamendae*.

Understorey species included *Garcinia smeathmannii* (abundant), and *Campylospermum flavum*.

Prominent forest edge trees were *Croton macrostachyus*, *Millettia conraui* and *Nuxia congesta*. Among ground ferns *Pteris pteridioides* was conspicuous. From a bluff, the crowns of palms (*Phoenix reclinata*) stood out on rocky places. The bluff was covered in scrub: *Adenocarpus mannii*, *Kotschya strigosa* and *Erica mannii*, with *Dissotis elliottii* var. *elliottii* and *Loudetia simplex* in the rocky parts. It was much trampled and browsed by bush cow and bushbuck.

Between the thicket and the forest surrounding it was a narrow belt of small trees including *Agarista salicifolia*, *Hymenodictyon floribundum*, *Nuxia congesta*, *Olea capensis*, *Psorospermum aurantiacum* and *Vitex doniana*.

Riparian Forest

c. 1830 – 1670 m

Diversity

A total of 116 vascular plant species were recorded in this upland, riparian forest. 54 trees, six climbers, 21 shrubs, 11 grasses, and 24 fern and fern allies. Details are presented below for the enumeration plot and profile strip respectively. Red Data List species included *Entandrophragma angolense*, *Pouteria*

altissima and *Prunus africana*.

Conservation status

The forest falls within the boundaries of Gashaka Gumti National Park.

Notes

In the centre of Hendu is a wide gently sloping valley, open to the north and east which is drained by a tributary of the Mayo Dobi. From its source on Dutsin Lamba to the valley floor, the banks of the stream were lined with trees, mainly *Syzygium guineense* var. *guineense*, frequently stunted and low forking, stems padded and branches festooned with ferns, bryophytes and lichens. Specially prominent were the vivid green moss, *Pilotrichella pentasticha*, draping the lower branches, and the lichen *Usnea trichodeoides* trailing in the crowns. *Trichomanes mannii*, a filmy fern was massed on boles. Less common among the moss and ferns was *Peperomia* sp. (JDC 4386). Abundant in this swampy, lightly shaded habitat were *Thalictrum rhynchocarpum* and *Amauropelta bergiana* var. *bergiana*, a fern with fronds 1.2 m tall.

The stream which meandered along the valley floor was bordered on one side by tussock grassland, with shrubby *Agarista salicifolia* growing up from below the bank. Opposite, where the ground rose steeply, tall forest extended up the slope for 70 m. Close to the water were *Syzygium guineense* var. *guineense*, up to 27 m tall and 1.2 m in diameter. Interspersed were tree ferns (*Cyathea dregei* and *C. manniana*), groups of giant lobelia (*Lobelia columnaris*) (Figure 24), and shrubby *Hypericum revolutum* subsp. *revolutum*. Below these were massed bracken (*Pteridium aquilinum*) and herbs including the semi-prostrate, mauve flowered *Viola abyssinica*.

On the bank above, *Newtonia buchananii*, up to 30 m high was the most prominent tree. Other common upper canopy species, not so tall, included *Albizia gummifera*, *Olea capensis* (24 m) and *Syzygium guineense* subsp. *guineense*. Understorey trees were *Carapa procera*, *Campylospermum flavum*, *Oxyanthus speciosus* and *Xymalos monospora*. Among shrubs *Ardisia kivuensis* (which may also be a small tree) *Chasalia* sp. near *umbraticola*, *Dracaena* sp. (JDC



Figure 24 *Lobelia columnaris* along a stream bank, with bracken, *Pteridium aquilinum*, in the foreground.



Figure 25 The fern *Vittaria guineensis* var. *camerooniana* and *Piper* sp. JDC 4386 draping the bole of a streamside tree on Cabbal Hendu.

4366) much browsed by bushbuck, and *Psychotria pedunculata* were common. Of the forest herbs, *Elatostema* sp. (JDC 4446) and *Sanicula elata* grew in wet places, while a *Peperomia* sp. with decorative, shiny leaves spread over the ground and a short way up tree trunks, as did *Arthropteris monocarpa*. Other ferns, all common, were *Asplenium quintasii*, *Pseudocyclophorus pulcher* with fronds up to 2.4 m tall, *Pteris pteridioides*, likewise a robust species, and *Tectaria gemmifera*. Epiphytes were abundant, the ferns including *Asplenium aethiopicum*, *A. dregeanum*, and *Vittaria guineensis* var. *camerooniana* (Figure 25). A *Begonia* sp. (JDC 4443) depended from a fallen tree over a stream. An orchid (JDC 4451) was common on high branches.

Syzygium - Albizia riparian forest

1830 m

Enumeration plot

An enumeration plot (see Table 9) of 0.4 ha was established 200 m beyond the tall forest on the steep slope described above. Out of a total 316 live trees, 297 (93%) were between 30-90cm in girth. Three species which were also prominent in the upper canopy accounted for 165 (56%) of these. Most abundant was *Olea capensis* with 86 (29%), followed by *Syzygium guineense* subsp. *guineense* 54 (18%) and *Albizia gummifera* 25 (9%). Besides the characteristic understorey species *Carapa procera*, *Garcinia smeathmannii*, *Campylospermum flavum*, *Oxyanthus speciosus* and *Xymalos monospora*, survivors from earlier stages in the succession were present. Among them were *Bridelia speciosa*, *Maesa lanceolata* (several moribund), *Nuxia congesta* (able to persist and reach the canopy), and *Psorospermum aurantiacum* (up to 9 m tall). Trees over 1.2 m in girth numbered 21, 7% of the total. The 2.4 m girth class was represented by one *S. guineense* subsp. *guineense*, the largest tree in the plot. In the 2.1 m girth class there was one *A. gummifera*. The two trees in the 1.8 m class were both *S. guineense* subsp. *guineense*, with *O. capensis* (2) and a strangling *Ficus* sp. in the 1.5m class. Half of the 14 trees in the 1.2 m class were *A. gummifera* and *S. guineense* subsp. *guineense*. The other seven included *Millettia* sp. (1) and *Polyscias fulva* (2), the latter a light tolerant species, frequently persisting to form part of the mature forest, *Sapium ellipticum* (1) and *Prunus africana* (1). The presence, in the canopy, of *Trema orientalis*, a healthy tree 20 m tall and 1.4 m in girth indicated the relatively long life-span of this pioneer tree.

Although no counts of saplings and/or seedlings were made, the following were observed, many abundant: viz. *Albizia gummifera*, *Clausena anisata*, *Garcinia smeathmannii*, *Olea capensis*, *Campylospermum flava*, *Prunus africana*, *Symphonia globulifera*, *Syzygium guineense* subsp. *guineense*, and *Xymalos monospora*. Surprisingly, since there were several big trees nearby, no regeneration of *Newtonia buchananii* was found.

The shrub layer, as so often in these upland forests, was dominated by *Psychotria peduncularis*, a dense 2.4 m high growth, with *Afrardisia kivuensis* a frequent associate. Among many woody climbers, (JDC 4409, ? *Landolphia* sp.) was conspicuous, its fruits much sought after by monkeys. *Thalictrum rhynchocarpum*, up to 2 m tall, was noticeable where the canopy was a little open. There was a profusion of epiphytes including flowering plants, but predominantly ferns, bryophytes and lichens. An orchid (JDC 4451), was common in the crowns and a *Peperomia* sp. (JDC 4356) on the lower boles of trees, often spreading over the ground between. Among ferns were *Asplenium dregeanum*, the most abundant species, *Trichomanes mannii* and *Vittaria guineensis* var. *camerooniana*. Mosses and liverworts, several not yet named, often with lichens, mantled the boles and branches of trees, and the stems of lianes. Other lichens festooned the crowns. Of the mosses and lichens, *Pilotrichella pentasticha*, *Parmelia andina* and *Usnea trichodeoides* have so far been identified.

Table 9 Enumeration plot from Dutsin Lamba (Cabbal Hendu) *Syzygium guineense*-*Albizia gummifera* forest.

Botanical name	Girth class								Total 30 cm & over	Total 1.22 m & over
	a	b	c	d	e	f	g	h		
<i>Albizia gummifera</i>	9	10	6	3			1		29	4
<i>Bridelia speciosa</i>	5								5	
<i>Campylospermum flavum</i>	14	1							15	
<i>Canthium henriquesianum</i>	3								3	
<i>Carapa procera</i>	7	1							8	
<i>Croton macrostachyus</i>		2		1					3	1
<i>Eugenia</i> sp. (4374)	7	3							10	
<i>Ficus</i> sp. (strangling epiphyte)					1				1	1
<i>Garcinia smeathmannii</i>	1								1	
<i>Maesa lanceolata</i>	10	7							17	
<i>Millettia</i> sp.	1			1					2	1
<i>Nuxia congesta</i>	17		1						27	
<i>Olea capensis</i>	64	20	2		2				88	2
<i>Oxyanthus speciosus</i>	1								1	
<i>Polyscias fulva</i>			1	2					3	2
<i>Prunus africana</i>		1	2	1					4	1
<i>Psorospermum aurantiacum</i>		8							8	
<i>Sapium ellipticum</i>	1		1	1					3	1
<i>Symphonia globulifera</i>	1								1	
<i>Syzygium guineense</i> subsp. <i>guineense</i>	34	19	1	4		2		1	61	7
<i>Trema orientalis</i>				1					1	1
<i>Xymalos monospora</i>	19	5	1						25	
Dead trees		1	1						2	
Total	202	79	16	14	3	2	1	1	318	21

(equiv. to 1180 trees on 1.5 ha)

Key to girth classes:

a 0.30 - 0.60 m	c 0.91 - 1.20 m	e 1.51 - 1.80 m	g 2.11 - 2.40 m
b 0.61 - 0.90 m	d 1.21 - 1.50 m	f 1.81 - 2.10 m	h 2.41 - 2.70 m

Symphonia - *Garcinia* riparian

forest

c. 1680 m

Syzygium guineense subsp. *guineense* does not always feature as prominently in fringing forest as Table 9 might suggest. *Newtonia buchananii* and *Olea capensis* are also restricted in their distribution. An example of a different forest type is *Symphonia globulifera* - *Garcinia smeathmannii*, described here from the western side of Hendu, opposite Cabbal Shirgu.

Profile strip

A profile strip was selected 400 m inside the forest, parallel to, and about 45 m from the central stream (Figure 26).

Structure, physiognomy, floristic composition

The profile diagram (Figure 26) illustrates a strip of undisturbed forest 69 x 10.7 m at approximately 1680 m running up the hillside along a 10° – 15° slope, from right to left in the diagram. Trees less than 6m tall, and shrubs are not shown. Nor was it feasible to include woody climbers, although these were a conspicuous feature. Two tree strata could be recognised; an upper, irregular (B) storey and a more distinct lower (C) storey. The trees comprising the B stratum, (18 – 43 m tall), averaged 23 m in height. The tallest tree was *Croton macrostachyus* followed by *Prunus africana* (37 m), *Symphonia globulifera* (27 m), and *Albizia gummifera* (26 m).

The inclusion in the B storey of six trees is arbitrary, since they could equally be regarded as an extension of the storey below, viz. *Bridelia micrantha* (one tree of 21 m), *Nuxia congesta* (three trees between 18 – 20 m, and *Garcinia smeathmannii*, two trees of 18 m. Although the crowns of the B storey trees were frequently in lateral contact, unlike the C storey, they did not constitute a closed canopy.

With 50 trees, the C storey comprised 74% of the total number of trees in the profile plot. Ranging from 6 to 17 m tall, the average height was 13 m. Excluding three potential upper canopy trees, *Symphonia globulifera* (2) and *Ficus lutea* (1), not considered as being in the C storey, eight species

were represented. *Garcinia smeathmannii* (29 trees) accounted for 58% of all the C storey trees. The others were *Allophylus africanus* (five trees) 10%, *Campylospermum flavum* and *Xymalos monospora* (four trees and 8% each), *Cassipourea congoensis* (three trees) 6%, *Eugenia* sp. 4374 and *Oxyanthus speciosus* (two trees and 4% each) with finally *Rothmannia urcelliformis* (one tree) 2%. Because of the scale it has not been practicable to include all the C stratum trees on the profile diagram.

The shrub layer (D), with *Psychotria pedunculata* dominant and a *Dracaena* sp. (4366), heavily browsed by bushbuck, was fairly open. In the ground layer (E) ferns were prominent.

The dark brown, longitudinally fissured, scaling bark and heavy branching of *Prunus africana* set it apart from the other species. *Symphonia globulifera* was another distinctive tree; tall, with a slender tapering bole, and small crown with short horizontal branches, the lowermost sometimes bending upwards almost at right angles, to form secondary crowns. The abundant bright red flowers, globose in bud, were conspicuous. A mistletoe, *Viscum? decurrens* (4405) was frequently associated with *S. globulifera*. The stem of *Nuxia congesta* was deeply fluted, the soft, pale brown bark flaking in longitudinal strips. The bole of *Croton macrostachyus* was smooth, cylindrical, pillar-like. In the C storey the straight, tapering stem of *Garcinia smeathmannii*, occasionally forked, with light symmetrical branching, and more or less spherical yellowish-green fleshy fruits, made this species unmistakable.

Lianes were abundant. Often long cable-like lengths, up to 7.5 cm in diameter, depending from the trees in the upper canopy, where they ramified, lacing the crowns together. Or they might loop across the ground, branch and coil about one another, smothering saplings, bending over and often breaking young trees, until encountering a stout enough support to reach the tree tops. Prominent among them were belbel leinde (4409 : Apocynaceae) and *Embelia schimperii*. Stranglers were a feature, *Ficus* spp. and sometimes *Schefflera abyssinica*.

Figure 26 Profile strip in *Symphonia globulifera*-*Garcinia smeathmannii* riparian forest on Cabbal Hendu, c. 1680 m.

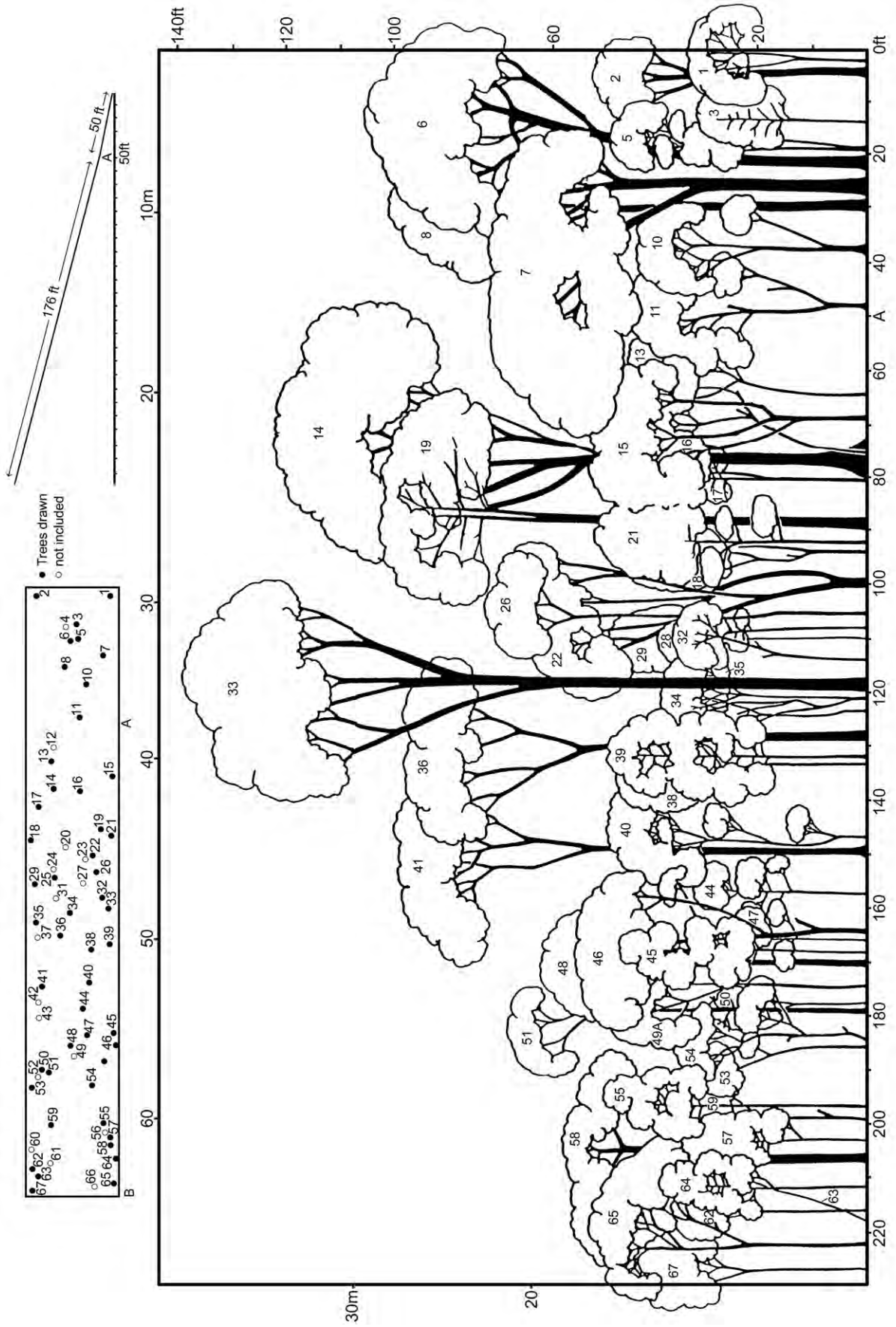


Table 10 Key to Dutsin Lamba (Cabbal Hendu) *Symphonia globulifera*-*Garcinia smeathmannii* forest profile strip (Figure 26).

No.	Botanical name	Stratum
1	<i>Garcinia smeathmannii</i>	C
2	<i>Ficus lutea</i>	C
3	<i>Garcinia smeathmannii</i>	C
4	<i>Garcinia smeathmannii</i>	C
5	<i>Garcinia smeathmannii</i>	C
6	<i>Croton macrostachyus</i>	B
7	Strangling <i>Ficus</i> - host tree completely enveloped (not collected)	B
8	<i>Symphonia globulifera</i>	B
9	<i>Campylospermum flavum</i>	C
10	<i>Oxyanthus speciosus</i>	C
11	<i>Allophylus africanus</i>	C
12	<i>Xymalos monospora</i>	C
13	JDC 4374 <i>Eugenia</i> sp.	C
14	<i>Prunus africana</i>	C
15	<i>Allophylus africanus</i>	C
16	<i>Allophylus africanus</i>	C
17	<i>Garcinia smeathmannii</i>	C
18	<i>Garcinia smeathmannii</i>	C
19	<i>Symphonia globulifera</i>	B
20	<i>Prunus africana</i>	B
21	<i>Garcinia smeathmannii</i>	C
22	<i>Nuxia congesta</i>	B
23	<i>Nuxia congesta</i>	B
24	<i>Garcinia smeathmannii</i>	C
25	<i>Garcinia smeathmannii</i>	C
26	<i>Bridelia micrantha</i>	B
27	<i>Garcinia smeathmannii</i>	B
28	<i>Garcinia smeathmannii</i>	C
29	<i>Garcinia smeathmannii</i>	C
30	<i>Garcinia smeathmannii</i>	C
31	<i>Campylospermum flavum</i>	C
32	<i>Xymalos monospora</i>	C
33	<i>Croton macrostachyus</i>	B
34	<i>Campylospermum flavum</i>	C
35	<i>Campylospermum flavum</i>	C
36	<i>Albizia gummifera</i>	B
37	<i>Garcinia smeathmannii</i>	C
38	<i>Garcinia smeathmannii</i>	C
39	<i>Garcinia smeathmannii</i>	C
40	<i>Garcinia smeathmannii</i>	C
41	<i>Albizia gummifera</i>	B
42	<i>Garcinia smeathmannii</i>	C
43	<i>Cassipourea congoensis</i>	C
44	<i>Garcinia smeathmannii</i>	C
45	<i>Allophylus africanus</i>	C
46	<i>Garcinia smeathmannii</i>	C
47	<i>Cassipourea congoensis</i>	C
48	<i>Garcinia smeathmannii</i>	B
49	<i>Garcinia smeathmannii</i>	C
49a	JDC 4374 <i>Eugenia</i> sp.	C
50	<i>Oxyanthus speciosus</i>	C
51	<i>Nuxia congesta</i>	B
52	<i>Garcinia smeathmannii</i>	C
53	<i>Garcinia smeathmannii</i>	C
54	<i>Xymalos monospora</i>	C
55	<i>Garcinia smeathmannii</i>	C
56	<i>Garcinia smeathmannii</i>	C
57	<i>Garcinia smeathmannii</i>	C
58	<i>Symphonia globulifera</i>	C
59	<i>Xymalos monospora</i>	C
60	<i>Garcinia smeathmannii</i>	C
61	<i>Garcinia smeathmannii</i>	C
62	<i>Garcinia smeathmannii</i>	C
63	<i>Rothmannia urcelliformis</i>	C
64	<i>Garcinia smeathmannii</i>	C
65	<i>Allophylus africanus</i>	C
66	<i>Symphonia globulifera</i>	C
67	<i>Garcinia smeathmannii</i>	C

68 trees in total.

Epiphytic ferns, bryophytes and lichens were very abundant and luxuriant in April because of the frequent rain and long periods of mist. Tree trunks, horizontal branches, tree crowns, saplings and the stems of lianes, decaying logs and rocks were all covered. Small ferns such as *Trichomanes pyxidiferum* var. *melanotrichum*, *Asplenium aethiopicum* and *Vittaria guineensis* var. *camerooniana* were massed low down on tree trunks. Most common of all, from this level to the ground, was *Asplenium dregeanum*. Where there was more light, amongst bryophytes and orchids, Polypodiaceae including *Pleopeltis macrocarpa* and *Drynaria volkensii* which accumulates plant detritus, spread along long branches. Along the stream near the profile plot *Marattia fraxinea* was abundant. Smaller, but still robust ferns, *Amauropelta bergiana* var. *bergiana* and *Pteris pteridioides* were also typical of stream banks.

Trees, not represented on the profile strip, but common in fringing forest nearby, were *Pouteria altissima* (to 25 m), *Clausena anisata* (to 11 m), *Millettia conraui* to 15 m, *Schefflera abyssinica* (11 m) which may also behave as a strangler, *Strombosia scheffleri* (17 m) and *Syzygium guineense* subsp. *guineense* (to 21 m).

Ecological notes

Regeneration

No regeneration counts were carried out, but seedlings and saplings were abundant, and included *Pouteria altissima*, *Prunus africana* and *Symphonia globulifera*, as well as large numbers of the C storey species, *Garcinia smeathmannii*.

Degradation and succession

The shrubby ecotone appeared to have been generally effective in preventing fires from entering the forest.

Some characteristic forest edge tree species include *Agarista salicifolia*, *Canthium* sp. near *cordatum*, *Clausena anisata*, *Solanecio mannii*, *Dombeya* cf. *ledermannii*, *Harungana madagascariensis*, *Hypericum revolutum* subsp. *revolutum* (or may be a shrub), *Maesa lanceolata*, *Millettia ?conraui*, *Nuxia congesta* and *Phoenix reclinata*.

Common shrubs were *Adenocarpus mannii* (sometimes a small tree), *Byrsocarpus ?coccineus*

(JDC 4460), *Hypericum roeperanum*, *Psorospermum aurantiacum* (sometimes a small tree), *Pycnostachys* sp., *Rubus fellatae* (scrambler), *Sesbania macrantha*, and *Tephrosia vogelii*.

Woody climbers included *Adenia cissampeloides*, *Canthium henriquesianum*, *Paullinia pinnata*, and *Smilax anceps*. The most conspicuous tall herbs were *Aframomum angustifolium*, *Eulophia horsfallii* and *Setaria ?chevalieri*.

Ferns included *Dryopteris athamantica* and *Pteridium aquilinum*.

In the enumeration plot (see Table 9) the presence in the canopy of light-loving trees such as *Trema orientalis* (one tree), and persistence among the understorey trees of *Maesa lanceolata*, *Nuxia congesta* and *Psorospermum aurantiacum*, typical forest margin species, indicated that the forest represented an advanced seral stage. At the profile plot (see Figure 26) *Croton macrostachyus*, *Nuxia congesta* and *Bridelia micrantha*, secondary forest species, were among the taller trees; in fact the tallest tree was a *Croton*. With *Prunus africana* and *Symphonia globulifera* also prominent in the upper canopy, and the absence from the understorey of secondary species, the forest appeared to have reached an advanced successional stage.

Adenocarpus mannii, *Sesbania macrantha*, *Tephrosia vogelii* and *Trema orientalis* separately initiated the early seral stages, with *Aframomum angustifolium*, *Setaria ?chevalieri* and *Pteridium aquilinum* frequently prominent in gaps.

Cabbal Hendu Grassland

Grassland, maintained by fire, covers the greater part of the plateau. Since the Fulani arrived in 1961, most of it has been grazed every year through the wet season. The whole area is subject to burning in the dry season. When the fire has passed, the grass cushions soon green over. A number of species flower before the rains, as do geophytic flowering herbs, which often are not resistant to trampling and prominent only in ungrazed areas. The small annuals which act as 'infillers' disappear in the dry season leaving the ground bare between the grass

cushions and geophytes. Such was the scene in April, when the rains were just starting. The taller, dominant grasses vegetate strongly and flower later in the season.

The general nature of the grassland changes with altitude, while grazing modifies the floristic composition. Wooded grassland persists to approximately 1680 m. Between Selbe and Hendu the principal species included, besides fire-resistant savanna trees such as *Combretum molle*, *Entada abyssinica*, *Psorospermum febrifugum* and *Syzygium guineense* (var. *macrocarpum* of Nigerian Trees), *Croton macrostachyus* and *Harungana madagascariensis*, both typical secondary forest species. Epiphytes, usually associated with *C. molle* and *E. abyssinica*, included the ferns *Asplenium theciferum*, *Drynaria volkensii* and *Pleopeltis macrocarpa*, with the orchid *Bulbophyllum cochleatum*.

At higher altitudes (c. 1900 m) open grassland predominated. Apart from sporadic *Faurea speciosa*, occasional palms (*Phoenix reclinata*) on steep, rocky places, and *Solanum aculeastrum*, trees were scarce. The latter, called gite na'i (cow's eye) by the Fulani, is extremely thorny and often used for hedges at their ruga sites. Fire trimmed *Hypericum revolutum* subsp. *revolutum*, or *Protea madiensis*, barely 1 m high unless in the shelter of rocks, were among the few shrubs. *Eupatorium africanum*, a suffrutex with several erect stems 60-90 cm high, was common. Other robust perennial herbs, several with woody rootstocks were *Dolichos* sp. JDC 4441 (? = *D. schweinfurthii*), *Echinops giganteus*, *Euphorbia depauperata*, *Fadogia* sp. (? *F. pobeguini*), *Vernonia guineensis* and *V. smithiana*. In April these were already flowering, some before the leaves appeared, from charred bases. Grasses flowering included *Eragrostis camerunensis*, *E. tenuifolia* and *Rhytachne rottboellioides*; also the more robust, caespitose species *Elyonurus argenteus* (see below) and *Setaria aurea*. Between the tufts was the stoloniferous grass, *Paspalum scrobiculatum*. *Loudetia simplex* which flowered later (in the rains), and grew to 1.2 m tall, was identified from unburnt culms. *Sporobolus africanus* (pagame) was occasionally locally dominant, but otherwise seldom seen. Geophytes included *Hypoxis angustifolia* and *H. recurvifolia*. Among other common herbs resistant to grazing were *Conyza subscaposa*, *Margaretta rosea*, *Mariscus sumatrensis* and *Piloselloides hirsuta*. *Gladiolus melleri*, and the orchid *Disa equestris*, were

confined to odd corners protected from trampling. Unlike Mambilla, where *Pteridium aquilinum* has spread extensively in grassland, at Hendu this cosmopolitan plant, which may be toxic to cattle, was seldom noted away from forest margins.

At Dutsin Lamba the grassland was much frequented by bush cow and only occasionally grazed by cattle. The Fulani believe that tsetse flies are present for at least part of the year, carried up by air currents from the Yakuba Plain. The absence of cattle was reflected in the floristic composition of the grassland. *Loudetia simplex* was the dominant species, with *Elyonurus argenteus* and *Rhytachne rottboellioides* frequent associates, and *Eupatorium africanum* interspersed throughout; to this extent, a replica of the Gangirwal grassland. Shrubby, yellow-flowered *Aeschynomene baumii* and *Humularia* sp. (4330) occurred, also *Satureja biflora*. Here *Gladiolus melleri* (one plant with red flowers) was abundant, as well as *Sopubia mannii* var. *mannii* with handsome purple flowers, almost never seen where cattle graze. On the escarpment edge at Cabbal Shirgu, inaccessible to cattle, *Delphinium dasycaulon* was recognisable from the leaves.

In the central part of Hendu near the main Filinga path, *Elyonurus argenteus* extended over several hectares of river flat. The tussocks, up to 30 cm high, with spreading leaves, up to 60 cm high, with bracken interspersed, were ungrazed. Kikuyu grass (*Pennisetum clandestinum*) "lawns", a fruitful source of edible mushrooms in April, characterized Fulani encampments. Introduced from Bamenda, this excellent grazing grass develops a thick, continuous sward, although it spreads only slowly.

Along some small streams with few trees, *Cyathea dregei* grew beside the water with giant lobelias (*Lobelia columnaris*) and *Dissotis elliottii* var. *elliottii* crowding the banks. The small fern *Cheilanthes inaequalis* var. *inaequalis*, the lower surface covered in mealy white powder, occupied crevices in low rock outcrops.

Table 11 Species recorded from submontane and montane forest on Cabbal Hendu

Trees

Ardisia kivuensis
Agarista salicifolia
Albizia gummifera
Allophylus africanus
Anthocleista vogelii
Anthonotha noldeae
Antidesma vogelianum
Bridelia micrantha
Bridelia speciosa
Campylospermum flavum
Canthium sp.
Carapa procera
Cassipourea congoensis
Clausena anisata
Croton macrostachyus
Dombeya sp. cf. *ledermannii*
Entandrophragma angolense
Eugenia sp.
Ficus lutea
Ficus sp.
Garcinia smeathmannii
Hymenodictyon floribundum (rocky places)
Harungana madagascariensis (forest margin)
Hypericum revolutum subsp. *revolutum* (forest margin)
Ixora foliosa
Khaya grandifoliola
Maesa lanceolata
Maytenus gracilipes
Millettia sp.
Newtonia buchananii
Nuxia congesta
Olea capensis
Oxyanthus speciosus
Pavetta hookeriana
Phoenix reclinata
Pittosporum viridiflorum
Polyscias fulva
Pouteria altissima
Prunus africana
Psorospermum aurantiacum
Psydrax acutiflora
Pterygota mildbraedii
Rauwolfia vomitoria
Rothmannia urcelliformis
Rytigynia umbellulata
Sapium ellipticum
Schefflera abyssinica
Solanecio mannii
Strombosia scheffleri
Symphonia globulifera
Syzygium guineense subsp. *guineense*
Syzygium guineense subsp. *bamendae*
Trema orientalis
Vitex doniana
Warneckea acutifolia
Xymalos monospora

Woody climbers

Adenia cissampeloides
Embelia schimperi
Paullinia pinnata
Psydrax Bridson
Smilax anceps

Shrubs

Dracaena ? sp.
Erica mannii
Humularia ? sp. (JDC 4330, new to West Africa?)
Hypericum roeperanum
Kotschya strigosa
Loranthus sp.
Piper capense
Psorospermum aurantiacum
Psychotria peduncularis

Shrubby herbs

Acanthus montanus
Aframomum angustifolia

Herbaceous flowering plants

Begonia sp.
Elatostema sp.
Eulophia horsfallii
Impatiens kamerunensis subsp. *obanensis*
Orchid sp.
Peperomia sp.
Peperomia sp.
Sanicula elata
Setaria sp. prob. *chevalieri*
Viola abyssinica

Ferns

Amauropelta bergiana var. *bergiana*
Arthropteris monocarpa
Asplenium aethiopicum
Asplenium dregeanum
Asplenium quintasii
Dryopteris athamantica
Marattia fraxinea
Pleopeltis excavata
Pleopeltis macrocarpa
Pseudocyclophorus pulcher
Pteridium aquilinum
Pteris pteridioides
Pteris togoensis
Tectaria fernandensis
Trichomanes pyxidiferum var. *elanotrichum*
Trichomanes mannii
? *Trichomanes* sp.
Vittaria guineensis var. *camerooniana*

Bryophytes and lichens

Pilotrichella pentasticha
JDC 4439 (includes 8 or 9 liverworts and at least three lichens)
JDC 4447 (material at BM awaiting determination)

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Chapter 5

The Shebshi Mountains

Kiri Plateau, Vogel Peak and Tiba Plateau

Extensive notes from travels and collecting trips in the area, which was typically lacking real forest:

Red Data List Species: *Eugenia gilgii*, *Khaya grandifoliola*, *Lovoa trichilioides*

Leinde Bumay:

low-mid altitude forest; c. 1220 m; in Gangoro Forest Reserve; c. 2 km²

Red Data List Species: *Prunus africana*, *Entandrophragma angolense*, *Lovoa trichilioides*, *Pouteria altissima*

Leinde Faya Unga:

low-mid altitude forest; c. 1220 m; in Gangoro Forest Reserve; c. 2 km²

Red Data List Species: *Prunus africana*, *Entandrophragma angolense*, *Khaya grandifoliola*, *Pouteria altissima*

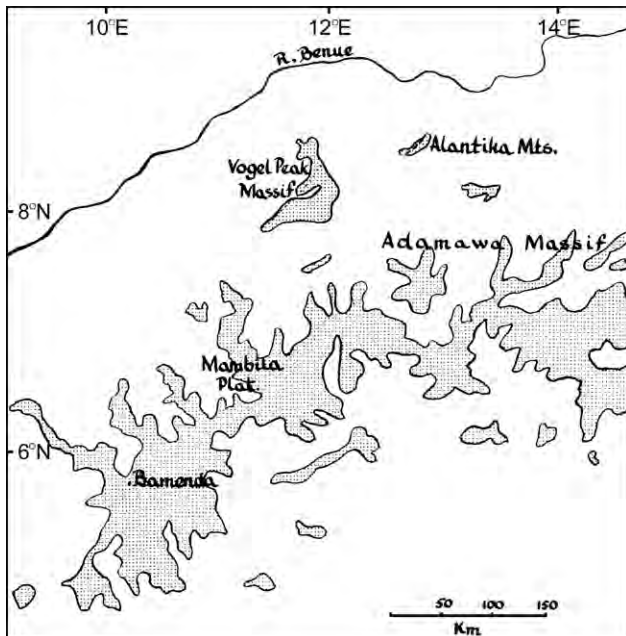


Figure 27 Map of Vogel Peak

Extent, landscape and geology

The Shebshi Mountains, comprising the Kiri (Toungo) Plateau, Vogel Peak and Tiba Plateau (Figures 2 and 27) form an almost unbroken chain of upland, 780 km² in area, rising abruptly above the surrounding plains, at an altitude of 305-610 m. Although not very wide, they extend for approximately 100 km (Figure 28). Bawden & Tuley (1966) have described the main environmental characteristics of these three 'Land Systems'. Their report has been used extensively here.

The Kiri Plateau falls within Toungo District, Ganye Local Government Area. It comprises flat to gently undulating upland, 1070-1220 m, and covers an area of c. 260 km². Grove (1956) reported that the plateau consists of 'horizontally disposed sandstone interbedded with lavas'. The soils have not been investigated, but Hepper (1965) noted the occurrence of shallow soils on sheets of concretionary ironstone. Floristically it is a mosaic of woodland and wooded grassland with occasional patches of dry thicket. When sheets of surface iron-pan occur,

grass is sparse or absent. Perennial streams support narrow strips of riverine forest.

Vogel Peak massif lies within both Toungo and Yelwa districts of Ganye Local Government Authority. There is no 'peak' in the usual sense, and the altitude of the highest point (Dimlang on the map) is just over 1680 m in height. The massif covers an area of 42 km² of strongly dissected, steep mountain slopes with rounded summits. On the older granites of the Basement complex shallow, stony, skeletal soils predominate, with many boulders and rock exposures. Extensive areas of bare rock occur on the higher slopes (Bawden & Tuley, 1966). It is an important watershed, draining into the Kam river. Floristically, woodland gives way to wooded grassland with increasing altitude, merging into montane grassland above about 1370 m. Riverine forest is developed in the valleys.

The Tiba Plateau Land System covers an area of 390 km², and is 20 km across at its widest point. It is connected to Vogel Peak by a narrow extension south-eastwards along the escarpment (Figure 28). The northern sector of the plateau is composed of Basement rocks with minor volcanic intrusions. In the southern sector volcanic intrusive and extrusive rocks predominate. In places intrusions give rise to large dome-shaped hills. No detailed soil survey has been carried out on the Tiba Plateau, but evidence from parent material, altitude and climate suggests that they can be grouped as humic ferrisols.

Floristically, wooded grassland, rather than woodland predominates. At the south-west end of the plateau, fragmented but impressive forest occurs on the escarpment and fringing streams in Gangoro Forest Reserve.

Climate

There were no climatic records. The general effect of an extensive mass of highland aligned at right angles to the rain-bearing winds, as in this case, is to increase precipitation on the westerly side, attracting mist throughout the year, and out of season rain, while casting a rain shadow to the east. At Vogel Peak in 1957, "thunder-storms were frequent and low cloud persisted around the centre of the massif well into the dry season" (Hepper, 1965). At Gangoro Forest Reserve on the Tiba Plateau in 1975 there was heavy rain on 28 November. On 21 February the first prolonged thunder shower of 1976 occurred. In mid-March, towards the hottest time of the year, the temperature at dawn and 8pm averaged 19° and 20°C respectively, the maximum only once slightly exceeding 27°C.

The Vogel Peak massif, at least on the western side, is much moister than the lower-lying Kiri Plateau. The Tiba Plateau attracts more precipitation than Vogel Peak. The mean annual rainfall of 1780 mm, postulated for the western part (Bawden & Tuley, 1966) would not appear excessive.

The most important biotic factor is the grazing and trampling by cattle. A few herds are permanent but most migrate with the seasons. Cattle tracks are everywhere. One effect of the trampling and grazing has been to reduce greatly the density of the grass cover. Coupled with the customary early burning to encourage new growth, this has resulted in less intense fires than would otherwise be the case, to the benefit of the woody growth. Nonetheless, stream-bank forest is often damaged by cattle, which trample tree seedlings, break saplings and open up the undergrowth. This allows grass to grow, and inevitably, fires follow.

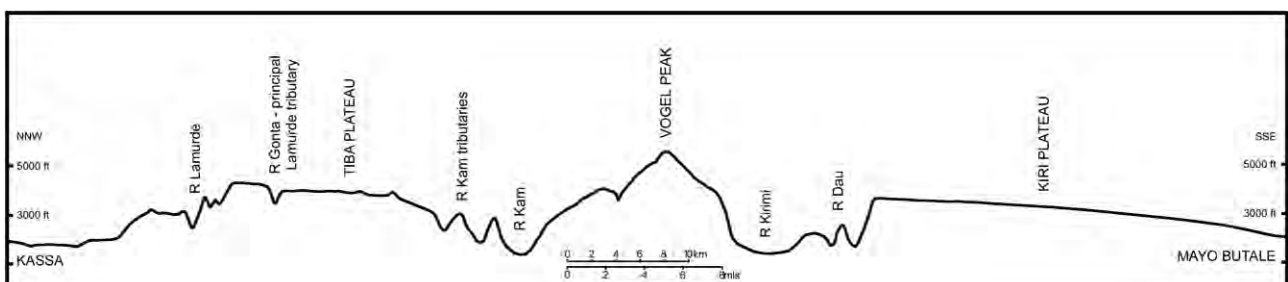


Figure 28 Transect across the Shebshi mountains, based on Nigeria Federal Surveys 1:250,000 map sheet 57 (Jalingo).

Observations

In 1957, when grazing on the Kiri Plateau was heavy, at Vogel Peak cattle were relatively few (Hepper, 1965). On the Tiba Plateau in the mid-sixties the situation appears to have been much the same, with the grassland in good condition (Bawden & Tuley, 1966). By 1976 the numbers of cattle had multiplied and the grassland had deteriorated.

Except for parts of the Tiba Plateau, such as around Donkin, the human population was generally sparse. For the Kiri Plateau, Bawden & Tuley (1966) reported limited arable farming which was on the decline, a trend which had obviously continued. There was no cultivation in the Vogel Peak massif. Because of its importance as a watershed, and distinctive flora, the recommendation of the Land Resource Study was that it be strictly reserved; a proposal yet to be implemented. On the Tiba Plateau, there is limited arable cultivation near the basalt domes.

The observations which follow owe as much to Hepper's account as to the writer's own reconnaissances.

The northern extension of the plateau constitutes the Mayo Ini/Kirimi watershed. The open landscape along the top of the escarpment is gently undulating.

Trees are typically confined to the vicinity of streams (Figure 29). Heavy grazing and annual burning combine with the poor soil to inhibit, if not prevent, the growth of trees. Suffrutices are abundant, including *Echinops gracilis*, *Fadogia ledermannii*, *Vernonia ocephala* and *V. saussureoides*. After burning they quickly shoot again and flower. Concurrently geophytes and plants with tuberous root-stocks appear between the charred grass bases. Such plants complete their reproductive cycle before the grass has grown up again. Some, for example *Moraea schimperii* flowers before the leaves appear. On exposed rocky summits woody species, surviving as windblown, gnarled shrubs included *Bersama abyssinica* ssp. *paullinoides*, *Dracaena* sp., *Memecylon fasciculare*, *Pavetta saxicola* and *Syzygium staudtii*.

Near Sanglimbi (c. 220 m) Hepper found a small isolated clump of trees dominated by *Synsepalum brevipes* and *Clausena anisata*, with *Canthium venosum*, *Psychotria* sp. near *tarambassica*, *Rourea minor* and *Tricalysia* sp. (FNH 2779). Occasional groups of wild bananas (*Ensete gillettii*) and clumps of bamboo (*Oxytenanthera abyssinica*) were observed. In a marshy place there was a small stand of screwpine (*Pandanus candelabrum*). The tree fern *Cyathea dregei* grew by streams in open grassland. Where riverine forest had developed *Syzygium guineense* var. *guineense* was usually the dominant tree. In



Figure 29 The smoothly rounded hilltop is one of a small cluster of similar rocky summits which constitute Vogel Peak. 1676 m at its highest point, this is the most lofty summit of the Shebshi Mountains. (photo February 1977).

well-developed forest near the source of the Mayo Ini, *Beilschmiedia mannii* and *Macaranga occidentalis* were recorded. Other trees included a *Garcinia* sp. cf. *ovalifolia*, *Maesa lanceolata* and the palm *Phoenix reclinata*. Woody climbers/scramblers listed include *Ancylobotrys amoena* (syn. *Landolphia amoena*), *Kosteletzkyia adoensis*, *Mussaenda erythrophylla* (the “Ashanti Blood”), and *Tetracera alnifolia*. Shrubs listed are *Barleria ruellioides*, *B. villosa*, *Cephaelis peduncularis* var. *suaveolens* (abundant), *Eugenia* sp. near *salacioides*, *Indigofera heudelotii*, *Ixora guineensis*, *Phaulopsis barberi*, *Piper guineense* (climber), *Pothomorphe umbellata*, *Ruspolia hypocrateriformis*, *Tinnea aethiopica*, and *Tricalysia okelensis* var. *oblanceolata*. Among many herbs were *Aframomum* sp. cf. *angustifolium*, *Culcasia scandens* (slender climber), *Desmodium repandum* and *Plectranthus glandulosus*, the latter dominant in thickets along the margins of riverine forest. Among the pteridophytes recorded were *Asplenium preussii*, *Cyclosorus dentatus*, *Doryopteris kirkii*, *Pteris togoensis* and *Selaginella* cf. *tenerrima*.

South of the Kirimi Valley were areas of sparse vegetation where the ironstone pan was at the surface, while on the sandstone, savanna woodland or wooded grassland predominate. The infrequent streams may support well-developed riverine forest.

Few cattle were seen in February, but the condition of the range did not suggest excessive stocking in the wet season, when most cattle are on the plateau. Tall *Trema orientalis* / *Anthocleista vogelii* regrowth on long-abandoned farms, and the presence of *Erythrina sigmoidea*, a common stockade tree, reflected the general tendency to move down from the hills.

The plateau woodland differed little floristically from the plains; one obvious difference was the absence of *Isoberlinia doka* on the plateau. Trees tend to be smaller, sometimes stunted. Borassus palm (*Borassus aethiopum*) which overtops them all, is an exception. At the plateau lip above Dau, Hepper came upon a new *Combretum* species, a cabbage-like plant which Exell was later to name *Combretum brassiciforme* (Hepper, 1965). Below the lip, on the upper part of the dry, stony escarpment of the Kirimi Valley, *Monotes kerstingii* often formed pure stands. Other trees on these steep slopes were *Afzelia africana*, *Vitellaria paradoxa*, *Isoberlinia doka* (not above c. 910 m), *Lophira lanceolata*, *Parinari curatellifolia* and

Uapaca togoensis. Hepper also recorded *Boswellia dalzielii*.

The drainage is principally to the Su, a tributary of the Mayo Yim. The path over the plateau from Kiri crosses one of these south-flowing streams. At the end of February the flow was still considerable. The forest lining the banks was undisturbed. *Brachystegia eurycoma* was the dominant species; large trees, with widely spreading branching and flattened crown, the new red foliage conspicuous. Also present were a *Uapaca* sp. (JDC 4698) up to 15 m tall, *Gardenia imperialis*, and, in the understorey, *Harungana madagascariensis* grew at the edge. Under light shade *Osmunda regalis* and *Bolbitis heudelotii* occupied the rocky bank, the latter partly submerged, whilst from the stream itself rose the white capitula of *Eriocaulon latifolium*.

Vogel Peak

The approach to Vogel Peak from the Kirimi Valley via Jangla is described by Hepper (1965). The path crosses the River Kirimi where it is joined by the Dau. Both streams flow from the sandstone plateau, and although the dry season was far advanced there was still an appreciable flow. Among few streambank trees were *Breonadia salicina*, *Brachystegia eurycoma* and *Olex subscorpioidea*. Towards the confluence with the Kam were more trees. Hepper recorded: *Breonadia salicina*, *Albizia glaberrima*, *Brachystegia eurycoma*, *Cynometra megalophylla*, *Phoenix reticulata* and *Phyllanthus reticulatus*. The climbing or straggling shrubs *Artabotrys velutinus*, *Cuviera truncata*, *Dalbergia hostilis* and *Jasminum dichotomum* were also present.

At Jangla in February (approximately 610 m) there was no water in the riverbed. Among tall trees lining the banks *Breonadia salicina* and *Brachystegia eurycoma* were again prominent; also *Maranthes kerstingii* which persisted to 1070 m, to reoccur around 1370 m in the central part of the massif. Smaller trees included *Dialium guineense*, *Millettia thonningii*, *Mimusops kummel*, *Napoleona imperialis* and *Vitex doniana*.

The impression from the south of an undivided massif, proved deceptive. Arriving at the col 760 m above Jangla there appears instead, a north-facing amphitheatre. Riverine forest, well developed lower

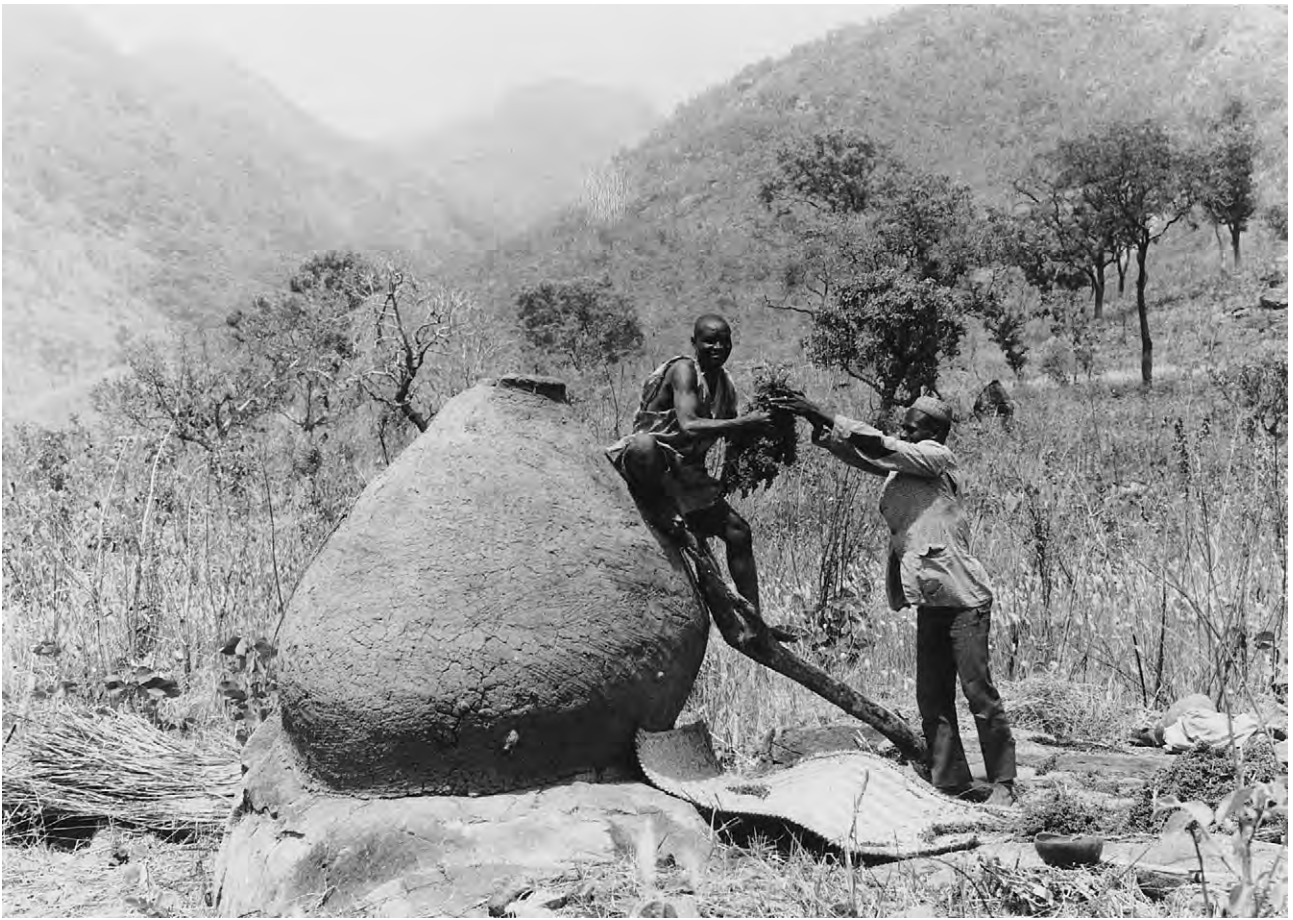


Figure 30 Harvesting guinea corn (*Sorghum* spp.) at Jangla, a hamlet below Vogel Peak (photo February 1977).

down, extended as narrow tongues along streams far up the rocky slope. Ascending steeply, the path from Jangla at first follows the stream, reduced by late February to a trickle with occasional pools. *Aubrevillea kerstingii* and *Erythrophloeum suaveolens* now gradually assumed prominence. *Synsepalum passargei* grew close to the water; it would be submerged in the rains and battered by debris, and may never grow upright. At a smaller stream nearer the col *Beilschmiedia* sp. was observed with *Ochna afzelii* (edge tree), *Tricalysia okelensis*, JDC 4711 (? *Trichilia* sp.), *Xylopia* sp., JDC 4730 and JDC 4729.

On leaving the stream the path continued through sparse woodland, floristically impoverished and stunted with increasing altitude, until the col, where montane grassland predominated. In general aspect and floristically there was little difference between the woodland here and on the plateau escarpment. *Bombax costatum*, *Borassus aethiopum* and *Haematostaphis barteri* were restricted to the lower slopes. *Isoberlinia doka* and *Uapaca togoensis* were locally abundant to c. 910 m. One of the most

common trees, often forming pure stands, was again *Monotes kerstingii*. *Lophira lanceolata* had a wide distribution with stunted individuals extending upwards into wooded grassland with *Psorospermum febrifugum* and *Syzygium guineense* (var. *macrocarpum* of Nigerian Trees (Keay, 1964)). *P. febrifugum* was one of very few trees to persist, fire-trimmed and widely scattered, in the montane grassland.

With no rain for over three months the streams were reduced to a trickle with occasional pools. Some 150 m below the col there was a shady, brimming pool where 19 years earlier Hepper and Daramola had camped. At about this altitude (1220 m) the forest reached its best development, the largest trees up to 30 m tall. Above approximately 1370 m the trees were not so tall and there were changes in floristic composition. At the eastern end of the massif forest persisted along one stream to its source on the high grassland.

Table 12 Species recorded from Hepper's camp (1220 m) in 1977.

Large trees 18-30 m	(m)
<i>Aubrevillea kerstingii</i>	27
<i>Khaya grandifoliola</i> *	30
<i>Lovoa trichilioides</i> *	21
<i>Maranthes kerstingii</i>	30
<i>Parkia filicoidea</i>	27
<i>Piptadeniastrum africanum</i>	30
<i>Polyscias fulva</i>	18
<i>Synsepalum cerasiferum</i>	24
Medium-sized trees 9-18 m	
<i>Anthocleista</i> (? <i>vogelii</i> - JDC 4782)	15
<i>Apodytes dimidiata</i>	12
<i>Beilschmiedia</i> sp.	15
<i>Eriocoelum kerstingii</i>	15
<i>Olea capensis</i>	15
<i>Symphonia globulifera</i>	15
? <i>Tabernaemontana</i> sp. (JDC 4780)	11
? <i>Trichilia</i> sp. (JDC 4737)	15
Small trees	
<i>Campylospermum glaberrimum</i>	4.6
<i>Gaertnera paniculata</i>	6
<i>Olex subscorpioidea</i>	4.6
<i>Podocarpus latifolius</i>	saplings
<i>Teclea verdoorniana</i> (? = JDC 4741)	saplings
Shrubs	
<i>Canthium henriquesianum</i>	scrambling
<i>Mussaenda arcuata</i>	scrambling
<i>Psychotria peduncularis</i>	
Woody climbers	
<i>Connarus griffonianus</i>	
<i>Landolphia comorensis</i>	
<i>Leptoderris fasciculata</i>	
<i>Rhaphiostylis beninensis</i>	
<i>Tetracera alnifolia</i> (? = JDC 4793)	
Ferns	
<i>Marattia fraxinea</i>	
Forest edge species	
<i>Clausena anisata</i>	
<i>Harungana madagascariensis</i>	
<i>Maesa lanceolata</i>	
<i>Pteridium aquilinum</i>	

Scattered palms (*Phoenix reclinata*) occurred on ledges where cliffs overlook the lower part of the valley. On the stony hillsides and fringing the forest below, were numerous clumps of bamboo (*Oxytenanthera abyssinica*). The presence of *Canarium schweinfurthii*, *Melicia excelsa*, *Pouteria alnifolia* and *Monodora* sp. (JDC 4789), may reflect the lower (approximately 150 m) altitude, likewise

the abundance of *Entada rheedei*, a high climber with enormous woody segmented pods.

Several trees, prominent at Hepper's camp dropped out with increasing altitude; for example *Khaya grandifoliola*, *Lovoa trichilioides*, *Maranthes kerstingii* and *Parkia filicoidea*. In contrast, *Podocarpus latifolius* grew where lichen-draped crowns and epiphytic orchids indicated the montane climate nearer the summit. The principal trees in a gully at about 1520 m were *Albizia zygia*, *Polyscias fulva* and *Symphonia globulifera*.

On the summit grassland, in a narrow fringe of forest near the source of a stream, several species were recorded. These included the trees *Beilschmiedia* sp. JDC 4768 (15 m in height), *Bridelia speciosa* (9 m), *Eugenia gilgii* (4.6 m), *Podocarpus latifolius* (9 m), *Symphoria globulifera* (9 m), *Syzygium guineense* subsp. *guineense* (8.6 m) and *Vitex doniana* on rocky outcrops nearby, reaching 6 m in height.

Common shrubs were *Adenocarpus mannii*, *Ancylobotrys amoena* and *Carissa edulis*. *Bulbophyllum cochleatum* and *Bolbitis achrostichooides* were conspicuous herbs and ferns respectively. Lichens included *Usnea articulata* and *U. submollis*.

On Vogel Peak, montane grassland floristically similar to the grassland found on the higher parts of the Kiri Plateau, occurred above about 1370 m, i.e., at a considerably higher altitude. Cattle were present and in February 1977 a herd of some 200 roamed the summits. *Loudetia simplex*, sometimes with *Hyparrhenia subplumosa* codominant, were the principal grasses. No *Sporobolus africanus* was noted. Trees and shrubs, mostly *Psorospermum febrifugum* and *Protea ?elliotii*, stunted and fire-trimmed, were few and far between. Suffrutices and geophytes were again prominent. Species not recorded from the Kiri Plateau (although very likely present there) included *Anthericum zenkeri* (bulb), *Clematopsis villosa* (stout rhizome), *Dolichos* sp. JDC 4765 (tuberous rootstock), *Eupatorium africanum* (woody rootstock), *Gnidia kraussiana* (perennial herb, the flowers fragrant like cowslips), *Grewia mollis* (suffrutex), *Ochna rhizomatosa* (suffrutex), *Thesium tenuissimum* (suffrutex) and *Urginea altissima* (bulb). On the highest parts, above 1520 m, the grass *Ctenium newtonii*, was co-dominant locally with *Rhytachne rottboelliooides*. Other herbs included *Crassula alba*, *Eriosema pulcherrimum*

(woody rootstock), *Gnaphalium undulatum* (woody at the base), *Pentas purpurea* (woody rootstock), *Piloselloides hirsuta* (acaulescent perennial) and *Polygala ukirensis*. Just below the highest point of the massif dense bracken fern (*Pteridium aquilinum*) occupied almost half an hectare. All plants collected from Vogel Peak appear in the checklist.

Tiba Plateau

General remarks

Travels on foot to and from the Gangoro forests afforded an overall impression of the vegetation of the Tiba Plateau and its approaches. Medium-sized stream fringing trees included *Breonadia salicina*, *Synsepalum cerasiferum*, *Anthocleista vogelii*,

Ficus lutea, *Gardenia imperialis*, *Maranthes kerstingii*, *Symphonia globulifera*, *Syzygium guineense* subsp. *guineense*, *Treculia africana*, *Uapaca togoensis* and *Vitex doniana*. Common small trees were *Craterispermum laurinum* and *Harungana madagascariensis*. The bamboo *Oxytenanthera abyssinica* was present (Figure 31). Shrubs included ?*Brillantaisia* sp. (JDC 4017), *Erythrococca hispida* and *Psychotria peduncularis*. The most obvious ferns were *Asplenium dregeanum* (an epiphyte), *Bolbitis heudelotii* and *Osmunda regalis*. The lichen *Usnea trichodeoides* was also recorded.



Figure 31 A flowering clump of *Oxytenanthera abyssinica*, the savanna bamboo, in Gangoro Forest Reserve. Throughout the area the bamboos were flowering prior to dying down to the base before shooting again a year later. In Uganda the cycle extends over seven years. This bamboo is widespread in dry forest and woodland throughout tropical Africa. The thick-walled, scarcely hollowed culms are greatly valued for hut building, furniture and fencing, for splitting to weave baskets, for spears and bows and arrows, besides xylophones and other musical instruments. The leaves are sometimes browsed by cattle. The young leaves and the grains are eaten in famine years (photo November 1975).

Description of the forests

On the Tiba Plateau, forest was extremely fragmented, but was most developed on the escarpment facing south/south-west. On the plateau, with the exception of Leinde Faya Unga at the foot of Gamvirki Hill, forest was confined to steep valley sides, bordering

streams (Figure 32). It was within this forest, and the largest valley forest Leinde Bumay, that the study was most concerned. Both forests were accessible from the Gankita-Donkin path.



Figure 32 Patch of forest fringed with fire-resistant wild date palms (*Phoenix reclinata*) among the rocky hills of Gangoro (Tiba) Plateau c. 1370 m. (photo December 1975).

Leinde Bumay

c. 1220 m

Diversity

A species list for Leinde Bumay is presented in Table 13. A total of 105 vascular plant species were collected, including the four Red Data List species, *Entandrophragma angolense*, *Lovoa trichilioides*, *Prunus africana* and *Pouteria altissima*.

Conservation status

Leinde Bumay lies within Gangoro Forest Reserve, proclaimed in 1961 (Appendix 1).

Profile strip

The profile diagram (Figure 33) illustrates a strip of undisturbed forest 78.6 x 10.7 m in a deep valley enclosed by rocky bluffs at the headwaters of the Mayo Gonta. The forest extended well back from the banks of the stream. The strip was laid out halfway up the slope, parallel to the stream. In all, 66 trees were recorded (see Table 14). For clarity, several of the C storey trees have been omitted from the diagram and dead trees have not been drawn.

Structure, physiognomy, floristic composition

The profile strip was fairly representative of the forest, except that adult specimens of three large, and relatively common tree species, *Entandrophragma*

angolense (Figure 32a) *Lovoa trichilioides*, and *Manilkara obovata* were not present. An *E. angolense* stood nearby, halfway down the slope to the river. The tree was over 30.5 m tall, the length of the bole, measured on the uphill side, was 16.5 m. The circumference above the buttresses, 4 m from the ground on the uphill side, measured 6.4 m.

No clear stratification was observed. However, for descriptive purposes three tree layers have been distinguished:

- (i) A discontinuous stratum A including 11 trees (17% of the total): height 24.4 - 36.6 m (av. 29.6 m)
- (ii) Stratum B containing 26 trees (39%): height 12.2 - 24.4 m (av. 18.9 m)
- (iii) The lowest stratum (C) with 29 trees (44%): height 6.1 - 12.2 m (av. 8.5 m).

There was no clear division between the smaller trees in stratum C and the tallest of the younger trees in the shrub layer, stratum D. Except where the fall of a large tree had given rise to a climber tangle the forest was easy to walk through. Visibility could be anything from 10 to 20 m. Most abundant among young trees and saplings were *Synsepalum cerasiferum*, *Craterispermum laurinum* and *Xylopia acutiflora*. Of the shrubs, *Psychotria peduncularis* 2-3 m tall outnumbered all the others. A stout perennial grass, *Olyra latifolia*, also occurred, the many-noded, branched culms up to 2-3 m tall.

The ground layer (E) included, besides tree seedlings, *Aframomum melegueta* up to 1 m tall, *Palisota* sp. JDC 4227, and ferns, including *Bolbitis acrostichoides*, *Doryopteris kirkii*, *Pteris togoensis* and *Tectaria fernandensis*.

There were many lianes and scandent shrubs in the forest, and half of all the species recorded at Leinde Bumay were present at the profile strip. These included the lianes *Acacia pentagona*, *Landolphia owariensis*, ?*Landolphia* sp. JDC 4142, *Pararistolochia leonensis* and *Rutidea olenotricha*, and the scandent shrubs *Clerodendrum volubile*, *Rhaphiostylis beninensis*, and *Smilax anceps*.

Strangling figs were present but were not a prominent feature. Slender-stemmed *Culcasia falcifolia* climbed

6 m on the boles of trees, many of them covered lower down by bryophytes, or on the drier upper part encrusted with lichens. While epiphytic ferns (mainly *Asplenium* spp.) were, like the mosses, shrivelled up, reflecting the season, *Peperomia* spp. (JDC 4022 and JDC4042) remained verdant. Epiphytic orchids were abundant in the upper canopy. Lichens, including *Usnea trichodeoides*, festooned the topmost branches of some trees. On damp rock faces and mossy boulders close to streams ferns were abundant. Species included *Asplenium dregeanum*, *A. inaequilaterale*, *A. preussii* and *Christella pseudoguentziana*. Tree ferns *Cyathea dregei* and *Marattia fraxinea*, another large streambank species, were rare at Leinde Bumay. Smaller trees might be draped with moss, particularly JDC 4027.



Figure 32(a) *Entandrophragma angolense* in Gangoro Forest Reserve on the Tiba Plateau showing the buttressing habit and the relatively smooth bark with scaling high up the tree. The girth where the buttresses merge with the bole (4 m from the ground), was 22.9 m, and the height c. 46 m. The tall tree to the right is *Pouteria altissima* (photo 1976).

Figure 33 Profile strip in Leinde Bumay, 1220 m.

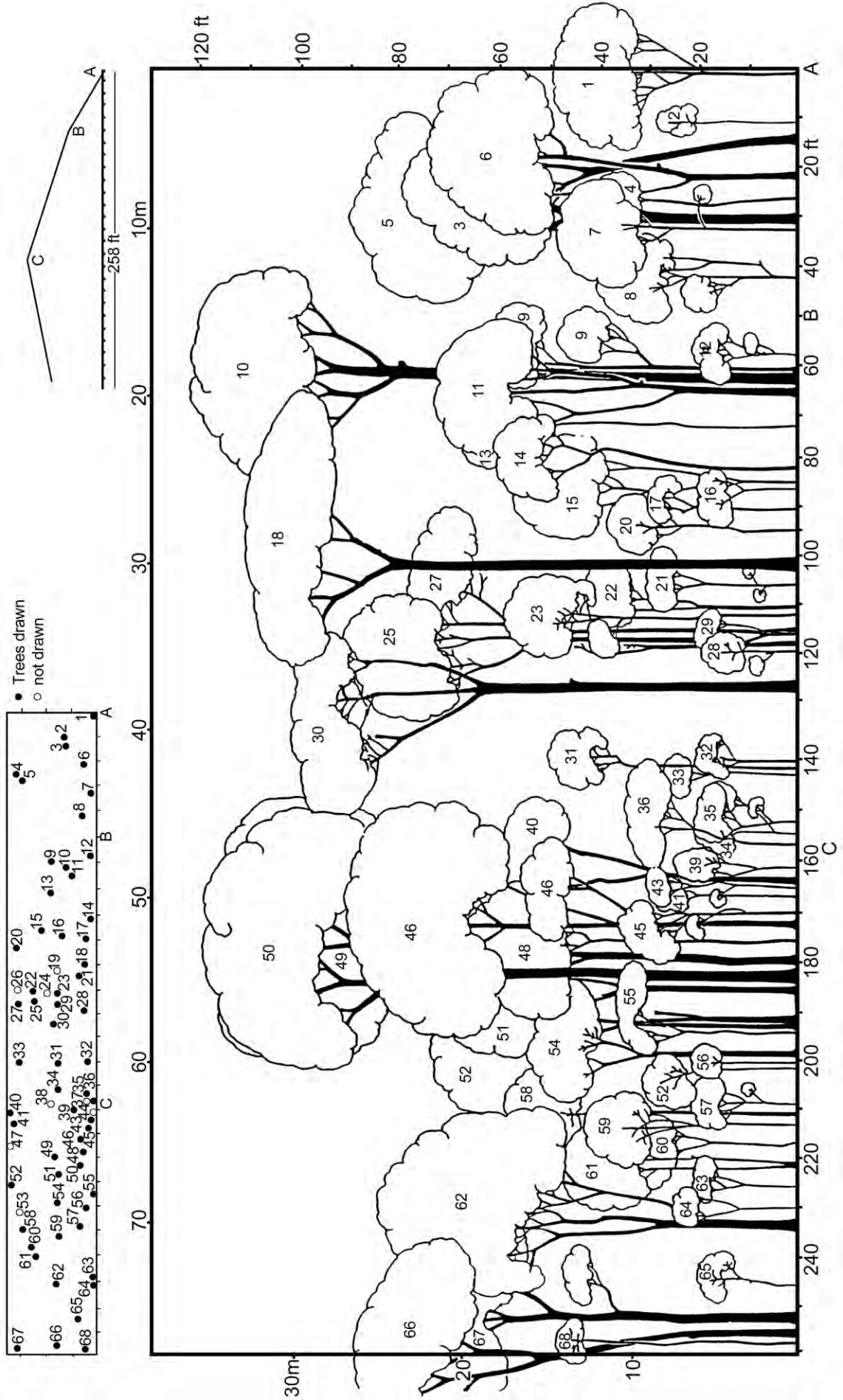


Table 14 Key to Leinde Bumay forest (Tiba Plateau) profile strip (Figure 33).

No.	Botanical Name	Stratum	No.	Botanical Name	Stratum	No.	Botanical Name	Stratum
1	<i>Gaertnera paniculata</i>	B	31	<i>Synsepalum cerasiferum</i>	B	61	<i>Diospyros canaliculata</i>	B
2	<i>Synsepalum cerasiferum</i>	C	32	<i>Diospyros canaliculata</i>	C	62	<i>Synsepalum cerasiferum</i>	A
3	<i>Pouteria altissima</i>	B	33	JDC 4195 ? <i>Trichilia</i> sp.	C	63	<i>Synsepalum brevipes</i>	C
4	<i>Antiaris toxicaria</i>	B	34	<i>Xyloia acutiflora</i>	C	64	<i>Synsepalum brevipes</i>	C
5	<i>Symphonia globulifera</i>	A	35	<i>Synsepalum cerasiferum</i>	C	65	<i>Synsepalum cerasiferum</i>	C
6	<i>Cola verticillata</i>	B	36	JDC 4172	C	66	<i>Cordia millenii</i>	A
7	<i>Synsepalum brevipes</i>	B	37	<i>Memecylon afzelii</i>	C	67	<i>Cola verticillata</i>	A
8	<i>Diospyros canaliculata</i>	B	38	<i>Olax subscorpioidea</i>	C	68	JDC 4218 <i>Maranthes glabra</i>	B
9	<i>Synsepalum cerasiferum</i>	B	39	<i>Synsepalum brevipes</i>	C			
10	<i>Aubrevillea kerstingii</i>	A	40	<i>Synsepalum cerasiferum</i>	B			
11	<i>Khaya grandifoliola</i>	B	41	<i>Olax subscorpioidea</i>	C			
12	JDC 4170	C	42	Dead, Not included: behind tree 45				
	<i>Tabernaemontana</i> sp.							
13	<i>Cola verticillata</i>	B	43	<i>Synsepalum brevipes</i>	C			
14	<i>Rauvolfia caffra</i>	B	44	<i>Aubrevillea kerstingii</i>	C			
15	JDC 4172 new to West Africa	B	45	<i>Olax subscorpioidea</i>	C			
			46	<i>Maranthes glabra</i>	A			
16	JDC 4187 <i>Cola anomala</i>	C	47	<i>Olax subscorpioidea</i> - but not included: behind tree 48	C			
17	JDC 4170	C	48	<i>Aubrevillea kerstingii</i>	B			
	<i>Tabernaemontana</i> sp.		49	<i>Aubrevillea kerstingii</i>	B			
18	<i>Parkia filicoidea</i>	A	50	<i>Aubrevillea kerstingii</i>	A			
19	JDC 4188	B	51	<i>Prunus africana</i>	B			
20	<i>Antiaris toxicaria</i>	C	52	<i>Synsepalum cerasiferum</i>	B			
21	<i>Synsepalum brevipes</i>	C	53	<i>Olax subscorpioidea</i>	C			
22	JDC 4187 <i>Cola</i> ? <i>anomala</i>	B	54	<i>Vitex oxycarpus</i>	B			
23	JDC 4189 <i>Beilschmiedia</i> sp.	B	55	JDC 4212 ? <i>Trichilia</i> sp.	C			
24	<i>Symphonia globulifera</i>	A	56	<i>Synsepalum cerasiferum</i>	C			
25	<i>Khaya grandifoliola</i>	A	57	JDC 4213 <i>Cola</i> sp.	C			
26	<i>Drypetes principium</i>	C	58	JDC 4189 <i>Beilschmiedia</i> sp.	B			
27	<i>Symphonia globulifera</i>	B	59	JDC 4215 <i>Diospyros</i> ? <i>abyssinica</i>	B			
28	<i>Synsepalum cerasiferum</i>	C	60	<i>Cynometra megalophylla</i>	C			
29	<i>Craterispermum laurinum</i>	C						
30	<i>Symphonia globulifera</i>	A						

Note: A stratum trees adjoining, absent from the profile strip, included *Entandrophragma angolense* and *Lovoa trichilioides*. *Manikara obovata*, a potential B canopy species was represented by small trees and saplings.

Leinde Faya Unga

1220 m

Diversity

Leinde Faya Unga closely resembled Leinde Bumay in its floristic diversity (Table 13), and shared the same Red Data List species, except for the presence of *Khaya grandifoliola*.

Conservation status

Leinde Faya Unga lies within Gangoro Forest Reserve.

Enumeration plot

Table 15 summarises the 0.4 ha enumeration.

Structure, physiognomy, floristic composition

In the upper tree layer the most prominent emergent was *Piptadeniastrum africanum*. There was a clearly defined understorey comprising 82% of the trees enumerated. Of these, one species, *Drypetes principium*, accounted for more than 50%.

At the enumeration plot *Khaya grandifoliola*, *Parkia filicoidea*, *Piptadeniastrum africanum* and *Prunus africana* were represented only by emergents or B storey trees, and *Entandrophragma angolense* by a single C storey tree; however, in the forest as a whole there was a balanced distribution of age classes among these species.

In the D stratum, although there were many small trees and shrubs, visibility was seldom less than 10 m, and often up to 30 m, so walking in the forest was not difficult. Young understorey trees included *Cola* sp. (JDC 4213), *Craterispermum laurinum*, *Drypetes principium*, *Garcinia smeathmannii*, *Memecylon afzelii*, *Xylopia acutiflora* and the Rutaceae (JDC 4172).

Young A and B stratum trees included *Synsepalum cerasiferum*, *Pouteria altissima*, *Aubrevillea kerstingii*, *Cola gigantea*, *Cynometra megalophylla*, *Diospyros canaliculata*, *Entandrophragma angolense*, *Manilkara obovata*, *Parkia filicoidea* and *Strombosia scheffleri*.

Shrubs included the occasional *Dracaena surculosa*,

and the common *Phaulopsis barberi*. *Psychotria peduncularis* and *Psychotria* sp. JDC 4214 (= FHI 62726). There were also clumps of *Olyra latifolia*.

In the ground layer (E) tree seedlings were much in evidence. Herbaceous vegetation tended to be sparse, but *Aframomum melegueta* was present, along with the forest grasses *Leptaspis cochleata* and *Oplismenus hirtellus*, and several ferns, the most common being *Bolbitis acrostichoides*.

Lianes were less obvious than at Leinde Bumay. Climbing by adventitious roots *Piper guineense* reached the crowns of trees 20 m high. The slender woody stem developed pronounced corky ridges with age. Epiphytic bryophytes and ferns were abundant, but desiccated in the dry season. There were many lichens, whether crustaceous species covering tree trunks, or draping the exposed crowns of tall trees. A *Peperomia* sp. (JDC 4022) carpeted a large horizontal limb 6 m from the ground. At a higher level epiphytic orchids were common.

Species lists for each forest appear in Table 13. For the non-woody plants the dry season was not the best time for collecting, and much more remains to be done.

Table 13 Species lists for Leinde Bumay and Leinde Faya Unga.

Trees > 30 m in height

Entandrophragma angolense
Hannoa klaineana
Khaya grandifoliola
Lovoa trichilioides
Piptadeniastrum africanum
 JDC 4264 (?= *Hannoa klaineana*)

Large trees 18 - 30 m

Albizia zygia
Antiaris toxicaria
Aubrevillea kerstingii
Canarium schweinfurthii
Cassipourea sp. (JDC 4141 & 4243)
Cola gigantea
Cola verticillata
Cordia millenii
Ficus sp.
Manilkara obovata
Maranthes glabra
Ochna sp. (JDC 4275 - ? new to Nigeria)
Parkia filicoidea
Pouteria altissima
Prunus africana
Rauvolfia caffra
Strombosia scheffleri
Symphonia globulifera
Synsepalum cerasiferum
Trichilia ?sp. (JDC 4140)
Trilepisium madagascariense
 JDC 4247

Medium sized trees 9-18 m

Beilschmiedia sp.
Blighia unijugata
Cassipourea gummiflua
Cynometra megalophylla
 ?*Diospyros abyssinica*
Diospyros canaliculata
Gaertnera paniculata
 Rutaceae (JDC 3970 = 4172) ? new to W. Africa
Synsepalum brevipes
Strombosia scheffleri
Suregada sp. (JDC 4240)
Treculia africana
Vitex ferruginea
Vitex oxycuspis
 JDC 4139
 JDC 4249

Small trees 4.5 – 9 m

Campylospermum flavum
Campylospermum glaberrimum
Cola ?anomala (JDC 4187)
Cola sp. (JDC 4213)
Craterispermum laurinum
Drypetes gilgiana
Drypetes principium
Eugenia sp. (JDC 3985, 4026, & 4231)
Ficus sp. (JDC 4020)
Garcinia smeathmannii
Ixora bauchiensis
Memecylon afzelii
Memecylon sp. (JDC 4000)
Memecylon sp. (JDC 4149)
Monodora sp. (JDC 4206)
Olex subscorpioidea
Psydrax parviflora
Rothmannia urcelliformis
Tabernaemontana sp. (JDC 4003 & 4170)

Trichilia sp. (JDC 4195 ?= 4212)
Xylopia acutiflora
 JDC 4012

Shrubs

Brillantaisia sp.
Dracaena fragrans
Dracaena surculosa
Erythrococca hispida
Phaulopsis barberi
Psychotria peduncularis
Psychotria sp. (JDC 4214) (= FHI 62726)

Woody climbers & scandent shrubs

Acacia pentagona
Agelaea pentagyna
Clerodendrum volubile
Craterosiphon scandens
Hippocratea sp. (JDC 4233)
Landolphia owariensis
Landolphia sp. (JDC 4142 - fruits collected)
Pararistolochia leonensis
Piper guineense
Rhaphiostylis beninensis
Ruspolia hypocrateriformis (JDC 3986 Det. Kew Tag. H637/77 – description in FWTA does not fit; this is a woody climber with a stem 7.5 cm diameter).
Rutidea olenotricha (slender stem)
Rutidea sp. (JDC 4217)
Securidaca welwitschii
Smilax anceps (scandent shrub)
Strychnos nigriflora
Tiliacoria funifera

Herbs

Aframomum melegueta
Arundinella pumila
Barleria ruellioides
Culcasia falcifolia
Cyathula prostrata
Dracaena thallicoides
Leptaspis cochleata
Olyra latifolia
Oplismenus hirtellus
Palisota sp. (JDC 4227)
Peperomia sp. (JDC 4042)
Peperomia sp. (JDC 4022)

Ferns

Asplenium inaequilaterale
Asplenium preussii
Bolbitis sp.
Bolbitis heudelotii
Christella pseudogueintziana
Cyathea dregei
Doryopteris kirkii
Marattia fraxinea
Pteris togoensis
Tectaria fernandensis

Epiphytes

Asplenium dregeanum
Asplenium inaequilaterale
Asplenium preussii

Bryophytes and lichens

JDC 4027 - festooning branches
Usnea trichodeoides

Table 15 Enumeration plot from Leinde Faya Unga forest (Tiba Plateau).

Botanical name	Storey	Girth Class													Total 30 cm & over	Total 1.21 m & over		
		a	b	c	d	e	f	g	h	i	j	k	l	m				
<i>Antiaris toxicaria</i>	C			1													1	
JDC 4196 <i>Beilschmiedia</i> sp.	B,C	2	3	3	1	1											10	2
JDC 4243, 4141 <i>Cassipourea</i> sp.	B,C		2	5	4	1											12	5
<i>Cola gigantea</i>	C		2														2	
<i>Cola verticillata</i>	B,C	1	1	6				2									10	2
<i>Cynometra megalophylla</i>	B,C			4	1	1	2										8	4
<i>Diospyros canaliculata</i>	C	5	6	1													12	
<i>Drypetes gilgiana</i>	B,C		1		1												2	1
<i>Drypetes principium</i>	C	73	20														93	
<i>Entandrophragma angolense</i>	C			1													1	
<i>Ficus</i> sp. (strangler, not collected)	A													1			1	1
<i>Garcinia smeathmannii</i>	C	10	4														14	
<i>Hannoa klaineana</i>	B,C			4	4	1	1										10	6
<i>Khaya grandifoliola</i>	B							1									1	1
JDC 4206 <i>Mondia</i> sp.	C	1															1	
<i>Parkia filicoidea</i>	A								1								1	1
<i>Piptadeniastrum africanum</i> (Girth at 3 m, above the buttresses)	A									1			1				2	2
<i>Prunus africana</i>	A							2	1								3	3
<i>Pouteria altissima</i>	A,B,C	4	1		1	1							1				8	3
<i>Strombosia scheffleri</i>	B,C	1	3	2	1	1											8	2
<i>Symphonia globulifera</i>	B,C	1		2	1												4	1
<i>Synsepalum cerasiferum</i>	A,B,C	6	6	2	3	1		1									19	5
JDC 4240 ? <i>Suregada</i> sp. ? <i>occidentalis</i>	C	10	2														12	
JDC 4170 ? <i>Tabernaemontana</i> sp.	C	2	2	1													5	
JDC 4212 ? <i>Trichilia</i> sp.	C	1															1	
<i>Trilepisium madagascariense</i>	A,C	1							1	1							3	2
<i>Vitex oxycuspis</i>	B,C	1			1												2	1
Dead trees	A,C	1	3	3						1*							8	1
JDC 4139	B,C		1														1	
JDC 4172 <i>Rutaceae</i> (? = 3970, identified by Kew as <i>Vepris</i> sp.)	C			1													1	
JDC 4247	B				1	1											2	2
JDC 4249	C	1	1														2	
JDC 4264 ? <i>Hannoa klaineana</i>	A									1							1	1
Total		121	58	36	19	8	6	4	2	4			2	1			261	46

**Piptadeniastrum africanum*

extrapolating, the figures for 1.5 ha would be: 30 cm and over 971
1.21 m and over 174

Key to girth classes:

a 0.30 - 0.60 m	e 1.51 - 1.80 m	i 2.71 - 3.00 m	m 3.91 - 4.20 m
b 0.61 - 0.90 m	f 1.81 - 2.10 m	j 3.01 - 3.30 m	
c 0.91 - 1.20 m	g 2.11 - 2.40 m	k 3.31 - 3.60 m	
d 1.21 - 1.50 m	h 2.41 - 2.70 m	l 3.61 - 3.90 m	

Ecological notes

Regeneration

Table 16 The count of established tree regeneration at Leinde Bumay (LB) and Leinde Faya Unga (LFU), from the profile strip and enumeration plot respectively.

Species	LB No.	LFU Abundance
<i>Aubrevillea kerstingii</i>	3	1
<i>Cola gigantea</i>	-	r
<i>Cola</i> sp. (JDC 4213)	-	o
<i>Craterispermum laurinum</i>	>10	a
<i>Cynometra megalophylla</i>	5	a
<i>Diospyros canaliculata</i>	3	a
<i>Drypetes principium</i>	-	su
<i>Entandrophragma angolense</i>	1	1
<i>Garcinia smeathmannii</i>	-	a
<i>Manilkara obovata</i>	2	a
<i>Memecylon afzelii</i>	1	o
<i>Monodora</i> sp. (JDC 4206)	2	-
<i>Parkia filicoidea</i>	3	1
<i>Pouteria altissima</i>	-	a
Rutaceae (JDC 4172)	3	a
<i>Strombosia scheffleri</i>	-	a
<i>Synsepalum brevipes</i>	3	-
<i>Synsepalum cerasiferum</i>	>10	a
<i>Trilepisium madagascariense</i>	2	-
<i>Xylopia parviflora</i>	>10	a

a- abundant; o-occasional; r-rare; su-superabundant; 1-one individual.

Influence of fire

The present limits of forest and wooded grassland have been determined by the interactions of fire, topography and edaphic conditions. At the time of collecting this data forest was restricted to valley sides and dissected terrain, or to the occasional fragment surviving in the shelter of large rocks. Only where there was a sharp break in relief, and not always then, was a narrow, relatively stable 'ecotone' observed. Elsewhere, fires continued to erode the forest boundary. The attrition was intensified where fires were deliberately set inside the forest by herdsmen to extend the grazing. At Leinde Faya Unga, the understorey had been burnt the previous year (1975) to a depth of 100 m, while most of the big trees had been scorched or suffered more severe damage.

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Chapter 6

Transitional & High Forest between c. 610 – 1170 m on the Western Escarpment of Mambilla Plateau

Akwaizantar forest:

transitional forest c. 760 – 1170 m; c. 11 km strip confined to the deeply incised valley of the Zonyo stream

Red Data List Species: *Dombeya* cf. *ledermannii*, *Khaya grandifoliola*

Kop Nti forest:

high forest 760 m; c. 6.5 km²

Red Data List Species: *Dombeya* cf. *ledermannii*, *Irvingia gabonensis*, *Khaya grandifoliola*

Location

The western foothills and escarpment valleys of the Mambilla plateau would be forested, were it not for the shifting cultivation practised by the local people, the Tigon and Kaka tribes. By the 1970s, most of the forest had been cleared and replaced by a mosaic of vegetation types associated with regeneration after forest clearance. The earliest stages of regrowth were characterised by *Acalypha ornata* with *Vernonia conferta*, or locally by *Musanga cecropioides*.

The western escarpment can be visited on foot by following the trekking route from Maisamari to Abong. Along this route, between the Tigon village of Batu Amanda and the Kaka villages of Inkiri and

Antere in the Donga valley, were two small, widely separated fragments of forest which appeared not to have suffered disturbance in the recent past. These were Akwaizantar and Kop Nti, the latter in River Nwum (formerly Antere) Forest Reserve.

Climate

The western escarpment faces the rain-bearing winds from the Atlantic. The mean annual rainfall at Abong on the Donga river (altitude 280 m), recorded over an 11 year period, was 2490 mm with a twin peak distribution and a two month dry season (less than 25 mm per month) (Bawden & Tuley, 1966).

Description of the Forests / Kurame

Akwaizantar Forest

transitional forest; c. 760 – 1170 m

Location

Akwaizantar forest is within Tigon District, 24 km south-west of Nguroje. It is located approximately halfway down the western escarpment of Mambilla Plateau, in the deeply incised valley of the Zonyo stream, at c. 6° 52' N and 10° 55' E (Figure 2).

From Mambilla Plateau, Akwaizantar may be reached through Yeri Maru (in 1978 the road terminus) and Masaboy village. The two hour walk to Masaboy crosses the headwaters of River Nwum (Sumsum, on the map). Masaboy is on the trekking path, via the Amba tie-tie bridge to Binka in West Cameroon (Figure 34). From Masaboy, a subsidiary

path leads to Akwaizantar, crossing eventually the Mawo stream, to arrive at the saddle close to the upper edge of the forest; a walk of about three hours.

The forest (in 1978) extended c. 4 kilometres to the north down the Zonyo valley. This account refers to the first kilometre of the forest in the valley, from an altitude of c. 1140 m at the saddle to the valley floor at approximately 760 m.

Conservation status

From the air, much of this forest appeared (1978) undisturbed, apart from farm clearings around the village of Akoforo. More recently Ngoro farmers have cleared extensively in the north-eastern part of Akwaizantar forest. However, Hopkins (pers. comm. 1996) found the local Tigon people committed to



Figure 34 Tie-tie bridge spanning the Donga River at Antere, below the River Nwum Forest, on the trekking route from Nguroje to Binka in West Cameroon. The bridge is suspended from the over-arching branches of *Brachystegia eurycoma* trees on opposite banks of the river.

preserving the forest, mainly for hunting, (which has reduced wildlife considerably during the past 20 years), and for growing cocoa. He was optimistic that slash and burn would diminish in future. A detailed reconnaissance is urgently needed.

Diversity

A total of 110 species were recorded from Akwaizantar forest, 83 trees, eight woody climbers, six shrubs, seven herbaceous species and six ferns. Two Red Data List species, *Dombeya* cf. *ledermannii* (at the forest edge) and *Khaya grandifoliola* (with a sporadic distribution) were present.

In a region where shifting cultivation was the norm, and hunting pressures unrelenting, Akwaizantar was (1978) unique. There was a tradition that long ago a pestilence (possibly smallpox) carried off the inhabitants, or it could be that this has for long been a no-man's land between Tigon and Mambilla. In 1978 the level of hunting at the head of the valley

was very low. Chimpanzees showed more interest than concern at our intrusion. One afternoon a troop of putty-nosed monkeys (*Cercopithecus nictitans*) began feeding on the flowers of a big *Canarium*, intermittently pelting the camp (Figure 35) with belbel leinde (*Landolphia landolphiodes*) fruits. They remained until the morning, undeterred by the camp fire and conversation below them, to return on two subsequent occasions. On several nights a giant pangolin (*Manis gigantea*) shuffled noisily through the drifts of brittle fallen leaves. A few bush-cow (*Syncerus caffer*) took refuge here. A leopard (*Panthera pardus*) was met with once, during the day, on the rocky slopes above the forest.



Figure 35 Camp in Akwaizantar Forest Reserve.

Notes

Trees on the upper edge of the forest included *Bridelia* sp. (?*B. speciosa* - JDC 5190) *Clausena anisata*, *Dombeya* cf. *ledermannii*, *Gaertnera paniculata*, *Phoenix reclinata*, *Polyscias fulva*, *Sterculia tragacantha* and *Vitex doniana*.

Shrubs and woody climbers included *Clerodendrum violaceum*, a climbing shrub, *Landolphia landolphioides* and the woody climber *Paullinia pinnata*.

The most prominent feature in the somewhat open forest at the head of the valley was the massive spreading crowns of *Canarium schweinfurthii*. Dwarfing their neighbours, a group of these trees surrounded a seasonal spring. Other streambank trees were *Erythrophleum suaveolens* and *Khaya grandifoliola*.

Enumeration plot

The descent to the valley, following the stream, is steep and rocky. A single *Parkia filicoidea* 30 m tall occurred half way down. At approximately 760 m the slope tailed off. The forest on the west side of the stream, where the ground was very stony, was just wide enough to lay out a sample plot 122 x 122 m, c.1.5 ha. (Table 17). The western edge of the plot was within 100 m of the forest/savanna boundary. The plot corners were marked with large heaps of stones.

Structure, physiognomy and floristic composition

Table 18 Trees <30 cm in girth, and other woody species and herbs recorded at, or in the vicinity of the enumeration plot (Table 17).

Habit	Species	Abundance
SH	<i>Aframomum</i> sp. JDC 5265	lf
CL/T	<i>Alchornea cordifolia</i>	lf
Pt	<i>Antrophyum mannianum</i>	r
Pt	<i>Bolbitis acrostichoides</i>	f
H	<i>Bulbophyllum</i> spp.	lf
CL/S	<i>Clerodendrum schweinfurthii</i>	o
CL	<i>Cnestis ferruginea</i>	o
T	<i>Cola hispida</i>	r
CL	<i>Combretum racemosum</i>	o
CL	<i>Entada rheedei</i>	o
CL	<i>Laccosperma opacum</i>	o
CL	<i>Landolphia landolphioides</i>	f
S	<i>Marantochloa</i> sp.	lf
H	<i>Olyra latifolia</i>	f
H	<i>Oplismenus hirtellus</i>	f
H	<i>Palisota</i> sp.	o
CL	<i>Paullinia pinnata</i> L.	f
Pt	<i>Platynerium ?elephantotis</i>	r
CL	<i>Smilax anceps</i>	o
Pt	<i>Tectaria fernandensis</i>	o
T	<i>Uapaca</i> sp.	o
T	<i>Xylopia acutiflora</i>	r
T	JDC 5186 ? <i>Annonaceae</i>	o
T	JDC 5187	

T = tree, CL = climber, S = shrub, H = herb, Pt. = fern.
f = frequent, lf = locally frequent, o = occasional, r = rare.

Table 17 Enumeration plot from Akwaizantar forest, on the western escarpment of Mambilla Plateau.

Botanical Name	Storey	Girth Class										Total 0.30m & over	Total 1.2m & over	
		a	b	c	d	e	f	g	h	i	j			
JDC 5421 ? <i>Aeglopsis chevalieri</i>	C		1										1	
<i>Azelia africana</i>	B				1								1	1
<i>Albizia zygia</i>	B,C		3	1	1	1							6	2
<i>Alstonia boonei</i>	B,C		1	1	1								3	1
JDC 5217 ? <i>Anthonotha</i> sp.	B,C	1	4	1									6	
<i>Aubrevillea kerstingii</i>	B,C	5	3	3	1								12	1
JDC 5190 <i>Bridelia speciosa</i>	B,C	1	9	6									16	
<i>Canarium schweinfurthii</i>	C	1	1										2	
<i>Ceiba pentandra</i>	A,B,C	3	1	2							1		7	1†
<i>Cola gigantea</i>	B			3									3	
<i>Cordia millenii</i>	C	1											1	
<i>Dichrostachys cinerea</i>	C		1										1	
JDC 5199 ? <i>Diospyros monbuttensis</i>	C	10	2										12	
<i>Elaeis guineensis</i>	B,C		1	2	2								5	2
<i>Erthrophloeum suaveolens</i>	B,C	1	4	1									6	
JDC 5230 <i>Ficus ?capensis</i>	C		1										1	
<i>Ficus</i> spp.	A,B,C	1	2	2	4				1				10	5
<i>Khaya grandifoliola</i>	C	3	1	1									4	
JDC 5244 <i>Maranthes</i> sp.	C	1											1	
JDC 5218 ? <i>Markhamia tomentosa</i>	B,C	22	13	2									37	
<i>Milicia excelsa</i>	C		2										2	
<i>Myrianthus arboreus</i>	C		1										1	
JDC 5228 <i>Ochna</i> sp.	C	1	1										2	
<i>Olex subscorpioidea</i>	C	2											2	
<i>Piptadeniastrum africanum</i>	A									1			1	1
<i>Polyscias fulva</i>	A,B	5	10	4	2	1							22	3
<i>Pycnanthus angolensis</i>	C		2										2	
JDC 5243 ? <i>Rauvolfia vomitoria</i>	C		1										1	
<i>Sapium ellipticum</i>	B,C	6	2	1									9	
<i>Sorindeia juglandifolia</i> *	B,C	3	3	2	1	1		1					11	3
<i>Spathodea campanulata</i>	B,C		1	5	2			1					9	3
<i>Sterculia tragacantha</i>	C	1	1										2	
<i>Symphonia globulifera</i>	B,C	3	4	1									8	
<i>Tabernaemontona</i> sp.	C	6	3										9	
<i>Trilepisium madagascariense</i>	B,C	23	17	6	3	2							51	5
<i>Vitex doniana</i>	B,C	10	6	7	4	2	2						31	8
<i>Vernonia conferta</i>	C		1	1									2	
JDC 5214	B				1								2	1
JDC 5215	B,C	5	1	1									7	
JDC 5216, 5260 **	B,C	14	13	13									40	
JDC 5223	C	4											4	
JDC 5224	C	2											2	
JDC 5231	C	1											1	
JDC 5232	C	1											1	
JDC 5240	C	1											1	
JDC 5248	B,C	1		1									2	
JDC 5249	C		1										1	
JDC 5250	B					1							2	1
Trees leafless or with a very small crown	B,C	4		3									7	
Dead trees	B,C	17	18	3									38	
Total		160	136	72	23	8	3	1	1	1	1		406	38

Number of species excluding the last two categories 48

* Kew Herbarium suggested this could be a *Trichoscypha* sp. Immature fruits were collected

** Frequently multi-stemmed (usually 2 or 3 but may be up to 5 stems,) when each stem was measured
JDC 5260 was collected in fruit. It is possibly a *Millettia* sp. (cf. Multi-stemmed *Millettia conraui* (JDC 3511)
at Cabbal Wade.

† 4.17 m

Key to girth classes:

a 0.30 - 0.60 m	d 1.21 - 1.50 m	g 2.11 - 2.40 m	j 3.01 - 3.30 m
b 0.61 - 0.90 m	e 1.51 - 1.80 m	h 2.41 - 2.70 m	
c 0.91 - 1.20 m	f 1.81 - 2.10 m	i 2.71 - 3.00 m	

Ecological notes

The forest appeared to be a late seral stage and may have regenerated from abandoned farms. Besides several tall oil palms (*Elaeis guineensis*) there were occasional huge trees, typical of those left after a farm is made, for example *Ceiba pentandra* and *Piptadeniastrum africanum*. Nearby were *Alstonia boonei* and *Morus mesozygia*. In the canopy, secondary species shared dominance with forest trees. Among the former were *Bridelia speciosa*, *Polyscias fulva*, *Spathodea campanulata* and *Vitex doniana*, an ecologically tolerant species. Forest trees included *Albizia zygia*, *Aubrevillea kerstingii*, JDC 5191 (perhaps *Sorindeia juglandifolia*, but could be *Trichoscypha* sp.) and, most abundant, *Trilepisium madagascariense*. Potential canopy/emergent species in the C storey were *Canarium schweinfurthii*, *Milicia excelsa*, *Cordia millenii*, *Khaya grandifoliola* and *Pycnanthus angolensis*. Among smaller forest trees were *Diospyros* cf. *monbuttensis*, *Myrianthus arboreus* and *Markhamia tomentosa* (JDC 5218). The tree JDC 5216/5260 (?*Millettia* sp.) accounted for 11% of all the stems enumerated, from the smaller

girth classes to the largest canopy trees of over 2.5 m in girth. This species was also common on rocky streambanks near the plot.

Along (and beyond) the western boundary of the plot, where fires had encroached, the succession was more recent. The many climber tangles, dense clumps of *Marantochloa*, short-lived *Vernonia conferta*, and savanna species including *Dichrostachys cinerea*, were evidence of this. Interspersed were *Bridelia speciosa*, *Erythrophleum suaveolens*, *Polyscias fulva*, *Sapium ellipticum*, *Sterculia tragacantha* and *Vitex doniana* - mostly around c. 9 m tall. Established saplings included *Aubrevillea kerstingii*, *Ceiba pendandra*, *Erythrophleum suaveolens*, *Piptadeniastrum africanum* and *Polyscias fulva* were recorded.



Figure 36 Lowland rain forest outlier on the east bank of River Nwum, c. 760 m. River Nwum Forest Reserve is bordered by the lands of two Kaka village groups, Antere and Inkiri. Slash and burn farming, hunting pressures, and the increasing population have destroyed the forests and decimated wildlife, so that this one small relict was the last refuge for the few remaining chimpanzees (photo April 1977).



Figure 37 *Uapaca* sp. (? = JDC 3846 which is *Uapaca togoensis*) in River Nwum Forest Reserve where this is the most abundant tree along the tributary streams on the western side of the valley. Associated species are *Erythrophleum suaveolens*, *Khaya grandifoliola*, *Maranthes glabra*, *Sterculia tragacantha*, *Treculia africana* (photo April 1977).

Kop Nti Forest

high forest; 760 m

Location

Kop Nti (“very thick kurmi” in Kaka), forms part of River Nwum Forest Reserve (Figures 36 and 37, Appendix 1). The forest is located below the south-western escarpment of Mambilla Plateau (Figure 2). The River Nwum forest reserve comprises the upper, canyon-like part of the valley, and down-stream for 4.5 km (Appendix 1).

From Yeri Maru, where the road ended, there are two ways to River Nwum; by the Inkiri path, or through Masaboy village. On the steep slopes below the Inkiri path, wooded grassland extends down to the upper edge of Kop Nti. The forest in 1977 covered the lower (eastern) slopes of the valley to the bank of the river. The total area was c. 6.5 km². On the opposite (rain shadow) side of the valley wooded grassland, dissected by narrow fringes of forest along consecutive streams, extended from the ridge top

to the river bank. The Masaboy route, approaching from this side, was less direct. Though longer, the descent to the river was easier, and led to a natural camp-site on the river bank.

Conservation status

The presence of Kop Nti in an area where every patch of forest represents a potential farm, suggested that formerly it was respected by local custom as a ‘juju’ forest. By 1977, perceptions had changed. The forest upstream along the Logmi, excluded at the time of reservation, had already been farmed, partly by the Antere community, and partly by people from Inkiri (Kachella Bemfay).

Prior to the forest reserve proclamation in 1971, bushcow (*Syncerus caffer*) in Kop Nti were hunted using gin traps and pitfalls, few of which had been filled in. By 1977 Kop Nti forest had not been exploited for timber but on the periphery there had been intermittent farming. There was a small resident population of chimpanzee (*Pan troglodytes*)

and bushcow; Kop Nti had become their final refuge. The chimpanzees, though not apparently harassed by local people, were at risk from Cameroonian hunters.

Structure, physiognomy, floristic composition

Structurally, the forest (Figure 38) appeared to resemble the 'Mixed Rain Forest' of Western Nigeria (Richards, 1939; Jones, 1955 & 1956). The forest was a patchwork of physiognomically distinct or intergrading, serally related phases, which Whitmore (1975) has described as 'mature', 'gap' and 'building' phases. The following phases were observed at Kop Nti:

(i) Mature Mixed (=Multidominant) Rain Forest structurally similar to the 'Wet Evergreen Forest' in Shasha Forest Reserve, as described by Richards (1939). (Richards (1983), while accepting that mixed forests usually do not show clearly defined strata, has concluded that the profile diagram

technique, despite its subjective aspects, remains a useful tool).

(ii) Mature forest, where the canopy (i.e., the crowns of the B storey trees and emergent A storey trees) is interrupted by the fall or piecemeal collapse of large old trees.

(iii) 'Scrub', an ambiguous category implying young secondary growth, pockets of small trees (e.g., *Mallotus oppositifolius*) with a continuous canopy, not infrequently smothered in creepers; small trees, shrubs and climber tangles; clumps of *Aframomum* and tall *Marantachloa*, with isolated emergents and occasional climber towers.

The following account is based on extensive observation, and botanical collections, supplemented by detailed profile and sample plot studies in River Nwum Forest Reserve (particularly Kop Nti).



Figure 38 An early stage in the succession from wooded grassland to high forest resulting from at least 10 years of fortuitous fire protection between the river and the forest edge. The leafless branches (top left) belong to a dead *Terminalia glaucescens*. In the foreground, is *Anthocleista djalonensis* with top-knot of large leaves. Behind, protruding above the thicket, is the crown of *Polyscias fulva*.

Profile strips

Two profile diagrams (Figures 39 and 40) were drawn to illustrate differences in structure, floristic composition and general appearance within a (relatively) very small area at Kop Nti. At the scale of the diagram it is not practicable to show more than a few of the many lianes (vines), always a prominent feature of the forest. Trees less than 6 m tall were not included.

The first profile drawing (Figure 39) depicts a strip of forest 45.7 x 13.7 m, altitude 760 m (120 m above the river), measured along the contour on a 35° slope. The tops of the tallest trees were on a level with the top of the slope, where the transition from forest to wooded grassland was immediate. There were 53 trees (one dead) over 6 m high representing 17 species, which could be separated into three strata.

The lowest storey (C) of trees up to 15 m high (but average about 10 m tall) was more or less continuous. Although the crowns of the trees in the A (34-35 m) and B (15-29 m) storeys typically overlapped, they did not form a closed canopy. There were three trees in the A storey, comprising two species, viz *Aubrevillea kerstingii* (1), distorted by a great weight of climbers, and *Trilepisium madagascariense* (2). Their crowns were raised well above those of stratum B. *A. kerstingii* had a spread of 26 m.

Stratum B included 13 trees of seven species. More than half were light demanding, viz *Sterculia tragacantha* (7) and *Pycnanthus angolensis* (1). The majority were c. 27 m high with rounded crowns. Their presence, with *Vitex doniana* and *Pouteria alnifolia*, suggested this was old secondary forest.

The C stratum, with 36 trees of 12 species, comprised two-thirds of all the trees measured. It comprised the young upper canopy species *Aubrevillea kerstingii*, *Ceiba pentandra*, *Erythrophleum suaveolens*, *Spondianthus preussii*, *Sterculia tragacantha* and *Vitex doniana*. Smaller trees, forming the majority, were *Olax subscorpioidea*, *Pavetta owariensis*, *Pittosporum viridiflorum* and, most abundant, JDC 3901, which accounted for 40% of all the trees in this stratum. The average crown spread was 5 m. For clarity, not all the C storey trees are included in the profile diagram.

Stratum D (the 'shrub stratum') was ill-defined. Herbaceous species were present but young trees predominated. There was no clear distinction

between this layer and the lowest tree stratum. The density of the understorey varied but nowhere was progress much impeded.

Young A and B stratum trees included *Aubrevillea kerstingii*, *Cola gigantea*, *Pouteria alnifolia*, *Myrianthus arboreus*, *Spondianthus preussii* and *Sterculia tragacantha*. Among smaller trees were *Clausena anisata*, *Cola hispida*, *Monodora tenuifolia*, *Olax subscorpioidea*, *Pavetta owariensis* and JDC 3901. The only shrub, *Leea guineensis*, was poorly represented. There was one stemless oil palm, *Elaeis guineensis*. The herbaceous element was characterised by head-high clumps of the forest grass *Olyra latifolia*, brakes of bamboo-like *Marantochloa leucantha*, and *Palisota* sp. (JDC 3811).

The ground layer (E) of plants from a few centimetres to over 1 m in height consisted of tree seedlings, herbs and ferns. The most abundant tree seedlings were *Trilepisium madagascariense*, which otherwise occurred (i.e., at the plot) only as a large tree. An *Acanthus* sp. (JDC 3814), an *Aframomum* sp. (JDC 3790 - in the *sulcatum-leptolepis* group) and *Dracaena aubryana* were all common, with the ferns *Adiantum philippense* and *Pteris togoensis*.

The crowns of many B storey trees, particularly *Sterculia tragacantha*, were distorted or broken by the weight of interlacing lianes, spreading from tree to tree. Some lianes, stems 10 cm or more in diameter, depended cable-like from the tallest tree-tops. *Piper guineense* climbed tree trunks to a height of 12 m.

Epiphytic orchids were present, but not conspicuous. The bracket fern *Platyserium angolense* was abundant above about 20 m in the crowns of *Sterculia tragacantha* in the B storey. *Pyrrosia schimperiana*, a creeping fern with a slender rhizome, was also restricted to the upper canopy. Some of the tree trunks were lightly mossed low down, but there were no other epiphytes at this level.

The second profile plot at Kop Nti (Figure 40) was a strip of forest, 45.7 x 10.7 m at the foot of the slope described above, at 690 m. It is c. 500 m from the river. The east end (i.e., to left in the diagram) abutted on to an area of 'scrub'; in this case trees c. 6 m tall with a broken canopy, climber tangles, scattered emergents and occasional climber towers.

There were 25 trees of 16 species greater than 6 m tall

Figure 39 Profile strip No. 1, Kop Nti, 760 m.

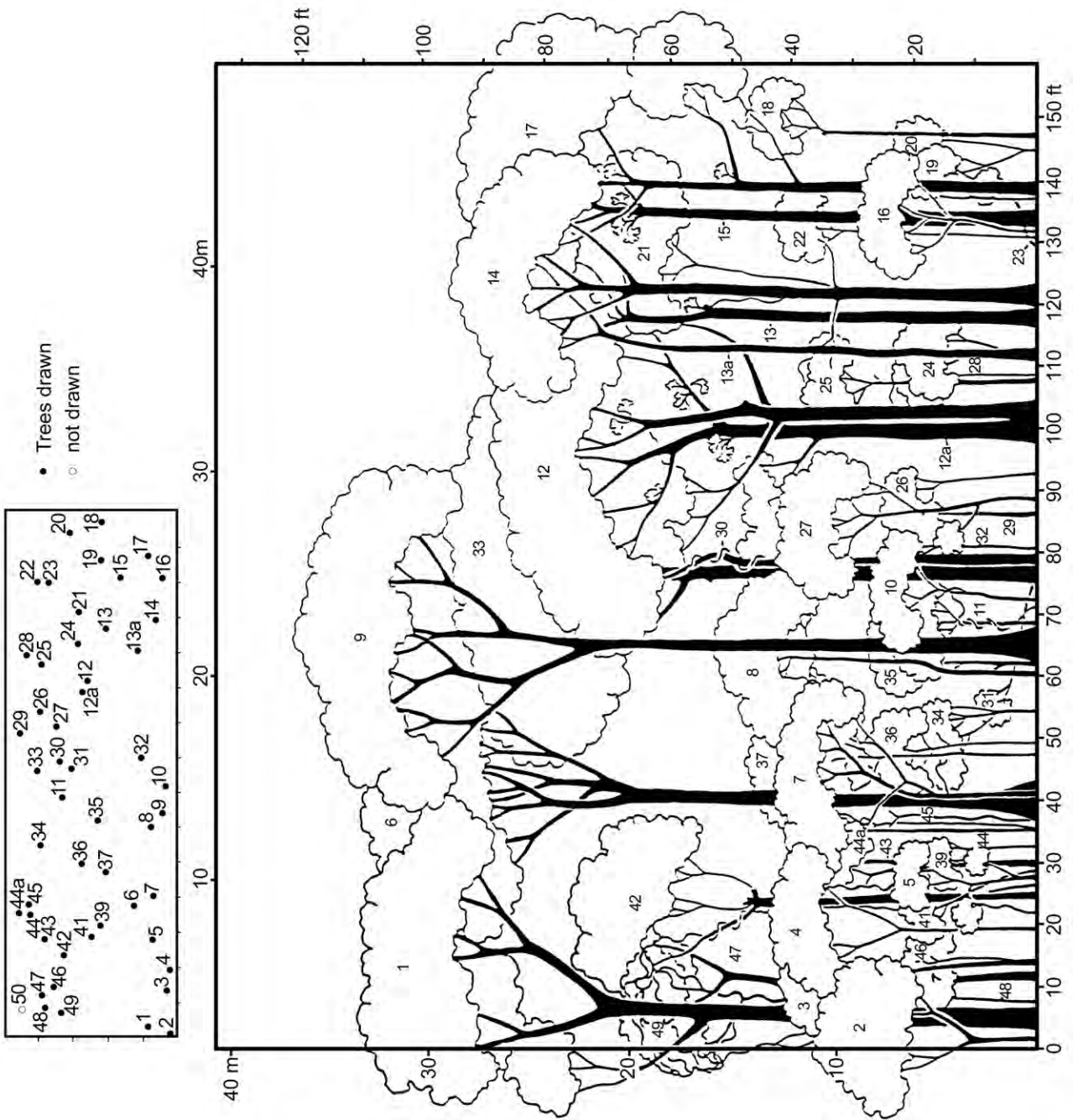
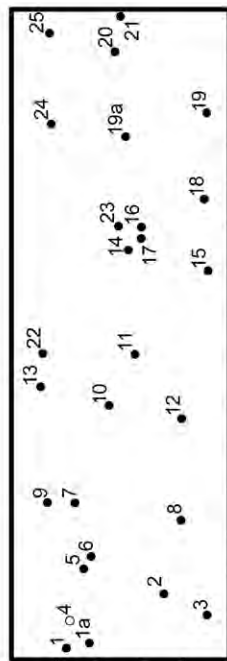
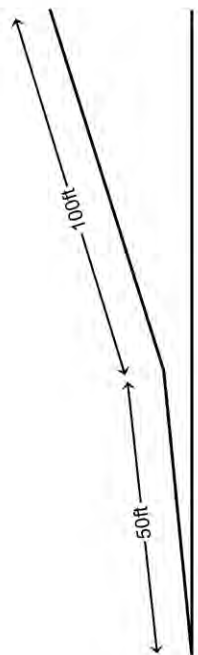
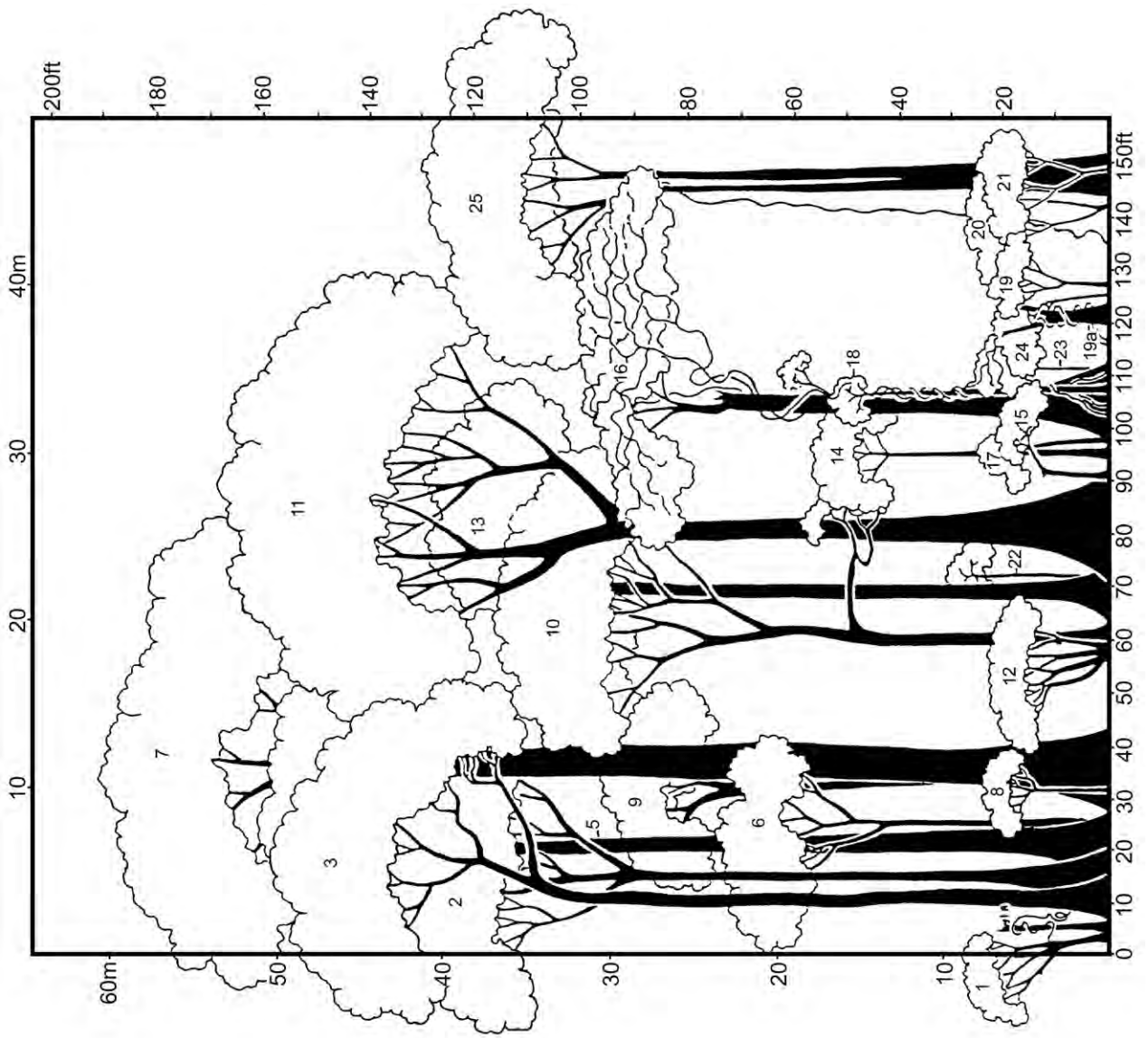


Table 19 Key to Kop Nti forest (River Nwum Forest Reserve) profile strip 1 (Figure 39).

No.	Botanical Name	Stratum	No.	Botanical Name	Stratum
1	<i>Aubrevillea kerstingii</i>	A	26	<i>Pavetta owariensis</i>	C
2	<i>Celtis philippensis</i>	C	27	<i>Vitex doniana</i>	C
3	<i>Erythrophileum suaveolens</i>	C	28	JDC 3906	C
4	<i>Erythrophileum suaveolens</i>	C	29	<i>Vitex doniana</i>	C
5	JDC 3901	C	30	JDC 3905	B
6	<i>Trilepisium madagascariense</i>	A	31	JDC 3901	C
6A	JDC 3901	C	32	JDC 3901	C
7	<i>Spondianthus preussii</i>	C	33	<i>Pycnanthus angolensis</i>	B
8	JDC 3833	C	34	<i>Olax subscorpioidea</i>	C
9	<i>Trilepisium madagascariense</i>	A	35	JDC 3901	C
10	JDC 3901	C	36	<i>Spondianthus preussii</i>	C
11	JDC 3901	C	37	JDC 3833	C
12	<i>Sterculia tragacantha</i>	B	38	JDC 3901	C
12A	<i>Sterculia tragacantha</i>	B	39	JDC 3901	C
13	<i>Sterculia tragacantha</i>	B	40	JDC 3901 But not recorded, below 20ft.	C
13A	Dead	B	41	<i>Pavetta owariensis</i>	C
14	<i>Trilepisium madagascariense</i>	B	42	<i>Sterculia tragacantha</i>	B
15	<i>Sterculia tragacantha</i>	B	43	<i>Spondianthus preussii</i>	C
16	<i>Pittosporum viridiflorum</i>	C	44	<i>Ceiba pentandra</i>	C
17	<i>Sterculia tragacantha</i>	B	44A	JDC 3901	C
18	JDC 3833	C	45	JDC 3901	C
19	JDC 3901	C	46	<i>Olax subscorpioidea</i>	C
20	JDC 3901	C	47	<i>Sterculia tragacantha</i>	B
21	<i>Vitex doniana</i>	B	48	<i>Sterculia tragacantha</i>	C
22	<i>Sterculia tragacantha</i>	C	49	<i>Aubrevillea kerstingii</i>	B
23	<i>Sterculia tragacantha</i>	C	50	<i>Sterculia tragacantha</i>	C
24	JDC 3901	C			
25	<i>Pouteria alnifolia</i>	B			
53 trees (including 6A, 12A, 13A & 44A, but ignoring tree 40)			For further work		
			3833	3 trees	
			3901	15 trees (Kaka name Mang)	
			3905	1 tree	
			3906	1 tree	
			3903	Massive liane enveloping the crown of tree 30	

Figure 40 Profile strip No. 2, Kop Ntli, 760 m.



- Trees drawn
- not included

Table 20 Key to Kop Nti forest (River Nwum Forest Reserve) profile strip 2 (Figure 40).

No.	Botanical Name	Stratum
1	<i>Myrianthus arboreus</i>	C
2	JDC 3830 <i>Cola cf gigantea</i>	A
3	<i>Pterocarpus mildbraedii</i>	A
4	JDC 3844	C
5	<i>Pterocarpus mildbraedii</i>	A
6	JDC 3833	B
7	<i>Ceiba pentandra</i>	A
8	<i>Mallotus oppositifolius</i>	C
9	<i>Tetrapleura tetraptera</i>	B
10	<i>Holoptelea grandis</i>	B
11	<i>Ficus mucoso</i>	A
12	<i>Mallotus oppositifolius</i>	C
13	<i>Pterocarpus mildbraedii</i>	A
14	JDC 3843	C
15	JDC 3796 <i>Tabernaemontana</i> sp.	C
16	<i>Alstonia boonei</i>	B
17	<i>Tabernaemontana</i> sp.	C
18	<i>Funtumia elastica</i>	C
19	JDC 3796 <i>Tabernaemontana</i> sp.	C
20	<i>Mallotus oppositifolius</i>	C
21	<i>Mallotus oppositifolius</i>	C
22	<i>Trilepisium madagascariense</i>	C
23	<i>Strombosia schefferi</i>	C
24	<i>Mallotus oppositifolius</i>	C
25	<i>Pterocarpus mildbraedii</i>	A

25 trees, plus 3 disintegrating dead C stratum trees, which were ignored.

For further work
 JDC 3796 *Tabernaemontana* ?sp.
 JDC 3830 *Cola* sp.
 JDC 3833
 JDC 3843
 JDC 3844

on the strip, plus two dead stumps. Of the 25, one C storey tree, *Deinbollia* cf. *pinnata*, does not appear on the profile diagram, being obscured by trees nearer to the base-line. One of the B stratum trees, *Tetrapleura tetraptera* has only the upper part of the crown showing. As with Kop Nti profile 1, the trees could be divided arbitrarily into three strata. Those in the topmost (A) stratum were taller than at Kop Nti profile 1, and proportionately more numerous. The vertical discontinuity between the trees of the lowest stratum (C) and those in the upper canopy (A and B strata) was more marked.

There were seven A stratum trees, heights ranging from 40 to 59 m, viz *Ceiba pentandra* (59 m), *Cola gigantea* (40 m), *Ficus mucoso* (52 m) and *Pterocarpus mildbraedii* (four trees, average height 46 m). Their wide-spreading crowns, raised well above the B stratum trees, were frequently in lateral contact.

Stratum B, which was discontinuous, included 4 trees; *Alstonia boonei* (30 m), *Holoptelea grandis* (37 m), *Tetrapleura tetraptera* (29 m) and *Cola gigantea* (23 m). The average height was 30 m. All were restricted to this stratum. Elsewhere in the forest, *Alstonia boonei* (here with a broken top) and *Holoptelea grandis*, were common A stratum trees. *T. tetraptera* was a typical mid-stratum species.

In the C stratum, while trees of up to 18 m in height (e.g., JDC 3843 ?*Guttiferae*) have been included, the average was 9 m. Belonging to eight species, they totalled 14, just over half of all the trees in the plot. Unlike profile 1, all were confined to this level, although three at least were potential B stratum trees, viz *Funtumia elastica*, *Strombosia scheffleri* and *Trilepisium madagascariense*. Unless among the unidentified species, young A storey trees were lacking. Most abundant, accounting for one-third of the total, was *Mallotus oppositifolius*; a small low branching, sometimes multistemmed, deciduous tree, average height 7 m. Here also were *Myrianthus arboreus* (1), *Tabernaemontana* sp. (JDC 3796) (3) and JDC 3844 (1).

The D stratum was indefinite. Besides plants peculiar to it, there were young C storey trees; most prominent *Mallotus oppositifolius*, followed by *Tabernaemontana* sp. (JDC 3796). Trees belonging to the strata above were absent. Among the smaller trees were *Rinorea brachypetala*, specially common, and ?*Cola hispida* (JDC 3820). As in Kop Nti profile

1, one or two stemless oil palms (*Elaeis guineensis*) occurred, plus the same robust herbaceous plants.

The ground layer (E) of tree seedlings, undershrubs, mainly monocotyledonous herbs, and ferns was patchy. Tree seedlings included *Rinorea brachypetala* (abundant), *Myrianthus arboreus*, and *Cola ?gigantea* (JDC 3830). A shrublet, *Chassalia* sp. JDC 3816, was plentiful. The herbs were the same as in Kop Nti profile 1, plus another forest grass, *Leptaspis cochleata*, and *Polliia mannii*, (Commelinaceae) with shining blue, berry-like fruits. Of the ferns, *Tectaria fernandensis* was common, *Bolbitis achrostichoides* formed small clumps, while *Adiantum philippense* and *Asplenium unilaterale* colonised bare ground.

Lianes were numerous, occurring at all levels. One hawser-like stem 17.5 cm in diameter, hung vertically from the crown of the very tall *Pterocarpus mildbraedii*, shown at the right-hand end of the profile drawing. The stumps of two smaller trees that had snapped under the weight of climbers, are also shown. The crown of the *Funtumia elastica* was virtually a small climber tower.

Piper guineense ascended tree trunks to a height of 5 m. The boles of some larger trees were slightly mossy. Epiphytic ferns were restricted to the upper canopy where *Platynerium angolense* was common, not confined, as it was in Kop Nti profile 1, to one species of tree.

All the A stratum trees were to some degree deciduous. Buttressing was pronounced. The large plank buttresses of *Ceiba pentandra* extended 7 m up the massive bole. *Alstonia boonei* was buttressed to a height of 6.5 m, above which the bole was deeply and regularly fluted almost to the crown. The triangular buttresses of *Ficus mucoso* spanned 6 m at the ground, extending almost as far up the smooth, columnar, fawn coloured bole of this stately tree. The figs, which fall to the ground at the end of the dry season, are paniculate on the main stem and older branches, about 5 cm across, orange when ripe. *Cola gigantea* was narrowly buttressed, the bole often fluted above. In March the large carpels lay open on the ground. Brown and densely felted outside, they are cream and smooth inside; the seeds, much relished by chimpanzees, are enclosed in a pink, fleshy aril. The bole of *Pterocarpus mildbraedii* is buttressed to 2 m. The fruits are broadly winged, almost circular, without prickles, up to 10 cm in

diameter. Vast numbers are produced, littering the forest floor around the end of March.

While none of the above was represented at the profile plot by saplings or younger trees, there was no lack of these in the forest as a whole.

Enumeration plot

The floristic composition of the forest was further studied on an enumeration plot of approximately 1.5 ha, 122 x 122 m, on gently undulating ground near the river (Table 21). The corners were marked by cairns with posts of *Hymenocardia acida*.

Of an estimated 60 species represented on the plot, 26 (43.3%) fell within the 30-90 cm girth classes. They included 389 of the total 545 trees enumerated (Table 22). The few exceptions relate to the three most abundant trees. *Mallotus oppositifolius* and *Funtumia elastica* were each represented in the 1.22 m girth class by one tree; *Myrianthus arboreus* by two trees in the 1.22 m and one in each of the 1.52 m

and 2.44 m girth classes.

Table 22 shows girth class distributions. While for many trees girth class distributions may appear anomalous, this takes no account of trees less than 6m tall. For most species, over the forest as a whole the representation of size classes appeared to be fairly even.

Within the enumeration plot the C stratum, nowhere very dense, consisted of small bushy trees, frequently blanketed with climbers, scattered clumps of *Olyra latifolia* and young trees belonging to the strata above. The former included *Clausena anisata*, *Elaeis guineensis* (one or two only, stemless), *Ouratea myrioneura* and, more abundant, *Rinorea dentata*. Among the latter *Albizia zygia*, *Cola ?gigantea* (JDC 4843), *Funtumia elastica*, *Myrianthus arboreus*, *Pterygota macrocarpa* and *Spondianthus preussii* were common. One *Aningeria* sapling was seen.

Table 22 Girth class distributions from within the Kop Nti forest (River Nwum Forest Reserve).

Species	30-90 cm	1.2 m & up
<i>Albizia zygia</i>	3	4
<i>Alstonia boonei</i>	3	3
<i>Balanites wilsoniana</i>	-	1 (3.96 m)
<i>Ceiba pentandra</i>	1	1 (7 m)
JDC 4843 (? <i>Cola gigantea</i>)	28	6
JDC 4822 <i>Cordia</i> sp.	4	6 (1.22-1.83 m)
<i>Erythrophleum suaveolens</i>	-	1 (2.13 m)
<i>Ficus mucoso</i>	8	1 (1.22 m)
<i>Holoptelea grandis</i>	-	3 (1.83-2.74 m)
JDC 4874 <i>Homalium</i> ? sp.	1	1 (1.52 m)
<i>Khaya grandifoliola</i>	-	1 (2.13 m)
<i>Milicia excelsa</i>	-	2 (3.35 & 5.18 m)
<i>Morus mesozygia</i>	2	1 (1.22 m)
JDC 3802 (<i>Pseudospondias</i> cf. <i>microcarpa</i>)	5	1 (1.22 m)
<i>Pterocarpus mildraedii</i>	5	7 (1.52-5.49 m)
JDC 4860 & 4875 <i>Pterygota</i> sp. ? <i>macrocarpa</i>	4	12 (1.22-5.49 m)
<i>Pouteria altissima</i>	-	1 (3.66 m)
<i>Spondianthus preussii</i>	3	1 (1.22 m)
<i>Stereospermum acuminatissimum</i>	2	2 (2.13 & 3.05 m)
JDC 4900	1	1 (1.22-5.18 m)

Table 21 Enumeration plot from Kop Nti forest (River Nwum Forest Reserve).

Botanical Name	Storey	Girth Class																	Total 0.30 m & over	Total 1.22 m & over	
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q			r
<i>Albizia zygia</i>	A,B,C	3			1	1		1			1									7	4
<i>Alstonia boonei</i>	A,B,C		3			1				1	1									6	3
<i>Aningeria altissima</i>	A												1							1	1
<i>Antiaris toxicaria</i>	C	2	1																	3	
<i>Baikiaea insignis</i>	C	1																		1	
<i>Balanites wilsoniana</i>	A												1							1	1
<i>Canarium schweinfurthii</i>	C		1																	1	
<i>Ceiba pentandra</i>	A,C		1																	2	1*
<i>Celtis philippensis</i>	C	3																		3	
<i>Chlorophora excelsa</i>	A,B										1						1			2	2
JDC 4822 ? <i>Cordia abyssinica</i>	B,C		2	2	4	1	1													10	6
JDC 4878 ? <i>Diospyros monbuttensis</i>	C	1	1																	2	
<i>Elaeis guineensis</i>	C	6	1																	7	
<i>Erythrophleum suaveolens</i>	B							1												1	1
JDC 3831 <i>Ficus mucoso</i>	B,C	6	2		1															9	1
<i>Funtumia elastica</i>	B,C	43	20	6	1															70	1
<i>Holoptelea grandis</i>	B						1	1		1										3	3
JDC 4874, ?=3922 & 4913 ? <i>Homalium</i> sp.	B,C		1			1														2	1
<i>Irvingia gabonensis</i>	C			1																1	
JDC 4890 ? <i>Khaya grandifoliola</i>	B							1												1	1
<i>Mallotus oppositifolius</i>	C	155	59	3	1															218	1
<i>Markhamia tomentosa</i>	C	2	1	1																4	
<i>Morus mesozygia</i>	B,C	2			1															3	1
<i>Myrianthus arboreus</i>	B,C	8	10	5	2	1			1											27	4
<i>Olax subscorpioideae</i>	C	4	1																	5	
<i>Polyscias fulva</i>	C	1																		1	
<i>Pouteria alnifolia</i>	C	1		1																2	
<i>Pterocarpus mildbraedii</i>	A,B,C	2	2	1		4			1						1			1		12	7
JDC 4960, 4875 <i>Pterygota</i> sp.	A,B,C	2		2	2	1		1	3				1			1		3		16	12
<i>Pycnanthus angolensis</i>	C	2																		2	
<i>Spondianthus preussii</i>	B,C	2		1	1															4	1
<i>Stereospermum acuminatissimum</i>	B							1			1									2	2
<i>Tetrapleura tetraptera</i>	C	4																		4	
JDC 3796 <i>Tabernaemontana</i> sp.	C	9	1																	10	
<i>Voacanga africana</i>	C	8	2	1																11	
JDC 3802	B,C	4	1		1															6	1
JDC 3901	C	3	4	1																8	
JDC 4842	B,C	2			1															3	1
JDC 4843	A,B,C	21	5	2	1	1			1		1		1			1			34	6	
JDC 4845	C		1																	1	
JDC 4846	C	1																		1	
JDC 4847	C	2	1																	3	
JDC 4849	C		1																	1	
JDC 4850	C	1		1																2	
JDC 4852	C	1	1																	2	
JDC 4855	C	1																		1	
JDC 4857	C		2																	2	
JDC 4861	C	2																		2	
JDC 4871	C	2	1																	3	
JDC 4872	C	1																		1	
JDC 4873	C	1																		1	
JDC 4877	C	2		1																3	
JDC 4895	B					1														1	1
JDC 4899	C	1																		1	
JDC 4900	B,C		1					1												2	1
(not possible to collect) climber tower tree	B,C		1					1												2	1
Dead trees	B,C	3	2	1	2			1	1	1										11	5
Total		315	130	30	19	11	5	6	8	3	2	3	1	2	2	2	1	4	545	70	

Number of species (estimated): 60

* 7 m

Key to girth classes:

a 0.30 - 0.60 m	f 1.81 - 2.10 m	k 3.31 - 3.60 m	p 4.81 - 5.10 m
b 0.61 - 0.90 m	g 2.11 - 2.40 m	l 3.61 - 3.90 m	q 5.11 - 5.40 m
c 0.91 - 1.20 m	h 2.41 - 2.70 m	m 3.91 - 4.20 m	r 5.41 - 5.70 m
d 1.21 - 1.50 m	i 2.71 - 3.00 m	n 4.21 - 4.50 m	
e 1.51 - 1.80 m	j 3.01 - 3.30 m	o 4.51 - 4.80 m	

In the lowest stratum (E) tree seedlings were abundant, with the grass *Leptaspis cochleata*. Other monocots included *Dracaena aubryana*, *Pollia mannii* and *Palisota* sp. (JDC 3811). The only fern recorded was *Tectaria fernandensis*.

Lianas were prominent, with *Landolphia* spp., *Saba comorensis* and *S. thompsonii* among the most common. The edible fruits of some species (Fulfulde belbel leinde) are much sought after by monkeys. A climbing palm with a prickly stem, *Laccosperma opacum*, reached into the canopy. *Pararistolochia goldieana*, climbing 6 m, with huge (up to 45 cm long), cauliflorous, evil-smelling, reddish purple flowers, was blooming at the beginning of the rains. Old stems of *Piper guineense*, developed thin corky “wings”. Stranglers were represented by *Ficus* sp. JDC 4870.

The high forest terminated abruptly at the foot of the slope on the east bank of the River Nwum. Over the river, intermittent fringing forest was associated with tributary streams. Other tree species at the edge of the high forest included *Canarium schweinfurthii* and *Piptadeniastrum africanum*, both large trees with huge spreading crowns. Also, not so large, were *Azelia bella*, *Baikiea insignis* with handsome white flowers opening overnight and fading by noon, *Baphia laurifolia*, *Erythrophleum suaveolens*, *?Pseudospondias microcarpa* (JDC 3802 and 3920) and the ‘African bread fruit’ *Treculia africana*, bearing huge spherical fruits up to 45 cm in diameter, sub-sessile on the trunk and main branches. The epiphytic cactus *Rhipsalis baccifera* was common. Below the Logmi confluence, where the valley is enclosed and mist tends to persist along the river, epiphytes were more frequent. Tree trunks were covered with filmy ferns (*Trichomanes chevalieri*) and moss (*Pilotrichella latiramea*) to a height of 2 m. *Begonia mannii* was observed, and, on a dripping rock face, *Epithemia tenue* (*Gesneriaceae*) and *Impatiens* sp. (JDC 3917) with pinkish-purple flowers. Ground ferns included *Asplenium unilaterale* and *Diplazium proliferum*.

The forest on the west bank was less well developed, with fewer species. One of the most common was *Uapaca* sp. (probably *U. togoensis*) 15-18 m tall, some with stilt roots reaching halfway up the bole. *Pandanus candelabrum* the ‘screw palm’, has well developed prop-roots; often gregarious along stream beds in forest; at River Nwum this small tree

was sporadic. Other trees, 15-20 m tall, included *Cynometra megalophylla*, *Hannoa klaineana* and *Homalium* sp. (JDC 3922). Among the smaller trees were *?Berlinia* sp. (JDC 3923), *Ixora ?bauchiensis* (JDC 4834), *Napoleona* sp. (JDC 4881) with flattened globose fruits about 5 cm across, borne on the main branches and trunk, plus three numbers (*Sorindeia* cf. *grandifolia*, and JDC 4816 and 4898). Where the bank was rocky *Synsepalum passargei* grew close to the water. Lofty woody climbers included a *Millettia* sp. (JDC 4866) with pinkish-purple flowers, also *?Asclepiadaceae* (JDC 4902), with copious white latex and opposite follicles 18 cm long. The orchid *Vanilla imperialis*, with large fleshy leaves, climbing by adventitious roots at each node, after trailing 30 m over rocky ground had ascended a small river bank tree to 5 m.

Downstream, where the valley was less enclosed, ‘scrub’ alternated with forest along the bank. A large deciduous tree JDC 4864 (*?Amphimas pterocarpoides*) with conspicuous flat papery fruits, leaf-like from below, was found only here, although the fruits travel far on the wind. Lofty climbers included *Entada rheedei*, with woody, segmented pods 1 m long, *Combretum* sp. (JDC 4815) (fruiting) and *?Strychnos* sp. (JDC 4812) with pale yellow flowers. In climber tangles, JDC 3918 with showy purple flowers stood out. Amongst small trees and shrubs were *Millettia chrysophylla* (tree 6 m tall) and several *Rubiaceae*. The latter included *Argocoffeopsis eketensis*, a scandent shrub, with fragrant white flowers, flowering when leafless; *Rothmannia whitfieldii*, a tree 6 m tall with globose 10-ridged fruits which yield an inky dye, and *Tricalysia coriacea*, with sweet smelling white flowers and small red fruits. *Neoboutonia melleri* var. *velutina* grew in a thicket with *Clematis* sp. JDC 4814, and *Rubus pinnatus* var. *afrotropicus* (ripe fruits orange-red, edible) on rocky ground at the water’s edge.

Dependent on topography, the upper limit of forest at Kop Nti was c. 300-400 m above the river. Where the break in slope was abrupt there was almost no ecotone. Elsewhere, the transition to savanna vegetation was gradual, with a buffer zone of varying width in which fires spreading down the slope tended to peter out. Along the edge of the forest were *Bridelia speciosa*, *Clausena anisata*, *Phoenix reclinata* (rare), *Polyscias fulva*, *Uapaca* sp. and *Vitex doniana*. Where savanna trees occurred, the boles were mossy, with *Erythrodontium* cf. *subjulaceum*

the most common moss. Also here, growing on *Terminalia schimperiana*, within a few feet of the ground, was *Platyserium angolense* (cf. Akwaizantar). Bordering the trees would be a thicket up to 20 m wide of shrubs and climbers/scramblers including *Leea guineensis*, *Smilax anceps*, ?*Landolphia* sp. (JDC 3871), and *Paullinia pinnata*. This in its turn was fringed by dense bracken fern, *Pteridium aquilinum*, and *Aframomum*, before merging into wooded grassland subject to regular burning.

On the western side of the valley, where a succession of small tributary streams descend the steep slopes, the principal fringing species were *Canarium schweinfurthii*, *Erythrophleum suaveolens*, *Khaya grandifoliola*, *Maranthes glabra*, *Polyscias fulva*, *Sterculia tragacantha*, *Uapaca* sp. (abundant) and *Vitex doniana*.

Ecological notes

When the reserve was demarcated, two areas of forest were excluded for farming. The Antere farmers moved into the Logmi Valley beyond the north end of the reserve boundary in the late 1960s and left the biggest trees, particularly *Ceiba pentandra*, to be burnt down later. Maize was grown for three or four years until yields diminished and weeds built up. The farms were left fallow following the 1972 harvest. After five years the forest regrowth, largely *Trema orientalis*, was felled and farmers were busy burning the debris in readiness for another crop of maize. Several of the old trees were lying smouldering or reduced to ashes. Of those still standing, all were scarred by fire. *Bombax buonopozense*, the bole hollow and the roots undermined by soil wash (i.e.,

on a 40 degree slope, without contour ridges or bunds) was conspicuous for an unusual abundance of the large red "tulip head" flowers.

Across the south-eastern boundary of the reserve farmers from Inkiri had cleared the forest, cultivated for two or three seasons, and then moved to another area. The regrowth was dense, up to 10 m tall; huge relict *Ceiba pentandra* (silk cotton trees) were prominent, with *Maranthes glabra*. *Anthocleista djalonensis* and *Polyscias fulva* had begun to overtop the thicket, with *Albizia zygia*, *Erythrophleum suaveolens* and *Trema guineense* not far behind. Smaller trees and shrubs included *Allophylus africanus* (among the most abundant), *Clausena anisata*, *Dombeya* sp. JDC 3896 and *Leea guineensis* (both shrubs).

It was interesting to find forest species invading wooded grassland. In an enclave between the forest and the river which was protected from burning, most of the savanna trees, including *Terminalia schimperiana*, were dead or moribund. A dense thicket had shaded them out, through which emerged the crowns of *Anthocleista djalonensis* and *Polyscias fulva*.

Past disturbance was shown by the presence of 'scrub' and climber tangles within the high forest, and the presence of *Elaeis guineensis* rarely greater than 1 m high, with isolated individuals of *Musanga cecropioides* and *Trema orientalis*. Their precise ecological implications however were unclear. Tradition had it that up to about a century ago this was uninhabited country, and that elephants, as well as buffalo, were common. Their presence could have been a contributory factor.

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Chapter 7

High Forest Outliers in the Middle Donga Valley

Baissa, River Amboi and Bissaula River Forest Reserves

Baissa:

High forest; 230 m; 66 km²

Red Data List Species: *Irvingia gabonensis*, *Khaya grandifoliola*, *Milicia excelsa*

River Amboi:

High forest, 230 m; 20 km²

Red Data List Species: *Hallea stipulosa*, *Irvingia gabonensis*, *Khaya grandifoliola*, *Milicia excelsa*

Bissaula River:

High forest; 230 m; 26 km²

Red Data List Species: *Irvingia gabonensis*, *Khaya grandifoliola*, *Milicia excelsa*

Introduction

This account refers to the situation which existed around 20 years ago. The description of Baissa forest is now an historical document; it had already been partially logged by the 1970s. Logging had intensified by 1985 (Dangpurki, pers. comm.), and today Baissa has been almost totally destroyed (Barnwell, pers. comm. 2000). However, the River Amboi and Bissaula River Forest Reserves survive, and are in good condition (Barnwell, pers. comm. 2000), although their future is uncertain.

The fact that these forests are fragmented, and account for scarcely 0.01 % of the total land area in the Middle Donga Valley, highlights their botanical significance. It is vital that they are conserved, both for both their floristic composition and habitat for fauna.

Climate

Lying to the west of the Suntai Highlands and Mambilla Plateau, the river system of the Middle Donga experiences a relatively even distribution of rainfall. No month is entirely dry. The mean annual rainfall, recorded over a seven year period, was 1870 mm. For half the year (April through October) the monthly mean was in excess of 100 mm, and October was the wettest month, with 310 mm. The three driest months recorded a total of 52 mm, viz December 20 mm, January 9 mm, and February 23 mm (Bawden & Tuley, 1966).

Description of the Forests

Baissa

Location

Baissa was a lowland forest, lying at c. 230 m on the Donga River, at latitude 7° 14' North, and longitude 10° 38' East (Figure 2).

Extent, landscape and history

Baissa Forest Reserve covers an area of 113 km² (Appendix 1), including about 66 km² of high forest. The terrain is gently undulating. The open savanna is dominated by tall grass with scattered fire-trimmed trees. The soils are shallow with strongly developed lateritic concretions in the interfluvies. The high forest blocks were scattered, some in the proximity of streams, others islands in the savanna. Between these two types transitional woodland was found, characterised by *Anogeissus leiocarpus*, with sometimes pure stands of *Uapaca heudelotii*.

During the 1970s Baissa was easily accessible by road (Figure 2). Over half of the reserve was high forest, so that Baissa was a ready source of timber, particularly mahogany (*Khaya grandifoliola*) and iroko (*Milicia excelsa*). Logging commenced in the early 1970s, when a Canadian circular breakdown mill was installed. A few years later, with the setting up of the Baissa Timber Development Corporation, a horizontal breakdown bandmill and sophisticated extraction equipment were acquired, with operations extending throughout the reserve.

Profile strip

The profile diagram (Figure 41) depicts a strip of undisturbed forest 107 x 15 m, on level ground in block 29 of Baissa Forest Reserve.

Structure, physiognomy and floristic composition

Three tree strata were recognizable. Only the lowest storey (C) of trees up to 15 m high was continuous. The trees above did not form a closed canopy. The division between C and B was not well defined, whereas the A stratum was sharply separated vertically from B. The tallest tree in the profile strip

was *Terminalia superba*, 43.6 m high (Figure 42).

Stratum A trees, of which there were 10, represent eight species. They were *Alstonia boonei* (2), *Celtis gomphophylla* (1), *Cola gigantea* (1), *Holoptelea grandis* (1), *Pterocarpus mildbraedii* (2), *Pterygota macrocarpa* (1), *Sterculia oblonga* (1) and *Terminalia superba* (1). The crowns were heavily branched, or flattened (e.g., *T. superba*), with a spread of up to 27.5 m. They were raised well above the crowns of stratum B trees, and there was minimal lateral contact.

In stratum B there were 11 trees, comprising six species: *Anthonotha macrophylla* (1), *Brachystegia eurycoma* (1), ?*Funtumia elastica* (1), *Pterygota macrocarpa* (3), *Trichilia prieuriana* (1), and *Vitex rivularis* (4). They varied in height from 15-33.5 m.

Of the 47 trees greater than 6 m high in the C stratum, six were not shown in the drawing. One was dead and another moribund. C stratum trees, including *Mallotus oppositifolius*, tended to have rounded, often straggling crowns, whereas *Pterygota macrocarpa* and *Sterculia oblonga*, which were potential B and A storey trees, had relatively narrow crowns.

The shrub stratum (D), which included young trees of the strata above, was not distinct. Species peculiar to this stratum, recorded at the plot, were *Cola hispida* (small tree), *Dictyandra arborescens* (shrub), *Heisteria parvifolia* and, common here though elsewhere sporadic, ?*Rinorea* sp. (JDC 5411). The thickness of the shrub stratum varies but in the undisturbed forest was never so dense as to make progress difficult.

The field layer (E) consisted of plants from a few centimetres to 1 m or more in height. Besides tree seedlings, particularly *Pterygota macrocarpa*, a stemless *Palisota* sp. (= HMC 146 from Bissaula River), was common where the canopy was light. There were patches devoid of almost any plants.

Figure 41. Profile strip in Baissa Forest Reserve, 230 m.

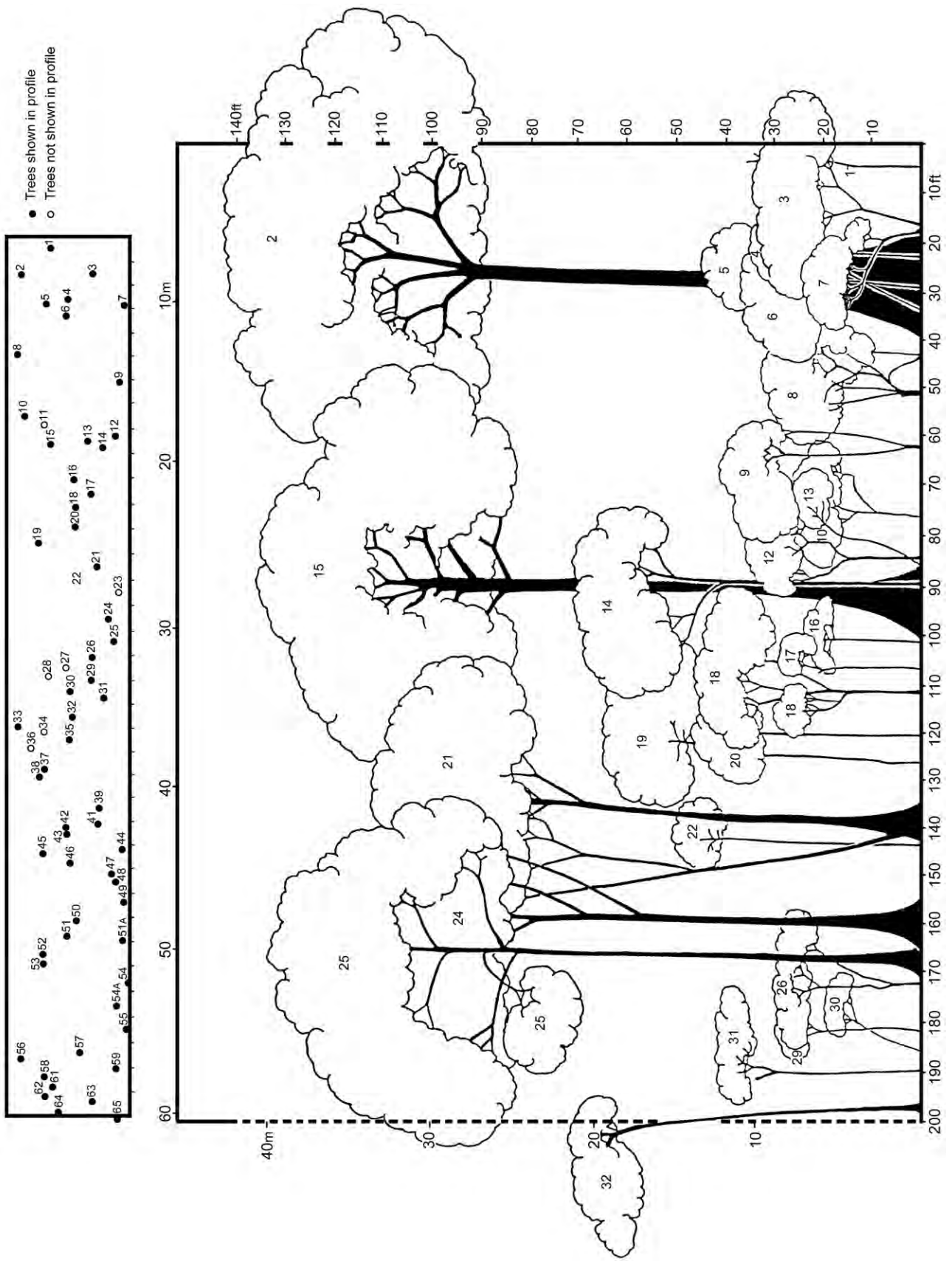


Figure 41 (Cont.) Profile strip in Baissa Forest Reserve, 230 m.

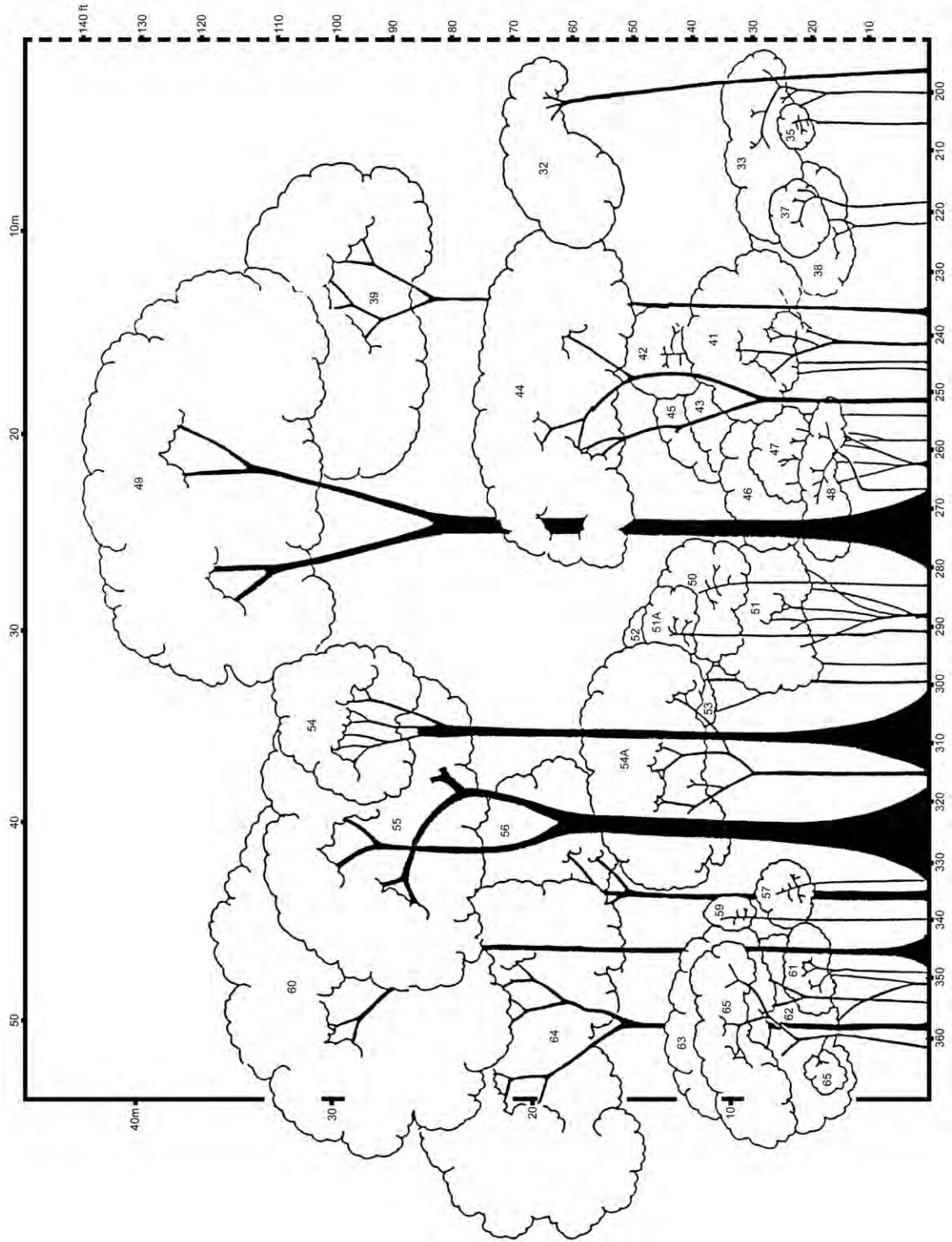


Table 23 Key to Baissa forest (Middle Donga Valley) profile strip (Figure 41).

No.	Botanical name	Stratum	No.	Botanical name	Stratum	No.	Botanical name	Stratum
1	Dead	C	31	<i>Vitex rivularis</i>	C	57	<i>Pterygota macrocarpa</i>	C
2	<i>Terminalia superba</i>	A	32	<i>Vitex rivularis</i>	B	58	<i>Vitex rivularis</i>	B
3	<i>Anthonotha macrophylla</i>	C	33	JDC 5345 <i>Trichilia</i> sp.	C	59	<i>Hannoa klaineana</i>	C
4	<i>Pterygota macrocarpa</i>	C	34	<i>Vitex rivularis</i>	C	60	<i>Holoptelea grandis</i>	A
5	<i>Sterculia oblonga</i>	C	35	<i>Pterygota macrocarpa</i>	C	61	<i>Trichilia prieuriana</i>	C
6	JDC 5432 <i>Trichilia</i> sp.	C	36	<i>Pterygota macrocarpa</i>	C	62	<i>Anthonotha macrophylla</i>	C
7	<i>Brachystegia eurycoma</i>	C	37	JDC 5368	C	63	JDC 5458	C
8	JDC 5439 ? <i>Anthonotha macrophylla</i>	C	38	<i>Mallotus oppositifolius</i>	C	64	<i>Brachystegia eurycoma</i>	B
9	JDC 5430 ? <i>Anthonotha macrophylla</i>	C	39	<i>Sterculia oblonga</i>	A	65	<i>Trichilia prieuriana</i>	C
10	JDC 5430 ? <i>Anthonotha macrophylla</i>	C	40	<i>Brachystegia eurycoma</i> omitted because it was hidden behind tree 39				
11	Dying, leafless	C	41	<i>Trichilia prieuriana</i>	C			
12	JDC 5432 <i>Trichilia</i> sp.	C	42	<i>Pterygota macrocarpa</i>	B			
13	<i>Ricinodendron heudelotii</i>	C	43	<i>Tetrapleura tetraptera</i>	C			
14	<i>Vitex rivularis</i>	B	44	<i>Vitex rivularis</i>	B			
15	<i>Alstonia boonei</i>	A	45	<i>Pterygota macrocarpa</i>	C			
16	<i>Pycnanthus angolensis</i>	C	46	JDC 5445 <i>Rothmannia</i> sp. prob. <i>urcelliformis</i>	C			
17	JDC 5368	C	47	<i>Anthonotha macrophylla</i>	C			
18	JDC 5345 <i>Trichilia</i> ?sp.	C	48	<i>Trichilia prieuriana</i>	C			
19	<i>Funtumia elastica</i>	B	49	<i>Pterocarpus mildraedii</i>	A			
20	<i>Pycnanthus angolensis</i>	C	50	<i>Pterygota macrocarpa</i>	C			
21	<i>Alstonia boonei</i>	A	51	JDC 5430 ? <i>Anthonotha macrophylla</i>	C			
22	<i>Pterygota macrocarpa</i>	B	51A	<i>Pterygota macrocarpa</i>	C			
23	JDC 5345 <i>Trichilia</i> sp.	C	52	<i>Pterygota macrocarpa</i>	B			
24	<i>Celtis gomphophylla</i>	A	53	JDC 5430 ? <i>Anthonotha macrophylla</i>	B			
25	<i>Pterygota macrocarpa</i>	A	54	<i>Pterocarpus mildraedii</i>	A			
26	<i>Mallotus oppositifolius</i>	C	54A	<i>Trichilia prieuriana</i>	B			
27	<i>Mallotus oppositifolius</i>	C	55	<i>Cola gigantea</i>	A			
28	JDC 5444	C	56	<i>Vitex rivularis</i> (But not measured as it is behind tree 55.)				
29	<i>Mallotus oppositifolius</i>	C						
30	not collected, <i>Monodora</i> sp.	C						

For further work

JDC 5345 *Trichilia* ?sp.
 JDC 5368
 JDC 5432 ?*Trichilia* sp.
 JDC 5440 *Funtumia* ?*elastica*
 JDC 5458
 JDC 5444

Many of the larger trees were buttressed. *Holoptelea grandis* had narrow buttresses extending high up the trunk, which was fluted above. The bole of *Pterocarpus mildbraedii* was cylindrical, narrowly buttressed to approximately 8 m. *Terminalia superba* (Figure 42) is aptly named. This tree, with broad, plank-like buttresses extending up to 3 m from the ground, with a long, straight bole and whorled branches, has a spreading, open crown. Another large tree, *Alstonia boonei*, the bole frequently fluted, yields copious latex when slashed; the fruits, a pair of slender follicles up to 60 cm long were hanging in clusters in March. *Balanites wilsoniana* attains a height of 37 m, with high buttresses and twisted fluting, often with compound thorns in the concavities. The fruits are ellipsoid, up to 9 cm long, 4.5 cm broad, yellow when ripe, with a fibrous coat surrounding the hard stone. The decaying fruits smell strongly of acetic acid. *Hylodendron gabunense*, a slender tree reaching 30 m in height, with sharp buttresses reaching high up the trunk, has woody spines on the bole and branches. *Klainedoxa gabonensis*, up to 40 m tall, exudes a watery, clear or honey-coloured sap with



Figure 42 *Terminalia superba*, in Baissa Forest Reserve, before it was logged out. Trees growing nearby included *Alstonia boonei*, *Celtis durandii*, *Cola gigantea*, *Holoptelea grandis*, *Klainedoxa gabonensis*, *Pterocarpus mildbraedii*, *Pterygota macrocarpa* & *Pycnanthus angolensis* (photo, 1974).

a musky smell when slashed (Burkill, 1994). It is easily recognised by the long stipules, up to 15 cm on young trees, protruding above the canopy and strewn the ground below. Young trees often have conspicuous spines on the bole. *Milicia excelsa* was one of the largest trees in the forest. A breast height girth of 6 m was not uncommon, and one tree at Baissa measured 8 m. Recorded only from Bissaula River (Peal, 1960), *Daniellia ogea* is not usually buttressed; it may reach a height of 55 m. The bark is distinctively marked, with horizontal patches like painted bands in various colours, grey, brown and orange predominating (Keay et al., 1964).

At the other extreme, were 'treelets', for example *Dicranolepis grandiflora*, and particularly *Memecylon* sp. (JDC 5306), a miniature tree 3.7 m tall, with a distinct main axis. Prominent among the many lianes were *Entada rheedei*, with thorny stems and huge pods, and the prickly rattan *Laccosperma opacum*. Climbing with adventitious roots, the bush pepper, *Piper guineense* (Hausa 'masoro') was common. An aroid, *Cercestis mirabilis*, with perforated leaves and with long pendulous roots and also clasping roots, climbing to 10 m, was noted on several occasions. In contrast to the mountain forests, epiphytes were not conspicuous. Epiphytic orchids, e.g. *Calyptrochilum christyanum*, were rare.

River Amboi Forest Reserve

Location

River Amboi is situated a few kilometres east of Baissa (Figure 2). The terrain is broken, with hills rising abruptly from an intricate system of valleys drained by numerous shallow, rocky-bedded streams, tributaries of the Ndaforo, Tiso and Amboi rivers, which flow south-westwards to join the Donga. Here also is a mosaic of savanna woodland and patches of open savanna, with transition woodland and high forest on better soils. The numbers of oil palms to be found in different parts of the forest indicated how widespread farming had been.

Conservation status

River Amboi forest lies within the River Amboi Forest Reserve (Appendix 1). At the time of the study, exploitation of the forest flora had been confined to sporadic pit-sawing. It is still relatively unharmed (Barnwell, pers. comm. 2000), however constant hunting, frequently using spotlights, had decimated wildlife.

Enumeration plot

The forest area studied at River Amboi was in an advanced stage of succession. An area was chosen towards the north-east corner of the Forest Reserve, south of the Ngara stream. A square 1.5 ha plot (Table 24) was laid out about 30 minutes walk from Gidan Giwa, 5 km north of Atsuku, which is on the road from Baissa to Abong. The plot corners were demarcated with large stone beacons.

Bissaula River Forest Reserve

Location

Bissaula town is only 32 km south-south-west of Baissa by a trekking path, and canoe ferry (Figure 2). In contrast, by road it is a journey of 160 km, via Mararaba and Takum. The Bissaula river flows north, to join the Donga near the south-west corner of Baissa Forest Reserve. Bissaula River forest reserve covers 148 km², including 26 km² of high forest extending as a fairly wide belt along the river, north of Bissaula town, with narrower belts branching to the east and southwest, following the water courses. The remainder of the reserve is savanna woodland, with *Crossopteryx febrifuga* and *Uapaca togoensis* among the commoner species, and *Anogeissus leiocarpus* in transitional woodland or regrowth on old farms (Peal, 1960). From the air, several small stands of fan palm (*Borassus aethiopum*) were noted in the forest along the Bissaula River.

Conservation status

Bissaula forest lies within a Forest Reserve (Appendix 1). At the time of the study, logging was limited to sporadic pit-sawing. It is still relatively unharmed (Barnwell, pers. comm. 2000) but the wildlife has been decimated.

Floristic composition

The species composition of Bissaula is summarised in Table 25, a comparison of the floristic diversity within the three Donga River forest reserves. Additional detail is in the checklist.

Ecological notes for the three Donga river forest reserves

Summarised species lists for the three forests are given in Table 25. For Baissa and River Amboi the lists are representative of the woody flora. At Bissaula, with few exceptions, the larger trees only had been recorded (Peal, 1960). Species with collecting numbers, are in the checklist.

Anogeissus leiocarpus was the most characteristic tree in transition woodland at Baissa and River Amboi. Borassus palms, sporadic in wooded grassland at Baissa, were also present well inside small patches of forest. The early stages of succession on abandoned farms were much as Ross (1954) describes them for the Rain Forest Zone of southern Nigeria, except that no examples of the *Musanga cecropioides* phase were seen (cf. Rosevear (1971)); Swaine and Hall (1983). Species in transition woodland and young secondary forest at River Amboi are recorded in the checklist.

At River Amboi *Antrophyum mannianum* perched on the stems of oil palms, up to 2.5 m from the ground. The large 'sun epiphyte' *Platyserium angolense* featured in the upper canopy. In Baissa the moss, *Groutiella sarcotricha*, was collected from a high branch of *Holoptelea grandis*, broken off by the wind. At Bissaula River the root parasite *Thonningia sanguinea* was found. Recorded by Migeod at 1520 m (1958) on Mt. Cameroon (FWTA), its presence in the mountain forests of Taraba and Adamawa has yet to be established.

Present in the middle Donga forests but not noted elsewhere were *Holarrhena floribunda*, *Hylodendron gabunense* and *Mammea africana*.

Copies of the Native Authority Orders constituting Baissa (1968), River Amboi (1976) and Bissaula River (1969) Forest Reserves are set out in Appendix 1.

Table 24 Enumeration plot from River Amboi Forest Reserve.

Botanical Name	Storey	Girth Class																Total 0.30 m & over	Total 1.22 m & over
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p		
<i>Azalia africana</i>	B,C		1	1		1		1									4	2	
<i>Albizia zygia</i>	C				1												1	1	
<i>Balanites wilsoniana</i>	C		1														1		
<i>Bombax buonopozense</i>	A,B,C		4							1						1	6	2	
<i>Ceiba pentandra</i>	C	2	2														4		
<i>Celtis philippensis</i>	C	75	21	4													100		
<i>Cola gigantea</i>	B,C	30	28	11	13	6	3	1	1								93	24	
<i>Craterispermum cerinanthum</i>	C	19	3														22		
<i>Detarium senegalense</i>	C	2															2		
JDC 5385 ? <i>Diospyros</i> sp.	C	1	1														2		
<i>Elaeis guineensis</i>	C			16	17												33	17	
<i>Erythrophleum suaveolens</i>	B,C	2	5	1	1					1							10	2	
<i>Ficus exasperata</i>	B					1		1									2	2	
JDC 5356 ? <i>Garcinia</i> sp.	B,C	1															1		
JDC 5384 ? <i>Glyphaea</i> sp.	C	2															2		
<i>Holoptelea grandis</i>	C		1														1		
<i>Hylodendron gabunense</i>	B,C		1	1		1											3	1	
<i>Khaya grandifoliola</i>	B,C	6				1	1										8	2	
<i>Klainedoxa gabonensis</i>	C		2	1													3		
JDC 5398																			
<i>Mallotus oppositifolius</i>	C	4															4		
<i>Mammea africana</i>	C	7	6	1													14		
JDC 5375 ? <i>Maranthus</i> sp.	C			1	1												2	1	
<i>Milicia excelsa</i>	C				1												1	1	
JDC 5358 ? <i>Monodora</i> sp.	C	16	3	1													20		
<i>Olex subscorpioidea</i>	C	39	2														41		
<i>Pandanus candelabrum</i>	C	3	6														9		
<i>Pouteria alnifolia</i>	C	2	1														3		
<i>Pterygota macrocarpa</i>	B							2	1								3	3	
<i>Pycnanthus angolensis</i>	B,C	2	3	2	1	1	1	1									11	4	
<i>Ricinodendron heudelotii</i>	A,B,C		4	1	4	1	3	2	2	5	2	4	3	2	1		34	29	
JDC 5352 ? <i>Sorindeia juglandifolia</i>	B,C	5	7	5	5	3	1	1	1	2							30	13	
<i>Spathodeia campanulata</i>	B,C				2	5			1								8	8	
<i>Spondianthus preussii</i>	C	35	14	3	1												53	1	
JDC 5387 ? <i>Sterculia</i> sp.	C		1														1		
<i>Synsepalum brevipes</i>	C	13	6														19		
<i>Tetrapleura tetraptera</i>	C	4	6	4	4												18	4	
<i>Treulia africana</i>	B,C	4	4	1	1			1									11	2	
JDC 5345 ? <i>Trichilia</i> sp.	C	8	5	3													16		
JDC 5357 <i>Uapaca</i> sp.	B,C	5	2	3		1											11	1	
<i>Vitex</i> sp. (? <i>V. doniana</i>)	C	1			1												2	1	
JDC 5346	C	2															2		
JDC 5348	C	10	4														14		
JDC 5349	C	1															1		
JDC 5368	C	3	1														4		
JDC 5369	B					1											1	1	
JDC 5395	C	2															2		
Dead or dying	C	6	5	1	1	2		1		1							17	5	
Total		312	150	61	54	24	12	7	7	9	3	4	3	2	2		650	127	

Number of species (estimated) 46

Key to girth classes:

a 0.30 - 0.60 m	e 1.51 - 1.80 m	i 2.71 - 3.00 m	m 3.91 - 4.20 m
b 0.61 - 0.90 m	f 1.81 - 2.10 m	j 3.01 - 3.30 m	n 4.21 - 4.50 m
c 0.91 - 1.20 m	g 2.11 - 2.40 m	k 3.31 - 3.60 m	o 4.51 - 4.80 m
d 1.21 - 1.50 m	h 2.41 - 2.70 m	l 3.61 - 3.90 m	p 4.81 - 5.10 m

Table 25 Summarised species lists for the three forests: Baissa, River Amboi and Bissaula River.
 Bai = Baissa, Amb = River Amboi, Bis = Bissaula.

Botanical name	Forest reserve			Botanical name	Forest reserve		
	Bai	Amb	Bis		Bai	Amb	Bis
Trees > 30 m high				<i>Maesopsis eminii</i>	X	-	-
<i>Azelia africana</i>	X	X	X	<i>Pouteria alnifolia</i>	-	X	-
<i>Alstonia boonei</i>	X	X	-	<i>Musanga cecropioides</i>	X	-	-
<i>Antiaris toxicaria</i>	X	-	-	(one tree, beside a logging road)			
<i>Aubrevillea kerstingii</i>	X	X	X	<i>Myrianthus arboreus</i>	X	X	-
<i>Bombax buonopozense</i>	-	X	-	? <i>Newboldia laevis</i>	X	X	-
<i>Canarium schweinfurthii</i>	X	-	-	<i>Synsepalum brevipes</i>	-	X	-
<i>Ceiba pentandra</i>	X	X	X	? <i>Pseudospondias microcarpa</i>	-	X	-
<i>Celtis durandii</i>	X	-	-	<i>Spathodea carnpanulata</i>	-	X	-
<i>Cola gigantea</i>	X	X	-	<i>Spondianthus preussii</i>	-	X	-
<i>Daniellia ogea</i>	-	-	X	? <i>Sterculia tragacantha</i> JDC 5387	-	X	-
<i>Holoptelea grandis</i>	X	X	X	<i>Syzygium guineense</i> subsp. <i>guineense</i>	X	X	X
<i>Khaya grandifoliola</i>	X	X	X	(streambanks in savanna)			
<i>Millettia excelsa</i>	X	X	X	? <i>Trichilia prieuriana</i>	X	-	-
<i>Pterocarpus mildbraedii</i>	X	X	-	<i>Trichilia welwitschii</i>	X	X	-
<i>Pterygota macrocarpa</i>	X	X	-	<i>Trichilia prieuriana</i>	X	-	-
<i>Ricinodendron heudelottii</i>	X	X	X	<i>Trilepisium madagascariense</i>	-	X	-
<i>Sterculia oblonga</i>	X	-	-	<i>Uapaca</i> (? <i>U. heudelottii</i> JDC 5357)	X	X	X
<i>Terminalia superba</i>	X	-	X	<i>Vitex doniana</i>	X	X	-
Trees 18-30 m				(streambanks in savanna, secondary forest, transition woodland and occasional in savanna woodland)			
<i>Albizia adianthifolia</i>	X	-	-	<i>Vitex rivularis</i>	X	-	-
<i>Albizia zygia</i>	-	X	X	<i>Trichilia cf. prieuriana</i> JDC 5458	X	-	-
<i>Anogeissus leiocarpus</i>	-	X	-	Small Trees 4.5 – 9 m			
<i>Balanites wilsoniana</i>	X	X	-	<i>Anthonotha macrophylla</i>	X	X	-
<i>Berlinia grandiflora</i>	X	X	X	<i>Antidesma laciniatum</i>	-	X	-
<i>Brachystegia eurycoma</i>	X	X	X	<i>Carpolobia alba</i>	-	X	-
<i>Cleistopholis patens</i>	-	-	X	<i>Cola hispida</i>	X	X	-
<i>Detarium senegalense</i>	X	X	X	<i>Craterispermum cerianthum</i>	-	X	-
<i>Erythrophleum suaveolens</i>	X	-	X	<i>Dicranoplepis grandiflora</i> treelet	X	-	X
<i>Ficus</i> sp. JDC 5325 (a strangler)	-	X	-	? <i>Diospyros</i> sp. ?JDC 5385	-	X	-
<i>Hannoa klaineana</i>	X	-	-	? <i>Garcinia</i> sp. JDC 5322	-	x	-
<i>Homalium letestui</i>	X	-	X	? <i>Glyphaea brevis</i> JDC 5384	-	x	-
<i>Hyiodendron gabunense</i>	-	X	-	<i>Macaranga hurifolia</i>	X	X	-
<i>Iringia gabonensis</i>	X	X	X	<i>Mallotus oppositifolius</i>	X	X	-
('abono': cultivated)				<i>Memecylon</i> (?sp.) JDC 5306: treelet	-	X	-
<i>Klainedoxa gabonensis</i>	X	X	X	<i>Monodora</i> (?sp.) JDC 5358	X	X	-
<i>Mammea africana</i>	X	X	X	<i>Napoleona</i> ? <i>imperialis</i> JDC 5317	-	X	X
? <i>Maranthes</i> sp. JDC 5375	-	X	-	<i>Sarcocephalus pobeguinii</i>	X	-	-
<i>Mitragyna stipulosa</i>	X	-	-	<i>Olax subscorpioidea</i>	-	X	-
(streambank in forest)				<i>Ouratea</i> sp. cf. <i>flava</i>	-	X	-
<i>Parinari excelsa</i>	X	-	-	<i>Oxyanthus racemosus</i>	-	X	-
<i>Pycnanthus angolensis</i>	X	X	X	<i>Pandanus candelabrum</i>	X	X	X
<i>Tetrapleura tetraptera</i>	X	X	X	? <i>Rinorea</i> sp. JDC 5411	X	X	-
<i>Treculia africana</i>	-	X	-	<i>Rothmannia longiflora</i>	-	X	-
<i>Holarrhena floribunda</i>	-	X	-	<i>Rothmannia urcelliformis</i>	X	-	-
Medium sized trees: 9-18 m				<i>Rothmannia whitfieldii</i>	-	X	-
<i>Anthocleista djalonenis</i>	-	-	X	Not yet named			
<i>Borassus aethiopum</i>	X	-	-	JDC 5346	-	X	-
<i>Celtis brownii</i>	-	X	-	JDC 5348	-	X	-
<i>Dialium guineense</i>	-	X	-	JDC 5349	-	X	-
<i>Diospyros mespiliiformis</i>	X	-	-	JDC 5368	X	X	-
<i>Elaeis guineensis</i>	X	X	X	JDC 5395	-	X	-
(river bank in savanna and secondary forest)				JDC 5444	X	-	-
<i>Ficus exasperata</i>	-	X	-				
<i>Funtumia elastica</i>	X	-	-				

Woody climbers (present in all three forest reserves)

Acacia sp. JDC 5439, *Calamus deeratus*, *Entada mannii*, *Laccosperma opacum*, ?*Landolphia* sp. JDC 5372, *Mezoneuron angolense*, *Pararistolochia flosavis*, *Piper guineense*, *Urera cordifolia*, JDC 5394, JDC 5402, JDC 5441.

Shrubs

Callichilia sp. JDC 5333, *Chassalia* sp. - shrublet JDC 5326, *Dictyandra arborescens*, *Didymosalpinx abbeokutae*, ?*Dracaena* sp. JDC 5360, *Heisteria parvifolia*, *Psilanthus mannii*, *Pycnocoma cornuta*.

Herbs

Acanthus sp., *Aframomum limbatum*, *Antrophyum mannianum*, *Asplenium emarginatum*, *Bolbitis achrostichoides*, *Corymborkis corymbis*, *Dracaena thalioides*, *Marantochloa leucantha*, *Marantochloa purpurea*, *Olyra latifolia*, *Palisota hirsuta*, *Palisota* sp. HMC 145, *Palisota* sp. HMC 146, *Platynerium angolense*, *Polka condensata*, *Pteris hamulosa*, *Cercestis mirabilis*, *Thonningia sanguinea*, JDC 5469 – Cucurbitaceae.

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Chapter 8

High Forest Outliers in Lowland Gashaka

The Gangumi and Wurkam River Forests

Gangumi:

High forest; 230 m; 28.5 km²

Red Data List species: *Afzelia africana*, *Irvingia gabonensis*, *Khaya grandifoliola*, *Milicia excelsa*

Wurkam River Forest Reserve:

High forest; 230 m; 20.5 km²

Red Data List species: *Afzelia africana*, *Irvingia gabonensis*, *Khaya grandifoliola*, *Milicia excelsa*

Location

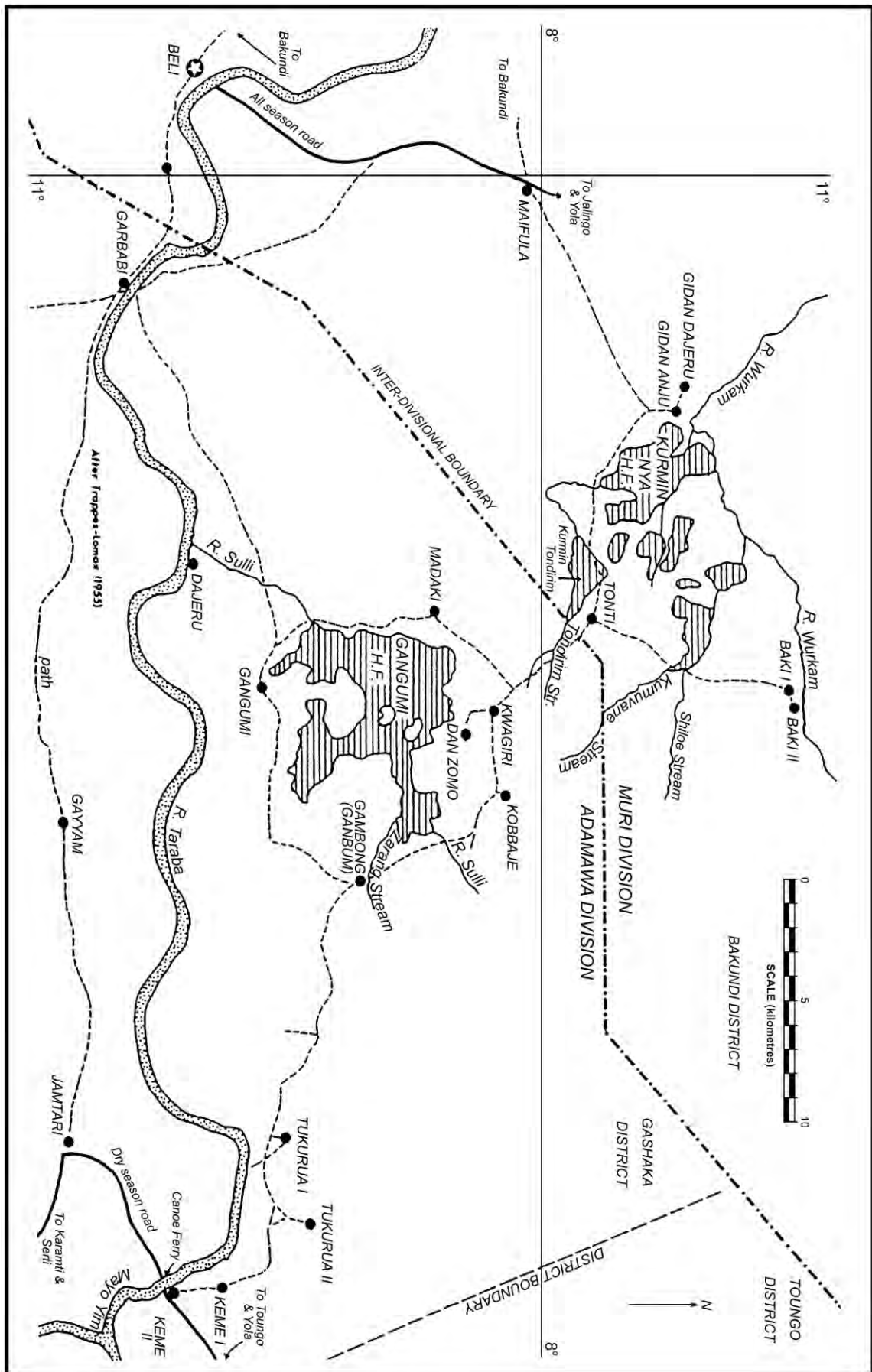
Gashaka District extends north-east to Toungo District, eastwards to the border of the Cameroon Republic, south to Mambilla Plateau, and westwards to Ndoro (Kurmi) and Bakundi Districts. Its total area, including presumably the Hendu and Cabbal Wade uplands, was estimated (1955) to be c. 11,650 km² (Trappes-Lomax, 1955). At the 1954 census the district was organised into 13 village areas, with a combined population of 10,682; a density slightly less than one person per square kilometre. This sparse population was attributable to the prevalence of onchocerciasis (river blindness) and sleeping sickness, as well as the Fulani raids of the nineteenth century. Except at Serti, which had grown, the population in 1978 remained static.

Most of Gashaka is hilly, with steep-sided hills (e.g., Bali Mt.) rising 610-910 m from the base. The only extensive areas of flat country are the Bakundi and Serti Plains. There are numerous rivers and streams; the Kam, its source on Mambilla Plateau, the Ngamgam and the Gashaka from the Gotel Mountains, and the Ser and the Mayo Yim are all perennial. Several lesser streams flow for at least part of the dry season.

The presence of animal trypanosomiasis excludes cattle, unless on their way to or from the upland grazing enclaves. Farming practices vary. Fadama farming is usually continuous. In savanna, depending on the soil, crops are grown for between three to five years, with a fallow period of five to six years. High forest farming at Gangumi was said to have been ten years under crops, with a seven year fallow (Trappes-Lomax, 1955).

The true wealth of Gashaka must be its biodiversity, in an environment unsurpassed in West Africa. However, the construction of an all-weather road to Serti led to large-scale bush-meat hunting and by 1971 wildlife had been decimated. In that year the then North-Eastern State Government, through the Division of Forestry and Wildlife, commenced a detailed survey of the wildlife resources. From this initiative there has evolved the Gashaka Gumti National Park. Much of lowland Gashaka, including gallery forest, but not the Gangumi and Wurkam River forests, is now within the Park.

Figure 43 Map showing Gangumi and Wurkam River Forest Reserves. After Trappes-Lomax (1955) Forest Reconnaissance map of Gashaka and part of the Bakundi Districts.



Description of the Forests / Kurame

Gangumi and Wurkam River

Forest Reserves

Location, extent and soils

The Gangumi Forest Reserve is located c. 26 km ENE of Bali, and 11 km N of the Taraba River. The Wurkam River Forest Reserve is approximately 12 km NNW of this, comprising forests along the banks of the River Wurkam and its tributaries (Figure 43).

There were (1978) roughly 28.5 km² of high forest at Gangumi and 20.5 km² in Wurkam River Forest Reserve (Trappes-Lomax, 1955). These were the only large accessible forests in lowland Gashaka.

The soils are Ferruginous Tropical Soils derived from crystalline acid rocks of the Basement Complex (Bawden & Tuley, 1966).

Conservation status

The current state of these forests is unknown. However in the 1950s, Trappes-Lomax urged that priority Reserve Status be given to the Gangumi and Wurkam River forests, on account of their extreme vulnerability and potential for timber production. His proposals were accepted, and the boundaries agreed during 1955/56. Copies of the Native Authority Orders constituting Gangumi (1957), Wurkam River (1967) and Kamatan (1962) (south of the Taraba River) Forest Reserves are given in Appendix 1.

Diversity

A total of 83 species were recorded from the high forest at Gangumi, 71 trees, three woody climbers, and nine shrubs; obviously the collectors concentrated on the trees. Four Red Data List species, *Azalia africana*, *Irvingia gabonensis*, *Khaya*

Table 26 Species lists, mainly for Gangumi Forest Reserve but also from Wurkam River, based on collections by Latilo & Daramola (L & D, FHI numbers - November 1954) & JDC (May 1977).

Trees	<i>Milicia excelsa</i>	JDC	4956 ? <i>Tabernaemontana</i>
<i>Azalia africana</i>	<i>Mimusops kummel</i>		or <i>Voacanga</i>
<i>Albizia ferruginea</i>	<i>Monodora</i> sp.?	JDC	4957
<i>Albizia zygia</i>	<i>Napoleona</i> sp.?	JDC	4973
<i>Allophylus africanus</i>	<i>Ouratea</i> cf. <i>flava</i>	JDC	4976
<i>Alstonia boonei</i>	<i>Parinari</i> (?= <i>Parinari excelsa</i>)	JDC	4979
<i>Anogeissus leiocarpus</i>	<i>Picralima nitida</i>	JDC	4982
<i>Antiaris toxicaria</i>	<i>Pouteria alnifolia</i>	JDC	4955
<i>Aphania senegalensis</i>	<i>Pterygota macrocarpa</i>	JDC	5003
<i>Berlinia</i> sp.	<i>Ricinodendron heudelotii</i>	JDC	5004 ? <i>Guttiferae</i>
<i>Carpolobia alba</i>	<i>Rinorea</i> sp.?		
<i>Ceiba pentandra</i>	<i>Rothmannia urcelliformis</i>	Woody climbers	
<i>Celtis brownii</i>	? <i>Rothmannia</i> sp.	<i>Acacia pentagona</i>	
<i>Celtis durandii</i>	<i>Schrebera arborea</i>	<i>Calamus deeratus</i>	
<i>Celtis zenkeri</i>	<i>Spathodea campanulata</i>	<i>Landolphia</i> sp. (? <i>L. comorensis</i>)	
<i>Cola gigantea</i>	<i>Sterculia oblonga</i>	Shrubs	
<i>Cola hispida</i>	<i>Strombosia pustulata</i>	<i>CreMASpora triflora</i>	
<i>Diospyros canaliculata</i>	<i>Synsepalum brevipes</i>	<i>Dicranolepis grandiflora</i>	
<i>Diospyros mespiliformis</i>	<i>Terminalia superba</i>	<i>Leea guineensis</i>	
<i>Elaeis guineensis</i>	<i>Tetrapleura tetraptera</i>	<i>Pancovia</i> sp.	
<i>Erythrophleum suaveolens</i>	<i>Treculia africana</i>	<i>Pararistolochia goldieana</i>	
<i>Ficus</i> vs. <i>variifolia</i>	<i>Trichilia prieuriana</i>	<i>Pavetta corymbosa</i> var. <i>corymbosa</i>	
<i>Ficus</i> sp. (? <i>F. mucoso</i>)	<i>Vitex rivularis</i>	<i>Pleiocarpa</i> sp. (may be small tree)	
<i>Ficus sagittifolia</i>	<i>Voacanga africana</i>	<i>Rothmannia whitfieldii</i>	
<i>Ficus</i> sp. - large strangler		<i>Thonningia sanguinea</i>	
<i>Holoptelea grandis</i>	Awaiting identification:		
<i>Homalium letestui</i>	JDC	4923	
<i>Irvingia gabonensis</i>	JDC	4949	
<i>Khaya grandifoliola</i>	JDC	4953	
<i>Lecaniodiscus cupanioides</i>	JDC	4955	

grandifoliola and *Milicia excelsa* were recorded. A list of tree species recorded by members of the Trappes-Lomax expedition and JDC is given in Table 26.

Enumeration

The Forest Reconnaissance enumeration results are summarised in Appendix 3. At Gangumi the most abundant species, represented in every size class, were *Ricinodendron heudelotii* and *Pterygota macrocarpa*. Together, they accounted for more than one-third of all trees enumerated. The only common economic species was *Azelia africana* (7%). In Kurmin Nya (Wurkam River) the most common trees were *Ricinodendron heudelotii*, *Picralima nitida* and *Pterygota macrocarpa*. Economic species were negligible, even *Azelia africana*, and no mahogany (*Khaya grandifoliola*) was found (Trappes-Lomax, 1955).

Detailed observations were made on a 1.5 ha sample plot at Gangumi in May, 1977. The plot was located in well-developed forest, 45 minutes walk NNW of the old Gangumi village site, and a further 15 minutes walk within the forest. At each corner large cairns were erected, surmounted by white-painted jan yaro (*Hymenocardia acida*) posts.

All trees 30 cm in girth and over at breast height were classified in 30 cm intervals (Table 27). A summary of the results are compared with similar data from River Nwum forest (chapter 6), Omo (formerly Shasha), Okomu, and the Southern Bakundu forests, studied by the Cambridge Botanical Expedition to Nigeria and the Cameroons (Richards, 1963) (Table 28).

Structure, physiognomy and floristic composition

Gangumi forest was a mosaic of serally related phases; tall forest with a more or less defined structure alternated with broken high forest, thickets of young trees, scrub or climber tangles. (cf. the plateau forest at Okomu Forest Reserve described by Jones (1956)). In structure the forest at the plot resembled in essentials the high forest in Omo Forest Reserve, depicted by Richards (1939). There were three tree strata, the lowest (C) was continuous. The trees above formed two strata, neither continuous. The tallest trees (stratum A, emergents), with spreading crowns, rarely in contact, were raised well

above those of the 'middle storey', stratum B. This stratum, with trees varying in height, their crowns seldom in contact, was the least well defined.

The 'shrub' layer (D), in which there were almost as many young trees as shrubs, often single-stemmed, and treelets (e.g., *Dicranolepis grandiflora*), tended to merge with the lowest tree storey. Tree seedlings predominated in the ground layer (E). There were few herbs, no ferns and no byrophytes (cf. the mountain forests, chapters 2 - 5). The shrub layer was not dense; walking through the forest was straightforward.

There were many lianes, including the prickly-stemmed rattan *Calamus deeratus*, which occurred along streams. The only epiphyte seen was *Platyserium angolense*, found high in the forest canopy except at the forest edge, where one was observed 1.2 m from the ground. Several of the bigger trees, including *Pterygota macrocarpa*, were strongly buttressed, and some were deciduous. Trees with wind dispersed fruits or seeds included *Albizia* spp., *Holoptelea grandis* and *Terminalia superba* (fruits), and *Alstonia boonei*, *Ceiba pentandra* and *P. macrocarpa* (seeds).

Both the 1954 and 1977 enumerations emphasise the abundance of *Pterygota macrocarpa* and *Ricinodendron heudelotii*, and the scarcity of mahogany (*Khaya grandifoliola*) and iroko (*Milicia excelsa*). At the sample plot *Octolobus angustatus*, which was not recorded in the 1954 enumeration, comprised 41% of all C stratum trees (cf. the River Nwum forest (chapter 6) where *Mallotus oppositifolius* accounted for 40%). The tendency for one understory species to be locally dominant in West African lowland rain forest is also noted by Richards (1963).

When the Forest Reconnaissance Report appeared (1955), many of the botanical collections awaited identification. Provisionally, some 67 species were recorded from 26.4 ha spread over 12.3 km of enumeration cut-lines. The 1977 tally is based on a 1.5 ha sample, supplemented by extensive observation. Assuming that none of the 13 still unidentified sample plot trees is a duplicate, the number of species recorded is virtually the same as it was in the earlier enumeration. Over 50% of the species occurred at the sample plot (Table 27).

Table 27 Enumeration plot from Gangumi Forest Reserve.

Botanical Name	Storey	Girth Class																	Total 0.30 m & over	Total 1.22 m & over
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q		
<i>Afzelia africana</i>	A,B									1						1		2	2	
<i>Alstonia boonei</i>	A,B									1	1						2*	4	4	
<i>Ceiba pentandra</i>	A,C			1												2		3	2	
<i>Celtis philippensis</i>	B,C	1	1			1												3	1	
<i>Celtis gomphophylla</i>	B					1												1	1	
<i>Chrysophyllum albidum</i>	C	6	2	1														9		
<i>Cola gigantea</i>	A,B							1	1							1		3	3	
JDC 4950 ? <i>Diospyros canaliculata</i>	C	18	6															24		
<i>Erythrophleum suaveolens</i>	B						1	1		1								3	3	
JDC 4972 <i>Ficus</i> sp.	B									1								1	1	
<i>Ficus</i> vs. <i>varifolia</i>	C	1		1	1													3	1	
<i>Holoptelea grandis</i>	B,C				1								3				1	5	5	
JDC 4952 ? <i>Homalium</i> sp.	B,C	1		1	1	2	1	2	2	1								11	9	
<i>Milicia excelsa</i>	B					1												1	1	
<i>Octolobus grandis</i>	C	287	31															318		
JDC 4948 <i>Parinari</i> sp. ? <i>P. excelsa</i>	B						1											1	1	
<i>Pterygota macrocarpa</i>	A,B,C	7	15	12	7	3	3	4	3	2	2			1	1	1		61	27	
<i>Ricinodendron heudelotii</i>	A,B,C	9	9	4	2	2	1	1		2	2	2	2	1	1			38	16	
<i>Sterculia oblonga</i>	B								1									1	1	
<i>Strombosia pustulata</i>	C	34	12	1														47		
<i>Terminalia superba</i>	A														1			1	1	
<i>Tetrapleura tetraptera</i>	B,C	1			2	1	1											5	4	
JDC 4923	C	3	1															4		
JDC 4949	C	88	30	3														121		
JDC 4953	C	1	4															5		
JDC 4955	C	42	3															45		
JDC 4956 ? <i>Tabernaemontana</i> sp.	C	12	13	2	1													28	1	
JDC 4957	C	3																3		
JDC 4973	C		1															1		
JDC 4976	C	1	1															2		
JDC 4979	C	1																1		
JDC 4982 (?= JDC 4955)	C	1																1		
Broken off but alive, no leaves	C			1														1		
Dead trees	A,B,C	2	3		1	2			3	2					1	1		15	10	
Total		519	132	27	16	13	8	9	11	9	6	3	2	3	1	8	1	4	772	94

Number of species estimated = 35

*(inc. 1 of 58 m GBH)

Key to girth classes:

a 0.30 - 0.60 m	f 1.81 - 2.10 m	k 3.31 - 3.60 m	p 4.81 - 5.10 m
b 0.61 - 0.90 m	g 2.11 - 2.40 m	l 3.61 - 3.90 m	q 5.11 - 5.40 m
c 0.91 - 1.20 m	h 2.41 - 2.70 m	m 3.91 - 4.20 m	
d 1.21 - 1.50 m	i 2.71 - 3.00 m	n 4.21 - 4.50 m	
e 1.51 - 1.80 m	j 3.01 - 3.30 m	o 4.51 - 4.80 m	

Table 28 Comparison enumeration plot data from Richards (1963) and JDC.

	Omo (Shasha)	Okumu	S. Bakundu	River Nwum	Gangumi
Number of trees (on plot)					
30 cm - 1.21 m	781	582	551	545	772
1.22 m and over	71	70	164	69	94
Number of species (estimated)					
0 - 30 cm	42	70	109	60	35
30 cm - 1.21 m	40	60	92	50	13
1.22 m and over	16	31	42	28	11
Ratio individual/species					
30 cm - 1.21 m	18.6	8.3	5.1	9	22.1
1.22 m and over	4.4	2.3	3.9	2.5	8.6
Percentage of most abundant species 30 cm - 1.21 m					
	20	30	11	40	41.2
	<i>Rinorea</i> sp.	<i>Strombosia retivenia</i>	<i>Diospyros xanthochlamys</i>	<i>Mallotus oppositifolius</i>	<i>Octolobus angustatus</i>
Percentage of most abundant species over 1.22 m					
	21	14	7	17	7.9
	<i>Casearia bridelioides</i>	<i>Pausinstylia</i> sp. or spp.	<i>Cynometra hankei</i>	? <i>Pterygota macrocarpa</i> = JDC 4875	<i>Pterygota macrocarpa</i>

All plots 122 x 122 m; c. 1.5 ha.

Data for Omo (Shasha) and Okumu from Richards (1939); for Southern Bakundu For./Res. from Richards (1963); for River Nwum from Chapman (1993-1997).

Among Sterculiaceae characteristic of the Dry Forest Zone (Keay, 1949), approximately half have not been recorded from either the Gangumi, Wurkam River or the Donga Valley forests, eg., *Hildegardia barteri*, *Nesogordonia papaverifera*, *Sterculia rhinopetala* and *Triplochiton scleroxylon* (obeche). While one or other may yet turn up, it is unlikely that so distinctive a tree as obeche could have gone unnoticed. *H. barteri* and *T. scleroxylon* occur further north, at Vom, and Sanga River Forest Reserve respectively (Keay et al., 1964). Other canopy trees, not recorded from the Gashaka forests, but found in the Donga Valley forests, include *Balanites wilsoniana*, *Hylodendron gabunense* and *Klainedoxa gabonensis*.

From the forests as a whole (but mainly Gangumi) the following have been recorded:

- Emergents: *Afzelia africana*, *Albizia ferruginea*, *Alstonia boonei*, *Antiaris toxicaria*, *Canarium schweinfurthii*, (river fringing), *Ceiba pentandra*, *Cola gigantea*, *Hannoa klaineana* (gallery forest), *Khaya grandifoliola*, *Milicia exelsa*, *Pterygota macrocarpa*, *Ricinodendron heudelotii*, *Terminalia superba*.
- Large trees (18-30 m): *Albizia zygia*, *Anogeissus leiocarpus*, (200 m inside the forest), *Berlinia* sp. prob. *B. grandiflora*, *Celtis zenkeri*, *Diospyros mespiliformis*, *Erythrophleum suaveolens* (Figure 44), *Ficus* sp. JDC

4972 (? potential emergent), *Ficus* sp. (strangler, not collected), *Holoptelea grandis*, ?*Homalium* sp. JDC 4952, *Irvingia gabonensis*, *Mimusops* sp. JDC 5001, *Parinari* sp. (JDC 4948, ?*P. excelsa*), *Schrebera arborea*, *Sterculia oblonga*, *Tetrapleura tetraptera*, *Treculia africana* (riparian).

3. Medium sized trees (9-18 m): *Aphania senegalensis*, *Celtis durandii*, *Chrysophyllum albidum*, *Diospyros* ?*canaliculata* JDC 4950, *Ficus* cf. *variifolia* JDC 4975, *Pouteria alnifolia*, *Synsepalum brevipes*, *Spathodea campanulata*, *Strombosia pustulata*, *Trichilia prieuriana*, *Vitex rivularis* and JDC 5004.

4. Small trees (4.5-9 m): *Allophylus africanus* (forest edge), *Carpolobia alba*, *Cola hispida*, *Ficus sagittifolia*, *Lecaniodiscus cupanioides*, ?*Monodora* sp. (JDC 4991), ?*Napoleona* sp. (JDC 4932), *Octolobus angustatus*, *Ouratea* sp. cf. *flava*, *Rinorea* sp. JDC 4933, (almost a shrub), ?*Rothmannia* sp. (JDC 4930), ?*Rothmannia* sp. (JDC 4840), ?*Tabernaemontana* sp. (JDC 4956), *Voacanga africana*; plus the following numbers still to be named; 4923, 4949, 4953, 4955, 4957, 4973, 4976, 4979, 4982, 4985, 5003.

5. Lianes: ?*Acacia pentagona* (JDC 4983), *Calamus deeratus*, ?*Landolphia comorensis* (JDC 4936), plus several others.

6. Shrubs, including treelets and climbing shrubs: *CreMASpora triflora*, *Dicranolepis grandiflora*, *Leea guineensis*, *Pancovia* sp., *Pararistolochia goldieana* (climber), *Pavetta corymbosa*, *Pleiocarpa* sp., *Rothmannia whitfieldii*, JDC 4966 and JDC 4988.

7. Herbs (including ferns): *Amorphophallus johnsonii*, *Dioscorea* sp. (climber), *Marantochloa purpurea*, *Olyra latifolia*, *Platynerium angolense* (epiphyte), *Streptogyna crinata*, *Thonningia sanguinea* (root parasite) and JDC 4937 (monocot).

Ecological notes

How the Gangumi and Wurkam River forests evolved can only be supposition. Trappes-Lomax (1955) ascribed their presence to local ground water conditions. He describes the forests as being associated consistently with rivers or streams, and usually found on lower-lying sites than the surrounding savannah woodland. Too wide to be



Figure 44 In the Middle Donga Basin the most sought-after tree for making canoes is *Erythrophleum suaveolens* (Hausa Gwaska).

properly termed fringing forests, he calls them bowl forests.

At Gangumi, by the end of the dry season, the soil profile at the sample plot was dry, and towards the bottom of the 150 cm soil pit, almost brick hard. Yet the trees, whether evergreen or deciduous in new leaf, showed little, if any signs of stress, and clearly were able to tap adequate moisture from deeper levels.

As to the former extent of the forest, assuming regression had occurred prior to the impact of farming and settlement, a change in the climate, resulting in lightning fires, could have been the decisive factor. In a series of experiments on the Ivory Coast, repeated fires eventually turned semi-deciduous forest into grassy savanna. Conversely, long term protection from fire (in this case 60 years) on two soils of differing fertility, led to the evolution of closed forest stands from more or less wooded savanna (Louppe et al., 1995).

The effect of human interference on the forest-savanna equilibrium over a long period is also important. In 1954, one former village site at Gangumi was detected by the presence, well within the forest, of relict 'farm trees', *Khaya senegalensis* and *Vitex doniana* (Trappes-Lomax, 1955).

At Gangumi, in thickets of *Lippia multiflora* along the forest edge, *Anogeissus leiocarpus* was often abundant. *Anogeissus* woodland at the Olokomeji Forest Reserve represents the transitional stage when forest invades fire-swept savanna (Clayton, 1958), however at Gangumi (1977) the forest did

not appear to be gaining ground, rather the reverse. The ecotone was sharpened by fires, some of which had penetrated 50 m into the forest, killing outright the smaller trees and scorching the larger ones. Near Kwagiri, the presence of *Anogeissus* 24 m tall, with clean, straight stems, 200 m within the forest, suggested a pre-farming history of alternate limited recession and advance.

The sequence of succession and the status of the *Pterygota - Ricinodendron - Octolobus* phase are unclear, but it would appear likely that most, if not all the forest, represents different seral stages.

Little is known regarding the interaction of animals with the forest. In 1977 there were still a few buffalo in Gangumi. Mainly grazers, they will also browse shrubs, and by their trampling effect seedling regeneration. Red river hog (*Potamochoerus porcus*) were common. They eat tree fruits and by rooting for fleshy roots and bulbs influence tree regeneration. Small forest antelopes feed on leaves and fruits. Fruit bats and frugiverous birds are specially important agents of seed dispersal. Sought after fruits include *Antiaris toxicaria*, *Chrysophyllum albidum*, *Ficus* spp, *Ricinodendron heudelotii* and *Tetrapleura tetraptera*. The seeds of *Azizelia africana*, *Cola gigantea* and *Sterculia oblonga* are attractive for the fleshy aril.

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Appendix 1

Native Authority Orders for Forest Reserves

Gangoro Forest Reserve, Tiba Plateau (Chapter 4)

(Extracted from Forestry Division records, Yola)

Area

approx. 47 km²

Situation

On the Tiba Plateau in the Mumuye District of Muri Division, 13-14.5 km SW of Donkin. Latitude 8° 44' N, Longitude 11° 42' E

Topography

Embraces an important watershed; many of the main tributaries of the Mayo Kam and Mayo Fan probably have their source here. The terrain is broken up into steep sided hills and deep valleys.

Vegetation

The hilltops are mostly grass covered but the hillsides and valleys carry dense high forest in which *Khaya grandifoliola* and *Piptadeniastrum africanum* are prominent species.

Rights admitted in the Proposed Muri Native Authority

Gangoro Forest Reserve Inquiry Report, piloted by the P.F.O. John W. Chapman and approved July 1st 1959, rights were admitted to the local people to:

Collect the following: honey and beeswax, dead wood for fuel, gora (*Oxytenanthera abyssinica*) canes, fruits of masoro (*Piper guineense*), goro (*Cola verticillata*) and jabba leinde (*Aframomum* spp.). Cut grass and draw water. To those native members recognised by traditional law and custom as entitled to hold it, of the local communities of Gangoro village area; the right to hunt and to fish. Grazing privileges were extended to Ardo Wayo (Head Fulani in Gangoro), Ardo Waje from Hyere Wire and Ardo Ola from Banga.

The District Head Mumuye (Bunu) was at that time Sa'adu Pantisawa. The boundary survey was done in January and February, 1959, by J.W. Chapman and M.I. Smaila. Gangoro Forest Reserve was finally gazetted as Northern Nigeria Legal Notice No. 102 of 1961 in the Supplement to the Northern Nigeria Gazette of June 15th, 1961.

Names of the hills in the reserve

Gamvirki, Mahariyuba, Timpara, Gamvon, Gbantanyusa and Taraba.

Names of those present at the Inquiry Party

Muri N.A. District Head	Malam Usman Jalingo
Mumuye District Head (Bunu)	Sa'adu Pantisawa
Ardo Wayo	Head Fulani in Gangoro
Panti Gangoro	Gavu
Panti Donkin	Batini
Panti Gansati	Mashi
Panti Rambe	Rambe
Panti Jagaba	Mako
Panti Shara	Mako
Sarkin Goro of Ganditola	Tibi
Sarkin Daji Muri	Malam Halilu Jalingo
Sarkin Daji Jalingo	Malam Issa Karim
Forest Guard	Malam Abdullahi Pangri

It was stipulated that there should be no farming, cutting of trees or buildings of any kind in the reserve.

Gashaka - Mambilla Local Authority: River Nwum Forest Reserve Order 1971 (Chapter 7)

Area

20.56 km²

Rights

Local people are entitled: To take without permit: Fruits of ciwo (*Landolphia owariensis*), kwakwa (*Elaeis guineensis*), gwandar daji (*Annona senegalensis*), malmo (*Syzygium guineense* var. *macrocarpum*) and dinya (*Vitex doniana*); leaves of kwakwa (*Elaeis guineensis*), kajinjiri (*Phoenix reclinata*), kalgo (*Piliostigma thonningii*) and tafasa (*Cassia tora*); honey and beeswax. To tap palm wine. To fish. To hunt, but not to dig pits or set traps and snares.

United Hills Native Authority: Forest Reserve Order (Baissa), 1968 (Chapter 8)

(The boundaries of Baissa and Bissaula River Forest Reserves as shown on the 1:250,000 Sheet 66 (Donga) topographical map are misleading. River Amboi Forest Reserve is not shown).

Area 113 km²

Boundaries

North:	Sabon Gida-Baissa motor road
East:	Gidan Malam-Gwanda path
South:	North bank of the River Donga
West:	West bank of the Tati river

Comprising

66.3 km² of high forest, the remainder savanna woodland and wooded grassland.

Rights

Removal of dead wood for fuel. Collection of honey and beeswax without the use of fire. Hunting but excluding pack hunting, trapping or the use of fire. Taking the fruits of akokari (*Irvingia gabonensis*), kwakwa (oil palm), kimba (*Xylopia acutiflora*), gbargadu (*Maesobotrya* spp.) and masoro (*Piper*

guineense); leaves of abutu (*Pandanus candelabrum*) and gbargadu; native sponge and kwagiri (*Calamus* sp.).

Mambilla Local Authority : Forest Reserve Order (River Amboi), January 1976 (Chapter 8)

Area

c. 70 km²

Boundaries

North: Atumbu-Maihula path

East: Maihula-Amburu path

South: River Amboi from Amburu to Amboi

West: Path from Amboi through Ashuku to Atumbu

Access

8 km east of Baissa, in Tigon District

Rights

The collection of thatching grass, honey and beeswax; fruits of akokari (*Irvingia gabonensis*), dorowa (*Parkia clappertoniana*), rimi (*Ceiba pentandra*), masoro (*Piper guineense*), dinya (*Vitex doniana*) and kwakwa (Oil Palm); leaves of shuwaka (*Vernonia amygdalina*); lianes, kwagiri (*Calamus* sp.) for walking sticks and thatching; also herbs, leaves and the bark of trees for medicinal purposes. The right to tap palm wine, to fish and to hunt in a manner approved by the Local Authority. _____

United Hills Native Authority Forest Reserve Order (Bissaula River), 1969 (Chapter 8)

Area

c. 148 km²

Boundaries

North: The Wuro Gumgum stream, part of the Bissaula River, and to the Gidan Dan Baki Gwanda footpath.

South & South-east: The Abafum River south to Maikurdi and then the Maikurdi to Bissaula footpath

West: The motor road from Bissaula north to the Wuro Gumgum stream (i.e., between the Kunatata range and the and the Donga River).

Access

North of Bissaula, to the Takum road, extending east to the Abafum river in Wukari Division.

Rights

To take the fruits of masoro (*Piper guineense*), dorowa (*Parkia clappertoniana*), dinya (*Vitex doniana*), akokari (*Irvingia gabonensis*), giginya (*Borassus aethiopum*), and kizni (*Bridelia ferruginea*). To collect the leaves of amguba (*Pandanus candelabrum*), and the bark of kukuki (*Sterculia setigera*), gwanon kurmi (*Olex* sp. presumably *O. subscorpioidea*), and kizni (*Bridelia ferruginea*); also the latex of awayo (*Ficus vogelii*) and alibada (*Landolphia* sp.). Hunting without the use of fire, fishing and customary burials.

**Adamawa Native Authority:
Forest Reserve Order No. 5 (Gangumi), 1957 (Chapter 8)**

Area

c. 62 km²

Boundaries

Kwagiri-Gambong path
Gambong-Gangumi path
Gangumi-Kwagiri path

Access

The Maifula-Tonti-Kwagiri-Gangumi path, or the path from Garbabi.

Topography

Mainly flat or undulating with isolated rocky hills in the south and east.

Comprising

About 28.5 km² of high forest, the remainder savanna woodland including pure stands of doka (*Isobertinia doka*) and *Uapaca*, and open savanna.

Rights

To collect the fruits of mechowu (*Diospyros canaliculata*), buri (*Landolphia comorensis* van. *florida*), keveto (*Pancovia* sp.), kunisum (*Chrysophyllum albidum*) and wild *Dioscorea* tubers. To use the stems of climbing palms (*kwagiri*) for rope and to make bows and spear shafts from gantemino (*Octolobus angustatus*). To perform tsafi ceremonies provided no new clearings are made. Hunting and fishing.

**Muri Native Authority:
Wurkam River Forest Reserve Order, 1967 (Chapter 8)**

Area

c. 58.3 km²

Boundaries

The Wurkam River near Gidan Anju to a point near Baki village.
The Baki-Tonti path.
The Tonti-Gidan Anju path, but including certain small patches of high forest (i.e., part of Kurmin Tondirim) lying close to and to the south of this path.

Access

About 11 km from Maifula by the Tonti path.

Topography

Mainly flat or undulating, hilly to the east.

Comprising

About 21 km² of high forest, the remainder savanna woodland or open savanna.

Rights

To collect the fruits of dorowa (*Parkia clappertoniana*), gwandar daji (*Annona senegalensis*), tsada (*Ximenia americana*), tsadar kurmi (*Aphania senegalensis*), mechowu (*Diospyros canaliculata*) and wild *Dioscorea* tubers. To collect the bark of fasa kwari (*Fagara zanthoxyloides*), midribs and fronds of Raphia palm, rhizomes of kubla (*Thonningia sanguinea*) and stems of climbing palms (kwagiri). To make bows from kadanyar kurmi (*Pleiocarpa* sp.). To hunt and fish. To Ganjamare Zummi and Gangatuwe of Do, the right to reside and farm in an enclave of 0.6 km².

**Gashaka-Mambilla Native Authority:
Kamatan Forest Reserve Order, 1962 (Chapter 8)****Area**

c. 117 km²

Location

Mambilla escarpment and foothills south and east of Mai Idanu.

Topography

Steep slopes with precipitous valleys in the foothills.

Comprising

Principally open savanna but with small areas of *Uapaca* woodland, and some fringing forest associated with the headstreams of the Mbam, a tributary of the River Kam. The latter include Kurmin Kamatan, Kurmin Mayo Danki and Kurmin Matasirip in the broken foothills east of Mai Idanu. Waterbuck, Hartebeeste and Bushcow are present.

Rights

The collection of thatching grass, honey and beeswax, clay for pot making, dead wood for fuel, canes of gora (bamboo), and kwagiri (*Calamus* sp.), leaves of kajinjiri (*Phoenix reclinata*) and tukuruwa (*Raphia* sp.), tubers of wild *Dioscorea*, and the fruits of jabbe leinde (*Aframomum* spp.), gwandar daji (*Annona senegalensis*), chiwo (*Landolphia* spp.), dorowa (*Parkia clappertoniana*), masoro (*Piper guineense*), malmo (*Syzygium guineense*) and dinya (*Vitex doniana*).

Appendix 2

The Alantika Mountains

General description

The Alantika Mountains extend for some 40 km north-eastwards along the border with the Cameroon Republic. Seen from Yola beyond the flood plain of the Benue River, with the Vere Hills in the foreground, they appear as an abrupt escarpment above the eastern border of the Ini Plain. In the Land Resource Study classification the Alantika Mountains, with the Vere Hills, fall within Land System 18; viz. “slopes rising some 610 m above the plain to more level areas of rugged and rolling uplands 910-1220 m above sea level”. Stony soils characterise the scarp, with deeper soils on the more level upland areas and the floors of the wider valleys. The climate would appear to be much drier than the highland areas further south.

For long these uplands have been occupied by two small and, until recently, isolated pagan tribes, the Koma and Vomni. The system of terraced agriculture they developed was (in 1978) in decline as people moved to the plains. Most of the terracing is on the upper part of the escarpment.

Hepper visited the Alantikas from Mapeo in December, 1957. The way of life which he portrayed (Hepper, 1962) appeared to have altered little at the time of the writer's visit in June, 1978.

Along the foot of the hills from Mapeo to the village of Soncha is a park-like landscape with well-developed *Parkia biglobosa* (Hausa name dorowa), many of them parasitised by *Loranthus*, *Butyrospermum paradoxum* (kadanya) and *Daniellia oliveri* (maje) particularly conspicuous. From Soncha, 3 km from Mapeo, the approach to the mountains follows the Senchi valley.

Around hamlets, *Adansonia digitata* (kuka), *Ceiba pentandra* (rimi) and *Tamarindus indica* (tsamiya) were characteristic trees. Two other “farm trees”, preserved for their fruits, were *Vitex doniana* (dinya) and *Haematostaphis barteri*. Beehives were lodged in some trees. Other trees, many of them lopped more or less heavily for firewood, included *Annona senegalensis*, *Anogeissus leiocarpus*, *Bombax costatum*, *Crossopteryx febrifuga*, *Euphorbia kamerunica* (one group of three trees), *Lannea kerstingii*, *Nauclea latifolia*, *Parinari curatellifolia*, *Piliostigma thonningii*, and *Terminalia* sp. *Adina microcephala*, much stunted and usually lopped, and *Vincintella passargei* were the only stream-bank trees. Going up the valley, hamlets and the houses of family groups were never far away. Guinea corn was growing on slopes as steep as 45°. Nevertheless, the general impression was of open, rather stunted woodland. The species composition was at first much as it was at the bottom of the hills. Further up, some other trees began to appear, for example *Borassus aethiopum* (giginya) (only very occasional), *Boswellia dalzielii* (hano), *Ficus* sp = JDC 5163 from Mambilla (*Ficus glumosa*), and *Khaya senegalensis* (madachi). Well up the valley, around Dango village, *Khaya senegalensis* became quite common, the trees well proportioned. *Parkia biglobosa*, not lopped and of considerable size, was conspicuous, also *Canarium schweinfurthii* (atile), the latter probably planted here as it is in parts of Jos Plateau. The fruits are sold in the market at Karlahi.

The cactus-like shrub *Euphorbia ?venenifca* (= Hepper 1386), first recorded from this locality by Hepper, was common all the way up the valley (Hepper, 1965). Amongst herbaceous plants, *Tacca involuocrata*, and *Gloriosa* sp. were noted, with *Clematopsis scabiosifolia* and *Costus spectabilis*, all in flower.

Above Dango the stream was lined with *Syzygium guineense* subsp. *guineense* and *Vincintella passargei*. There also occurred here *Cussonia barteri* and *Harungana madagascariensis* with the wild banana *Ensete gillettii*. Further up the rocky valley, open woodland with *Anogeissus leiocarpus* and *Parkia biglobosa* persisted in stunted form.

Around the scattered village of Delingi, *Adansonia digitata*, *Canarium schweinfurthii* 9-12 m high, and *Tamarindus indica* were again common, along with *Acacia albida*, *Antiaris toxicaria* and JDC 5472 with prolific edible fruits.

At the head of the valley, on more or less flat ground, was a small wood c. 46 m wide, protected from fire and apparently a graveyard. None of the trees was more than 12 m high. Trees noted were *Clausena anisata*, *Croton* sp. ?*macrostachyus*, (an emergent), *Cussonia barteri* (just inside), *Garcinia afzelii* (prominent among the larger trees), and *Pittosporum* sp. The shrub *Carissa edulis* with an abundance of red fruits was common along the edge. Whether such small protected woods represent all there is of forest vegetation on the Alantikas remains to be discovered but it would seem quite possible.

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Appendix 3

Gangumi and Wurkam River forest enumeration data

Summary of the 1954-55 dry season forest enumeration
by A. F. Trappes-Lomax and party¹.

Gangumi

From a baseline on a bearing of 360°, close to the western edge of the forest, three cutlines totalling 10 km in length were made at 1.6 km intervals through the forest, and a strip, 13.2 m (1 chain) wide enumerated along each line. The area enumerated (c. 22 ha) represented 0.8% of the 28.5 square km of high forest. All identified tree species over 60 cm in girth (20 cm in diameter) were recorded.

The abundance of *Pterygota macrocarpa* and *Ricinodendron heudelottii* is striking. For 'economic species' there was a category for trees < 60 cm gbh. Trees more than 480 cm gbh were included in the top girth class. By far the most abundant species accounting for 92% of all trees > 240 cm gbh (an arbitrary figure intended to represent trees of exploitable size) was *Azelia africana*. The most valuable trees, *Chlorophora excelsa* and *Khaya grandifoliola* are extremely scarce.

Wurkam River

At Kurmin Nya, the second largest block of high forest after Gangumi, 26.5 ha (approx. 0.2% of an estimated 20.7 square km of high forest in the Wurkam River group) were enumerated. Starting from a point due east of Gidan Anju village a line was cut through the forest for 1.44 km on a bearing of 99° T.N. All identified tree species in a 30 m wide strip were enumerated in 120 cm girth classes. Again the most abundant species were *Pterygota macrocarpa* and *Ricinodendron heudelottii*. Economic species, including *Azelia africana*, were very poorly represented. No mahogany (*Khaya grandifoliola*) was recorded.

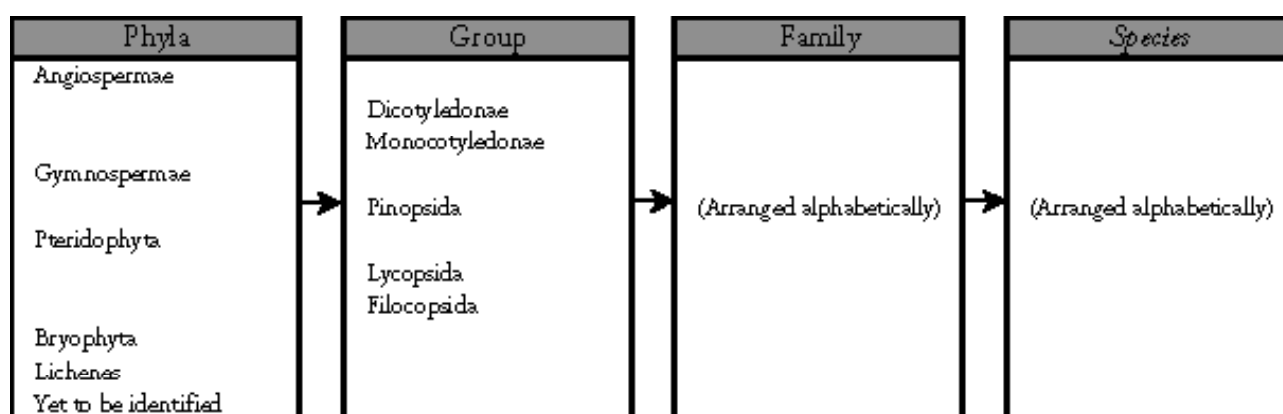
¹Trappes-Lomax, A.F. (1955). Report on a forest reconnaissance tour in Adamawa Province (November 1954 - February 1955). Unpublished report for Ministry of Animal and Forestry Resources, Northern Nigeria.

Distribution of girth classes, Gangumi River Forest.

Species	G.B.H.	G.B.H.	G.B.H.	G.B.H.	G.B.H.	G.B.H.	G.B.H.	G.B.H.	G.B.H.	G.B.H.	Total	Trees per	Trees per
	< 60 cm	60-121	121-180	181-240	241-300	301-360	361-420	421-480	>480	>240 cm G.B.H.	Total	acre	acre
<i>Atfelia africana</i>		9	10	28	29	23	23	6	6		134	2.454	1.593
<i>Albizia</i> spp.		7	3		2						12	0.219	0.036
<i>Antiaris africana</i>	1	8	2	1							12	0.219	
<i>Berlinia</i> sp.		10	4	2							16	0.293	
<i>Chlorophora excelsa</i>	2	3	1						1		7	0.128	0.019
<i>Khaya grandifoliola</i>	2	4	1	1	1						9	0.165	0.019
<i>Terminalia superba</i>	4	14	1	6	4						29	0.531	0.073
Total	9	55	22	38	36	23	23	6	7	219	4.01	1.74	

Checklist - First Edition

The checklist is organised in the following general format:



Families or species may also be located directly, by reference to the index at the rear of this report.

Each record attributed to a species may contain the following additional information:

Abbreviations where used:

Collector: FNH= Nigel Hepper, HMC= Hazel Chapman, JDC= Jim Chapman, L & D= M.G. Latilo & B. Daramola, Peal= John Peal, Trappes-Lomax= A.F. Trappes-Lomax;

Collection No: SR where a sight record;

Altitude (m);

Site: CH=Cabbal Hendu, CW=Cabbal Wade, *P.S.P.* forest = *Prunus-Syzygium-Podocarpus* forest, VP=Vogel Peak;

Date of record;

Frequency: a=abundant, d=dominant, f=frequent, o=occasional, r=rare, w= widespread (prefix l=local);

Form: Br=Bryophyte, E=epiphyte (or epiphytic), F=Fern, FA=Fern Ally, H=herb, L=Lichen, LIAN= liane, T= tree, SH= shrub, WC=woody climber;

Habitat & Notes.

ANGIOSPERMAE

DICOTYLEDONAE

Acanthaceae

Acanthus montanus (Nees) T. Anderson

FNH 1467, Alt: n/a, site: VP fringing forest, form: H, Habitat: Riverine forest. Notes: At the foot of Vogel Peak.

JDC 3814, Alt: 909m, site: River Nwum F.R., (6/04/75), form: H, Habitat: Forest margin & secondary forest.

JDC 4415, Alt: 1667m, site: CH upland forest, (29/04/76), freq: la, form: SH, Habitat: Steep shady bank of forest stream. Notes: Sterile.

JDC 4998, Alt: 229m, site: Gangumi F.R., (22/05/77), freq: o, form: SH, Habitat: Fringing forest/Stream banks.

JDC SR, Alt: c. 305m, site: Western escarpment of Mambilla, freq: o, form: H, Habitat: Fringing forest. Notes: Gidan Bature to Batu Amanda.

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, form: H.

JDC SR, Alt: 229m, site: River Amboi F.R., form: H, Habitat: Wooded grassland.

JDC SR, Alt: 229m, site: River Amboi F.R., form: H, Habitat: Tall secondary forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: H, Habitat: Transition woodland/Young secondary forest.

Barleria ruellioides T. Anderson

JDC 3966, Alt: 1440m, site: Gangoro forest, (30/11/75), form: H, Habitat: Forest.

Brillantaisia owariensis P. Beauv.

JDC 3313, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: la, form: H, Habitat: Forest margin.

JDC 3522, Alt: 1970m, site: CW *Pouteria altissima* forest, (16/11/74), form: SH, Habitat: Forest margin.

JDC 5258, Alt: 833m, site: Akwaizantar, (15/02/78), form: H, Habitat: Forest. Notes: 60-90cm (2-3ft.) tall, on shady stream bank.

Brillantaisia sp.

JDC 4017, Alt: 1440m, site: Gangoro forest, (3/12/75), form: SH, Habitat: Fringing forest. Notes: Under light canopy, handsome purple flowers.

Dicliptera laxata C.B. Clarke

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Eremomastax cf speciosa (Hochst.) Cufod.

JDC 3554, Alt: 1818m, site: CW *Pouteria altissima* forest, (21/11/74), form: H.

Hypoestes aristata (Vahl) Sol. ex Roem. & Schult. var. *aristata*

FNH 1459, Alt: n/a, site: VP fringing forest, form: H, Habitat: On rocks in riverine forest at the foot of Vogel Peak.

Hypoestes forskalei (Vahl) Sol. ex Roem. & Schult.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: ld, form: H, Habitat: Where canopy is open.

Hypoestes rosea P. Beauv.

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, form: H.

Justicia insularis T. Anderson

JDC 3400, Alt: 1970m, site: Gangirwal forest grassland ecotone, (4/11/74), form: H.

Justicia striata (Klotzsch) Bullock

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Justicia tenella (Nees) T. Anderson

FNH 1469, Alt: n/a, site: VP fringing forest, form: H, Habitat: On rocks in riverine forest at the foot of Vogel Peak.

Phaulopsis barteri T. Anderson

JDC 4222, Alt: 1440m, site: Gangoro forest, (26/02/76), form: SH, Habitat: Forest.

Ruspolia hypocrateriformis (Vahl) Milne-Redh.

JDC 3986, Alt: 1440m, site: Gangoro forest, (1/12/75), form: WC, Habitat: Forest.

Thunbergia togoensis Lindau

JDC 2968, Alt: 840m, site: River Nwum F.R., (9/07/72), form: H, Habitat: Edge of stream fringing forest near Antere school.

Thunbergia sp.

JDC 3543, Alt: 1818m, site: CW *Pouteria altissima* forest, (20/11/74), form: LIAN. Notes: Flowers collected.

Alangiaceae

Alangium chinense (Lour.) Harms

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: r, form: T.

Amaranthaceae

Cyathula prostrata (L.) Blume var. *pedicellata*

(C.B. Clarke) Cavaco

JDC 4029, Alt: 1440m, site: Gangoro forest, (4/12/75), form: H, Habitat:

Amongst rocks beside forest stream.

Anacardiaceae

Haematostaphis barteri Hook.f.

L.& D. (FHI) 28862, Alt: n/a, site: Gangumi, freq: r, form: T, Habitat: Savanna.

JDC 4713, Alt: 758m, site: VP woodland, (24/02/77), form: T, Habitat: Open woodland. Notes: Early flowers. Western slopes of Vogel Peak, above Jangla. Fruits blood red and edible. Fulfulde name: Tursuhi.

Lannea barteri (Oliv.) Engl.

JDC 3773, Alt: 1061m, site: River Nwum F.R., (29/03/75), freq: o, form: T, Habitat: In wooded grassland.

JDC SR, Alt: 229m, site: River Amboi F.R., freq: o, form: T, Habitat: Restricted to occasional small enclaves of wooded grassland.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Restricted to patches of wooded grassland.

Lannea schimperi (Hochst. ex A. Rich.) Engl.

JDC 5203, Alt: 1212m, site: Akwaizantar grassland, (4/02/78), freq: o, form: T, Habitat: Forest.

Lannea sp.

JDC 4992, Alt: 229m, site: Gangumi, (21/05/77), freq: f, form: T, Habitat: Savanna. Notes: Sterile collection.

Mangifera indica L.

JDC SR, Alt: n/a, site: Gangumi, freq: f, form: T, Habitat: Cultivated. Notes: Several up to 22m tall. At old Gangumi.

Pseudospondias cf microcarpa Engl.

JDC 3802, Alt: 758m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest; and on river bank. Notes: 15m tall. Leaves compound. Fruits (spirit material to FHO), the size of grapes, blue black when ripe. (incl. 6

Sorindeia cf grandifolia Engl.

JDC 3759, Alt: 1667m, site: CW, (28/02/75), form: T. Notes: In the valley forest below Dutsin Dodo.

JDC 3760, Alt: 1667m, site: CW, (28/02/75), form: T. Notes: Fruiting. Understory tree. At Kurmin Lugapa.

Sorindeia cf juglandifolia (A. Rich.) Planch. ex Oliv.

JDC 5191, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat: Forest. Notes: Kaka name: Goom.

JDC 5352, Alt: 242m, site: River Amboi F.R., (14/04/78), freq: a, form: T, Habitat: Tall secondary forest. Notes: Sterile collection.

Annonaceae

Annona senegalensis Pers.

JDC 3780, Alt: 1061m, site: River Nwum F.R., (30/03/75), form: T, Habitat: In wooded grassland.

JDC 4795, Alt: 606m, site: VP woodland, (28/02/77), form: T, Habitat: Open woodland. Notes: Flowers not yet open. On the steep slope immediately above Jangla village on the path to Vogel Peak.

JDC 4965, Alt: 229m, site: Gangumi, (15/05/77), freq: f, form: T, Habitat: Savanna. Notes: Right to collect the fruits.

Cleistopholis patens (Benth.) Engl. & Diels

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Friesodielsia sp.

JDC 3675, Alt: 1818m, site: CW *Pouteria altissima* forest, (8/02/75), form: LIAN. Notes: Fruits collected.

Isolona cf deightonii Keay ** New to Nigeria? **

JDC 4543, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot.

Monanthotaxis?

JDC 4663, Alt: 1515m, site: Mambilla Plateau, (10/02/77), form: WC, Habitat: In narrow belt of low forest between grassland and forest proper. Notes: Fruiting.

Monodora tenuifolia Benth.

JDC 3791, Alt: 909m, site: River Nwum F.R., (2/04/75), form: T, Habitat: Forest.

JDC 3798, Alt: 909m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest.

Monodora sp.

JDC 4789, Alt: 1364m, site: VP fringing forest, (27/02/77), freq: o, form: T, Habitat: Nr. Hepper's Camp.

JDC 4912, Alt: 758m, site: River Nwum F.R., (18/04/77), form: T, Habitat: Forest, on riverbank. Notes: ? = *Monodora tenuifolia*.

JDC 5170, Alt: 1364m, site: Akwaizantar, (31/01/78), freq: o, form: T, Habitat: Forest. Notes: Flowers collected.

JDC SR, Alt: 229m, site: Baissa, form: T.

Pachypodanthium staudtii (Engl. & Diels) Engl. & Diels

JDC 4973, Alt: 229m, site: Gangumi F.R., (17/05/77), form: T, Habitat: Forest.

Xylopiia acutiflora (Dun.) A. Rich.

JDC 3329, Alt: 1515m, site: Ngel Nyaki, (10/11/73), form: T.

JDC 3786, Alt: 1061m, site: River Nwum F.R., (31/03/75), form: T, Habitat: Forest.

JDC 4148, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest.

JDC 4570, Alt: 1515m, site: Ngel Nyaki, (4/08/76), form: T, Habitat: Submontane forest. Notes: Sterile. Small tree. At enumeration plot. Occasional fruiting specimens.

JDC 4618, Alt: 1515m, site: Ngel Nyaki, (3/02/77), form: T, Habitat: Submontane forest. Notes: Immature fruits. 6m tall understory tree.

JDC SR, Alt: 853-1067m & 1143m, site: Akwaizantar, freq: f, form: T, Habitat: Forest. Notes: Small understory tree.

Apiaceae

Agrocharis melanantha Hochst.

HMC 118, Alt: 1667m, site: Ngel Nyaki, (18/08/73), freq: o, form: H, Habitat: Forest margin.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: lf, form: H.

Peucedanum angustisectum (Engl.) Norman

RED DATA LISTED: LR/nt

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w/la.

Sanicula elata D. Don

JDC 4445, Alt: 1667m, site: CH upland forest, (6/05/76), freq: o, form: H, Habitat: Stream banks.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Steganotaenia araliacea Hochst.

L.& D. (FHI) 18856, Alt: n/a, site: Gangumi, freq: r, form: T, Habitat: Savanna.

Apocynaceae

Alafia multiflora (Stapf) Stapf

JDC 4492, Alt: 379m, site: Gashaka, (15/05/76), form: WC, Habitat: Stream bank at Gidan Kwano.

Alstonia boonei De Wild.

HMC 149, Alt: 212m, site: Baissa, (28/07/74), form: T, Habitat: Forest.

JDC 3808, Alt: 758m, site: River Nwum F.R., (5/04/75), freq: f, form: T, Habitat: Forest. Notes: Incl. 1 large tree in profile strip 2 & 6 trees in S.P.

JDC 4892, Alt: 758m, site: River Nwum F.R., (11/04/77), form: T, Habitat: Forest. Notes: Incl. 1 large tree in profile strip 2 & 6 trees in S.P.

JDC 4958, Alt: 229m, site: Gangumi F.R., (13/05/77), freq: f, form: T, Habitat: Forest.

JDC 5225, Alt: 1061m, site: Akwaizantar, (8/02/78), form: T, Habitat: Forest. Notes: Observed from just below the saddle to the sample plot on the valley floor at 853m. In sample plot No.4.

JDC 5418, Alt: 242m, site: River Amboi F.R., (24/04/78), form: T, Habitat: Tall secondary forest.

Ancylobotrys amoena Hua

JDC 4161, Alt: 1440m, site: Gangoro forest, (12/02/76), form: WC, Habitat: Forest margin.

JDC 4761, Alt: 1667m, site: VP amphitheatre, (26/02/77), form: SH. Notes: Scrambling/climbing shrub. In thicket bordering a stream near the principal summit of the massif.

Callichilia sp.

JDC 4977, Alt: 229m, site: Gangumi F.R., (17/05/77), form: SH, Habitat: Stream banks. Notes: Erect 2.5m (8 ft) tall.

JDC 5333, Alt: 242m, site: River Amboi F.R., (11/04/78), form: SH, Habitat: Tall secondary forest. Notes: Flowers collected. Up to 1.8m tall. Erect undershrub with conspicuous white hyacinth-scented flowers.

Carissa edulis (Forssk.) Vahl

JDC 4760, Alt: 1667m, site: VP amphitheatre, (26/02/77), form: SH. Notes: Spreading shrub. In thicket bordering trees along a stream just near the main summit of Vogel Peak.

Dictyophleba rudens Hepper

FNH 1470, Alt: n/a, site: VP fringing forest, form: WC. Notes: A new species described and identified by Hepper, presumed to be endemic to Vogel Peak. Kew.Bull.16:451.1963 Not in Lebrun and Stork.

Funtumia elastica (Preuss) Stapf

JDC 3856, Alt: 758m, site: River Nwum F.R., (14/04/75), freq: f/la, form: T, Habitat: Forest. Notes: Incl. tree 18 in profile strip 2 & 70 trees in S.P.

JDC 4830, Alt: 758m, site: River Nwum F.R., (1/04/77), freq: f/la, form: T, Habitat: Forest. Notes: Incl. tree 18 in profile strip 2 & 70 trees in S.P.

JDC 5440, Alt: 242m, site: Baissa, (2/05/78), form: T. Notes: Fruits collected.

Holarrhena floribunda (G. Don) T. Durand & Schinz

L.& D. (FHI) 28917, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Stream banks.

Landolphia incerta (K. Schum.) Pers.

JDC 3894, Alt: 606m, site: River Nwum F.R., (21/04/75), form: WC, Habitat: Forest. Notes: Flowering and fruiting. Said to be the most preferred liane for making, and repairing tie-tie (hammock) bridges.

Landolphia landolphioides (Hall. f.) A. Chev.

JDC 5189, Alt: 1212m, site: Akwaizantar, (3/02/78), freq: f, form: WC, Habitat: Forest. Notes: Fruits. Greatly relished by monkeys and, when ripe, people. Fulfulde: Belbel leinde.

Landolphia owariensis P. Beauv.

FNH 1517, Alt: n/a, site: VP amphitheatre, form: WC.

JDC 2950, Alt: 840m, site: River Nwum F.R., (7/07/72), form: WC, Habitat: Forest.

JDC 4159, Alt: 1440m, site: Gangoro forest, (11/02/76), form: WC, Habitat: Forest margin & in forest.

Landolphia sp.

JDC 3871, Alt: 606m, site: River Nwum F.R., (16/04/75), form: WC, Habitat: Forest margin. Notes: Fruiting. Also found in secondary forest. Kaka name: Ley.

JDC 3911, Alt: 606m, site: River Nwum F.R., (25/04/75), form: WC, Habitat: High Forest. Notes: Fruiting. Fruits smaller, but similar to JDC 3871, and called by the same name in this area: Ley.

JDC 4005, Alt: 1440m, site: Gangoro forest, (2/12/75), form: WC, Habitat: Forest margin.

JDC 4142, Alt: 1440m, site: Gangoro forest, (10/02/76), form: WC, Habitat: Forest.

JDC 4409, Alt: 1667m, site: CH upland forest, (28/04/76), freq: f, form: WC, Habitat: Forest. Notes: Fruiting. Fruits, when ripe are regular diet of monkeys. Fulfulde name: Belbel linedi.

JDC 5372, Alt: 242m, site: River Amboi F.R., (17/04/78), form: LIAN, Habitat: Wooded grassland. Notes: One fruit collected in spirit. Liane.

Stem 7.5cm in diameter, fruits up to 10cm in diameter: warty, pulp edible.
JDC 5381, Alt: 242m, site: River Amboi F.R., (18/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: One fruit collected in spirit. Liane similar to JDC 5372, but the fruits, ripening to orange, are not warty.

Motandra guineensis (Thonn.) A. DC.

JDC 2962, Alt: 840m, site: River Nwum F.R., (7/07/72), form: SH, Habitat: Forest. Notes: Climbing shrub.

JDC 5332, Alt: 242m, site: River Amboi F.R., (11/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Climbing shrub.

***Oncinotis* sp.**

JDC 3489, Alt: 1829m, site: CW *Pouteria altissima* forest, (12/11/74), form: LIAN. Notes: Fruits collected, edible.

Picalima nitida (Stapf) T. Durand & H. Durand

JDC SR, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest. Notes: Understory tree. Recorded at Gangumi and also Kurmin Nya, Wurkam River F.R. in 1954.

Pleiocarpa pycnantha (K. Schum.) Stapf

JDC 3325, Alt: 1515m, site: Ngel Nyaki, (9/11/73), freq: f, form: T.
JDC 4581, Alt: 1515m, site: Ngel Nyaki, (5/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. 12m tall understory tree. At enumeration plot.

***Pleiocarpa* sp.**

JDC SR, Alt: 229m, site: Wurkam River F.R., form: WC, Habitat: Forest. Notes: May be small tree. Right to take the wood for bows.

Rauvolfia caffra Sond.

JDC 4050, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Stream banks.
JDC 4228, Alt: 1440m, site: Gangoro forest, (28/02/76), form: T, Habitat: Stream banks.

Rauvolfia vomitoria Afzel.

JDC 2825, Alt: 1515m, site: Ngel Nyaki, (17/05/72), freq: o, form: T, Habitat: Forest margin.
JDC 4309, Alt: 455m, site: Gashaka, (12/04/76), form: T, Habitat: Stream banks. Notes: Flowering. At Gidan Gwana.
JDC 4380, Alt: 1667m, site: CH upland forest, (24/04/76), freq: o, form: T, Habitat: Forest margin.
JDC 4891, Alt: 758m, site: River Nwum F.R., (11/04/77), form: T, Habitat: Forest margin.
JDC 5243, Alt: 1061m, site: Akwaizantar, (10/02/78), form: T, Habitat: Forest. Notes: One tree.

JDC 5312, Alt: 242m, site: River Amboi F.R., (9/04/78), form: T, Habitat: Transition woodland/Young secondary forest.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

Saba comorensis (Bojer) Pichon

JDC 4500, Alt: 909m, site: River Nwum F.R., (30/06/76), form: WC,

Habitat: Forest.

JDC 4829, Alt: 758m, site: River Nwum F.R., (30/03/77), form: WC, Habitat: Forest.

JDC 4936, Alt: 229m, site: Gangumi F.R., (9/05/77), form: WC, Habitat: Forest. Notes: Common liana; the lemon-yellow warty fruits up to 12.7 x 8.9 cm (5 x 3½ in) are edible. Right to collect the fruits.

Saba thompsonii (A. Chev.) Pichon

JDC 4565, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: f, form: WC, Habitat: Submontane forest. Notes: Fruiting. Fruits edible.

Strophanthus hispidus DC.

JDC 5363, Alt: 242m, site: River Amboi F.R., (16/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Stem up to 5cm in diameter, sometimes several twining together tightly to form a massive woody cable.

Strophanthus sarmentosus DC.

FNH 1466, Alt: n/a, site: VP fringing forest, form: SH. Notes: At the foot of Vogel Peak.

JDC 4996, Alt: 229m, site: Gangumi, (22/05/77), form: WC, Habitat: Cultivated. Notes: Fruits/flowers collected. A source of arrow poison cultivated at Tonti and (JDC4996) old Gangumi. The stem of the latter 20cm (8in) in diameter, clasping the supporting mango so tightly as to cut deeply into the stem, the spreading crown over-shadowing the host tree.

Tabernaemontana contorta Stapf

JDC 3142, Alt: 1667m, site: Ngel Nyaki, (10/05/73), form: T.

***Tabernaemontana* sp.**

JDC 3796, Alt: 682m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest. Notes: Profile strip 2 and 10 trees in S.P.

JDC 4003, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest.

JDC 4170, Alt: 1440m, site: Gangoro forest, (13/02/76), form: T, Habitat: Forest.

JDC 4780, Alt: 1515m, site: VP amphitheatre, (27/02/77), form: T. Notes: Yet to be determined. Flowering material collected incl. flowers in spirit.

JDC 5172, Alt: 1364m, site: Akwaizantar, (31/01/78), freq: o, form: T, Habitat: Forest. Notes: Fruits collected in spirit.

JDC 5308, Alt: 242m, site: River Amboi F.R., (9/04/78), form: T, Habitat: Transition woodland/Young secondary forest. Notes: Flowers collected.

Voacanga africana Stapf

JDC 4853, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. JDC 4931, Alt: 229m, site: Gangumi F.R., (7/05/77), form: T, Habitat: Forest.

Voacanga bracteata Stapf

JDC 3332, Alt: 1515m, site: Ngel Nyaki, (10/11/73), form: T. Notes: Tree 56 on profile strip.

JDC 4555, Alt: 1515m, site: Ngel Nyaki, (3/08/76), form: T, Habitat: Submontane forest. Notes: Fruiting. Tall tree. At enumeration plot.

Aquifoliaceae

Ilex mitis (L.) Radlk.

JDC 3703, Alt: 2121m, site: Gangirwal, (9/02/75), form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

Araliaceae

Cussonia arborea Hochst. ex A. Rich.

JDC SR, Alt: 610-1067m, site: River Nwum F.R., form: T, Habitat: In wooded grassland.

JDC SR, Alt: From c.1067m, site: CH escarp & fringing forest, form: T.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

Polyscias fulva (Hiern) Harms

JDC 4466, Alt: 1667m, site: CH upland forest, (11/05/76), freq: o, form: T. Notes: At S.P.

JDC 4739, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: f, form: T, Habitat: From c.1372 m upwards.

JDC 5173, Alt: 1364m, site: Akwaizantar, (31/01/78), form: T, Habitat: Forest. Notes: Also common throughout including forest margins - at the sample plot all girth classes from 0.30m to 1.52m (1 - 5ft.) were represented. Mambilla name: Lhun.

JDC 5320, Alt: 242m, site: River Amboi F.R., (10/04/78), form: T, Habitat: Transition woodland/Young secondary forest.

JDC SR, Alt: 610m, site: Western escarpment of Mambilla, form: T, Habitat: Forest. Notes: Conspicuous around 610m in secondary forest, where it may form pure stands, or fringing streams.

JDC SR, Alt: n/a, site: Ngel Nyaki, freq: o, form: T. Notes: Tree 8 on profile strip.

JDC SR, Alt: n/a, site: River Nwum F.R., form: T, Habitat: Gaps in forest. Notes: Incl. 1 tree in S.P. Persists from early seral stage.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: River Nwum F.R., form: T, Habitat: In forest regrowth. Notes: Occasional, beginning to emerge.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

Schefflera abyssinica (Hochst. ex A. Rich.) Harms

JDC 2712, Alt: 1515m, site: Ngel Nyaki, (1/03/72), freq: o, form: T.

JDC 4321, Alt: 1364m, site: CH upland forest, (17/04/76), freq: o, form: T, Habitat: Submontane forest. Notes: Flowering. New leaves. 10.6m tall. Either a strangler or growing independently.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: E. Notes: Strangling epiphyte.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: E. Notes: Strangling epiphyte.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: E. Notes: Strangling epiphyte.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: E. Notes: Strangling epiphyte.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: E. Notes: Strangling epiphyte.

Schefflera barteri (Seem.) Harms

JDC SR, Alt: n/a, site: River Nwum F.R., form: WC, Habitat: Stream fringing forest.

Schefflera sp.

JDC 5257, Alt: 833m, site: Akwaizantar, (15/02/78), form: SH, Habitat: Forest. Notes: Sterile collection. Climbing shrub, seen once.

Aristolochiaceae

Pararistolochia goldieana (Hook.f.) Hutch. & Dalziel

JDC 4903, Alt: 758m, site: River Nwum F.R., (13/04/77), form: WC, Habitat: Forest.

JDC SR, Alt: 229m, site: Gangumi F.R., freq: o, form: WC, Habitat: Forest.

Pararistolochia cf leonensis (Mast.) Hutch. & Dalziel

JDC 4606, Alt: 1515m, site: Ngel Nyaki, (11/08/76), freq: o, form: WC, Habitat: Submontane forest. Notes: Fruiting. Present but not collected at the enumeration plot.

Pararistolochia macrocarpa (Duch.) Poncy

JDC 5434, Alt: 242m, site: Baissa, (1/05/78), form: WC, Habitat: Forest.

Asclepiadaceae

Margaretta rosea Oliv.

JDC 4352, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: f, form: H, Habitat: Regularly grazed grassland. Notes: Flowering. Resistant to trampling.

Mondia sp.

JDC 4206, Alt: 1440m, site: Gangoro forest, (23/02/76), form: T, Habitat: Forest.

JDC 4991, Alt: 229m, site: Gangumi F.R., (21/05/77), form: T, Habitat: Forest.

JDC 5358, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile collection.

Yet to be identified

JDC 3480, Alt: 1970m, site: CW *Albizia gummifera* forest, (10/11/74), form: WC, Habitat: Stream fringe.

JDC 4807, Alt: 1364m, site: River Nwum F.R., (25/03/77), form: WC, Habitat: Forest. Notes: Slender stem. Fruiting material collected.

Balanitaceae

Balanites wilsoniana Dawe & Sprague

JDC 3000, Alt: 1212m, site: River Nwum F.R., (26/12/72), form: T. Notes: One fruit sent to F.H.O. 7.6 x 5.1cm (3 x 2in); pointed, the outer part rotted off.

JDC 4502, Alt: 909m, site: River Nwum F.R., (30/06/76), form: T, Habitat: Forest. Notes: Incl. 1 large tree in S.P.

JDC 4887, Alt: 758m, site: River Nwum F.R., (11/04/77), form: T, Habitat: Forest. Notes: Incl. 1 large tree in S.P.

JDC 5389, Alt: 242m, site: River Amboi F.R., (19/04/78), form: T, Habitat: Tall secondary forest.

JDC 5455, Alt: 242m, site: Baissa, (5/05/78), form: T.

Balanophoraceae

Thonningia sanguinea Vahl

HMC 172, Alt: 212m, site: Nr. Bissaula, (3/08/74), form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: Wurkam River F.R., form: WC, Habitat: Forest. Notes: Root parasite. Right to collect rhizomes.

Balsaminaceae

Impatiens hochstetteri Warb. subsp. *jacquesii* (Keay)

Grey-Wilson

JDC 3444, Alt: 1970m, site: CW *Albizia gummifera* forest, (7/11/74), form: H.

Impatiens kamerunensis Warb. subsp. *obanensis* (Keay)

Grey-Wilson

JDC 3404, Alt: 1970m, site: Gangirwal, (4/11/74), form: H.

JDC 4479, Alt: 1667m, site: CH upland forest, (14/05/76), freq: r, form: H, Habitat: By forest streams.

Impatiens sakeriana Hook.f.

JDC 3409, Alt: 1970m, site: Gangirwal, (4/11/74), form: H. Notes: Near *C. subcordatum* DC.

Impatiens sp.

HMC 110, Alt: 1667m, site: Ngel Nyaki, (17/08/73), freq: o, form: H, Habitat: Forest margin.

JDC 3461, Alt: 1970m, site: CW *Albizia gummifera* forest, (8/11/74), freq: r, form: H. Notes: In deep shade. HMC 119 from Ngel Nyaki.

JDC 3524, Alt: 1970m, site: CW *Pouteria altissima* forest, (16/11/74), form: H.

JDC 3917, Alt: 606m, site: River Nwum F.R., (25/04/75), form: H, Habitat: High forest. Notes: 30cm high. The pinkish purple colour of the flowers has been lost in the spirit material. A few plants found in damp ground at the edge of a stream where there is plenty of light.

Begoniaceae

Begonia cf mannii Hook.f.

JDC 2948, Alt: 840m, site: River Nwum F.R., (7/07/72), form: EH, Habitat: Forest.

JDC 3567, Alt: 1829m, site: CW *Albizia gummifera* forest, (23/11/74), form: EH. Notes: On a branch 6m up.

Begonia sp.

JDC 4443, Alt: 1667m, site: CH upland forest, (6/05/76), freq: r, form: EH, Habitat: Forest. Notes: Flowers in spirit.

JDC 4609, Alt: 1515m, site: Ngel Nyaki, (12/08/76), freq: r, form: EH, Habitat: Pendent 1m in the crown of a tall tree. Notes: Fruiting.

Bignoniaceae

Kigelia africana (Lam.) Benth.

JDC 3805, Alt: 758m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest. Notes: Planted at shrines in villages in the area.

Markhamia tomentosa (Benth.) K. Schum. ex Engl.

JDC 4851, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Incl. 4 Trees in S.P.

JDC 5192, Alt: 1212m, site: Akwaizantar grassland, (3/02/78), freq: o, form: T, Habitat: Forest.

JDC 5218, Alt: 1061m, site: Akwaizantar, (6/02/78), freq: o, form: T, Habitat: Forest. Notes: Sporadic in wooded grassland. 37 trees in the 0.31, 0.61 & 0.91m girth classes.

Newbouldia laevis (P. Beauv.) Seem. ex Bureau

JDC 4557, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot.

JDC 4577, Alt: 1515m, site: Ngel Nyaki, (5/08/76), freq: a, form: Br, Habitat: Submontane forest. Notes: Common on tree trunks.

JDC 5368, Alt: 242m, site: River Amboi F.R., (17/04/78), form: T. Notes: Sterile gathering. 8m tall. Soft, pale coloured bark and prominent lenticels. Leaves compound, in whorls of three; 45-60cm long, the leaflets opposite, sessile, acuminate, c. 15 x 7.5cm, with inky coloured glands at the base. Said to be a compound fence tree. Trees 17 & 37 on the profile strip.

JDC SR, Alt: n/a, site: Gangumi, freq: f, form: T, Habitat: Cultivated. Notes: Kwagiri & Tonti. Frequently planted as fence tree; grown from truncheons.

Spathodea campanulata P. Beauv.

L. & D. (FHI) 28741, Alt: 229m, site: Wurkam River F.R., form: T, Habitat: Forest. Notes: Kurmin Tondirim, Wurkam River F.R.

JDC 3880, Alt: 606m, site: River Nwum F.R., (17/04/75), form: T, Habitat: Forest. Notes: Fruiting. Almost leafless. 15m tall in a small forest patch in a hillside gully.

JDC 5018, Alt: 229m, site: Gangumi F.R., (26/05/77), form: T, Habitat: Forest. Notes: Leafless. About 21.2m tall. Gangumi F/Reserve. This specimen was growing at the edge of the forest where fire had destroyed the understory.

JDC 5242, Alt: 1061m, site: Akwaizantar, (10/02/78), freq: o, form: T, Habitat: Forest. Notes: Seldom above 914m. Size classes 0.61-1.81m (2-

6ft.) g.b.h. recorded at the sample plot, with the tallest tree 24m (80ft.).
JDC SR, Alt: n/a, site: Taraba River, form: T, Habitat: Stream banks. Notes: Taraba river, Jamtari.
JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

Stereospermum acuminatissimum K. Schum.

JDC 3868, Alt: 758m, site: River Nwum F.R., (15/04/75), form: T, Habitat: Forest. Notes: Incl. 2 large trees in S.P.

Stereospermum kunthianum Cham.

JDC 3817, Alt: 909m, site: River Nwum F.R., (6/04/75), form: T, Habitat: In wooded grassland.

JDC 4939, Alt: 229m, site: Gangumi, (10/05/77), freq: o/lf, form: T, Habitat: Savanna.

JDC 5268, Alt: 985m, site: Akwaizantar grassland, (17/02/78), freq: o, form: T, Habitat: Forest.

Bombacaceae

Bombax buonopozense P. Beauv.

JDC 2998, Alt: 840m, site: River Nwum F.R., (26/12/72), form: T, Habitat: Forest. Notes: Flowers only, in spirit. Kaka name: song.

JDC 3134, Alt: 606m, site: Western escarpment of Mambilla, (4/05/73), form: T, Habitat: Forest. Notes: Nr. Buru Kassa, where a small kurmi had been farmed.

JDC 4823, Alt: 758m, site: River Nwum F.R., (28/03/77), form: T, Habitat: Forest. Notes: Flowers only, in spirit. Kaka name: song.

JDC 5267, Alt: 985m, site: Akwaizantar, (17/02/78), form: T, Habitat: Forest. Notes: Up to 37m tall. Observed from just below the saddle, to the sample plot on the valley floor at 853m. Also a common understory tree at the head of the valley. The bole cylindrical, 4.6m g.b.h. scarcely buttressed. Kaka name: song (as it is for *Ceiba pentandra*).

JDC 5400, Alt: 242m, site: River Amboi F.R., (20/04/78), form: T, Habitat: Tall secondary forest.

Bombax costatum Pellegr. & Vuill.

JDC 4803, Alt: 758m, site: VP woodland, (24/03/77), form: T, Habitat: Open woodland. Notes: Fruits almost ripe. Leafless. Low down on the south west facing slopes of the Vogel peak massif, on steep rocky ground a few hundred feet above Jangla village.

Ceiba pentandra (L.) Gaertn.

JDC 3807, Alt: 758m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest. Notes: Incl. 1 large tree in profile strip 2, and another, plus a smaller tree, in the S.P. Kaka name: song as it is for *Bombax buonopozense*.

JDC 4990, Alt: 229m, site: Gangumi F.R., (21/05/77), form: T, Habitat: Forest.

JDC 5049, Alt: 229m, site: Gangumi, (15/05/77), freq: f, form: T, Habitat: Cultivated. Notes: Fruiting. Kwagiri & Tonti villages. The cultivated form. The fruits are much larger than those of the forest tree. (cf. 4990 with fruits 10-12.7 cm (4-5 in).

JDC 5209, Alt: 1212m, site: Akwaizantar, (4/02/78), form: T, Habitat: Forest. Notes: The sample plot trees varied in girth (measured above the buttresses) from 0.3m to 4.3m+. Kaka name: song.

JDC 5417, Alt: 242m, site: River Amboi F.R., (24/04/78), form: T, Habitat:

Tall secondary forest. Notes: Fruits opening in April.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, form: T, Habitat: Forest. Notes: Left standing when the forest is farmed.

JDC SR, Alt: 229m, site: Baissa, form: T.

Boraginaceae

Cordia millenii Baker

JDC 4051, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Forest.

JDC 4167, Alt: 1440m, site: Gangoro forest, (13/02/76), form: T, Habitat: Forest.

JDC 5269, Alt: 1061m, site: Akwaizantar, (17/02/78), form: T, Habitat: Forest. Notes: Mambilla name: Fuh.

JDC SR, Alt: n/a, site: Ngel Nyaki, freq: o, form: T. Notes: Tree 4 on profile strip.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: f, form: T.

Cordia sp.

JDC 4822, Alt: 758m, site: River Nwum F.R., (28/03/77), form: T, Habitat: Forest. Notes: Sterile gathering. Inc. 10 trees in S.P. ?=*C. millenii* Bak.

Buddlejaceae

Nuxia congesta R.Br. ex Fresen.

JDC 2561, Alt: 1818m, site: Ngel Nyaki, (1/10/71), freq: r, form: T, Habitat: Forest margin.

JDC 4407, Alt: 1667m, site: CH upland forest, (28/04/76), freq: f, form: T. Notes: At profile strip & sample plot. After *Syzygium guineense* (Willd.) DC., subsp. *guineense*, it is one of the most characteristic trees.

JDC 4584, Alt: 1515m, site: Ngel Nyaki, (7/08/76), freq: r, form: T, Habitat: Forest margin. Notes: Old fruits. 13.5m tall.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzygium* streamside forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzygium* streamside forest, form: T.

Bursерaceae

Canarium schweinfurthii Engl.

JDC 3870, Alt: 758m, site: River Nwum F.R., (15/04/75), freq: lf/r, form: T, Habitat: River bank. Notes: Fruits fully formed but not ripe. 30m+ tall. On steep slope on forest edge. Rare in the forest. Kaka name: Liang. Both the aromatic resin and fruits are used by the Kaka people.

JDC 3905, Alt: 606m, site: River Nwum F.R., (23/04/75), form: T, Habitat: Forest. Notes: Sterile gathering, compound leaves.

JDC 4153, Alt: 1440m, site: Gangoro forest, (11/02/76), form: T, Habitat: Stream banks.

JDC 4491, Alt: 379m, site: Gashaka, (15/05/76), form: T, Habitat: Stream bank at Gidan Kwano.

JDC 4794, Alt: 1364m, site: VP fringing forest, (27/02/77), form: T, Habitat: In the deep valley below Hepper's Camp. Notes: 18m tall. With *Aubrevillea kerstingii* and *Chlorophora excelsa*.

JDC 5171, Alt: 1364m, site: Akwaizantar, (31/01/78), form: T, Habitat: Forest. Notes: Observed from just below the saddle, to the sample plot on the valley floor at 853m. Locally common near stream sources just below the saddle. The largest individual was 46m tall and 4.4m g.b.h. At the sample plot there were only young trees. Kaka name: Liang.

JDC SR, Alt: 366m, site: Western escarpment of Mambilla, form: T, Habitat: Forest. Notes: Nr. Batu Amanda. One tree recorded, 1.8m d.b.h., close to the water.

JDC SR, Alt: 229m, site: Baissa, form: T.

Santiria trimera (Oliv.) Aubrév

JDC 3342, Alt: 1515m, site: Ngel Nyaki, (12/11/73), form: T. Notes: About 24.2m tall, compound leaves. Most characteristic is the mango smell from the crushed new leaves, and the slash.

JDC 4594, Alt: 1515m, site: Ngel Nyaki, (8/08/76), form: T. Notes: About 2m (80") tall, compound leaves. Most characteristic is the mango smell from the crushed new leaves, and the slash.

Cactaceae

Rhipsalis baccifera (J. Mill.) Stearn

JDC 4893, Alt: 758m, site: River Nwum F.R., (11/04/77), form: ESH, Habitat: Forest margin on river bank. Notes: 15m tall. Epiphytic forest shrub pendent 2m from a horizontal branch of a river bank tree.

JDC SR, Alt: ± 457m, site: Western escarpment of Mambilla, form: ESH, Habitat: Fringing forest. Notes: Upstream from Batu Amanda.

JDC SR, Alt: n/a, site: Akwaizantar, freq: f, form: EH, Habitat: Forest. Notes: Epiphyte. On riverside trees.

Campanulaceae

Lobelia columnaris Hook.f.

RED DATA LISTED: LR/nt

JDC 4357, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: la, form: SHH, Habitat: Stream banks. Notes: Flowering almost over. Damp ground near streams.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H, Habitat: Forest margin. Notes: Up to 2.5m tall.

Wahlenbergia krebsii Cham. subsp. *arguta* (Hook.f.)

Thulin

JDC SR, Alt: Above 2286m., site: Gangirwal upland grassland, freq: o.

Wahlenbergia ramosissima (Hemsley) Thulin subsp. *ramosissima*

RED DATA LISTED: VU B1 + 2bc

Collected from Cabbal Wade and Mambilla Plateau (Cheek et al. 2000)

Capparaceae

Ritchiea albersii Gilg

JDC 3338, Alt: 1515m, site: Ngel Nyaki, (11/11/73), freq: o/lf, form: T.

JDC 4579, Alt: 1515m, site: Ngel Nyaki, (5/08/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot and profile strip.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: T.

Cecropiaceae

Musanga cecropioides R. Br.

JDC 3119, Alt: 455m, site: Western escarpment of Mambilla, (4/05/73), form: T, Habitat: Forest. Notes: From above Zongo Mata at ±700m, down to ±305m, prominent along river banks or dominant in secondary forest, forming pure stands 18-21m tall. (See also Rosevear (1932) 'The Umbrella Tree', The Nigerian Field, 1:4).

JDC 3788, Alt: 1061m, site: River Nwum F.R., (31/03/75), form: T, Habitat: River bank in forest and an abandoned farm at Antere.

JDC 5422, Alt: 242m, site: Baissa, (29/04/78), freq: o, form: T. Notes: Scattered individuals - e.g. along logging roads.

Myrianthus arboreus P. Beauv.

HMC 169, Alt: 212m, site: Baissa, (3/08/74), form: T.

JDC 3819, Alt: 833m, site: River Nwum F.R., (7/04/75), freq: f/la, form: T, Habitat: Forest. Notes: Incl. 1 tree in profile strip 2 & 27 in S.P.

JDC 5212, Alt: 1061m, site: Akwaizantar, (6/02/78), freq: o, form: T, Habitat: Forest.

JDC 5321, Alt: 242m, site: River Amboi F.R., (10/04/78), form: T, Habitat: Tall secondary forest.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, form: T, Habitat: Forest.

Celastraceae

Hippocratea sp.

JDC 4233, Alt: 1440m, site: Gangoro forest, (29/07/76), form: WC, Habitat: Forest. Notes: Fruiting- fruits winged.

Maytenus gracilipes (Welw. ex Oliv.) Exell

JDC 4435, Alt: 1667m, site: CH upland forest, (4/05/76), freq: o, form: T, Habitat: Fringing forest.

Maytenus senegalensis (Lam.) Exell

JDC 3775, Alt: 1136m, site: River Nwum F.R., (29/03/75), form: T, Habitat: In wooded grassland.

Maytenus undata (Thunb.) Blakelock

JDC SR, Alt: n/a, site: Gangirwal *Syzgium* streamside forest, form: T/SH.

Salacia pallescens Oliv.

JDC 3916, Alt: 606m, site: River Nwum F.R., (25/04/75), form: T, Habitat: High forest. Notes: Fruiting. 2.4m tall. Understory tree in high forest.

Salacia sp.

JDC 3919, Alt: 606m, site: River Nwum F.R., (25/04/75), form: WC, Habitat: Forest. Notes: Fruiting.

JDC 4018, Alt: 1440m, site: Gangoro forest, (3/12/75), form: WC, Habitat: Forest.

JDC 4280, Alt: 1440m, site: Gangoro forest, (13/03/76), form: WC, Habitat: Forest margin. Notes: Early fruiting.

Chrysobalanaceae

Maranthes ?

JDC 5375, Alt: 242m, site: River Amboi F.R., (18/04/78), form: T, Habitat: Tall secondary forest. Notes: Fruits in spirit. 27m high. Bole slender, bark soft, flaking, slash deep red.

Maranthes glabra (Oliv.) Prance

JDC 3842, Alt: 758m, site: River Nwum F.R., (10/04/75), form: T, Habitat: Forest, espec. river bank.

JDC 4207, Alt: 1440m, site: Gangoro forest, (24/02/76), form: T, Habitat: Forest.

JDC 4218, Alt: 1440m, site: Gangoro forest, (25/02/76), form: T, Habitat: Forest.

Maranthes kerstingii (Engl.) Prance

JDC 4106, Alt: 1364m, site: Gangoro forest, (6/02/76), form: T, Habitat: Stream fringing forest.

JDC 4707, Alt: 606m, site: VP fringing forest, (23/02/77), freq: o, form: T, Habitat: Common at Jangla, sporadic to c. 1067m.

JDC 4754, Alt: 1515m, site: VP amphitheatre, (26/02/77), freq: a, form: T, Habitat: c. 1219-1515m.

JDC 5259, Alt: 1061m, site: Akwaizantar, (17/02/78), form: T, Habitat: Forest.

Parinari congoensis F. Didr.

JDC 3862, Alt: 606m, site: River Nwum F.R., (15/04/75), freq: r, form: T, Habitat: Stream fringing forest. Notes: Near the Donga River.

Parinari curatellifolia Planch. ex Benth.

HMC 164, Alt: 212m, site: Baissa, (2/08/74), form: T, Habitat: Savanna Woodland/Wooded Grassland.

JDC SR, Alt: n/a, site: Gangumi, freq: lf, form: T, Habitat: Savanna.

Parinari cf excelsa Sabine

JDC 4948, Alt: 229m, site: Gangumi F.R., (12/05/77), form: T, Habitat: Forest.

JDC 5452, Alt: 242m, site: Baissa, (5/05/78), form: T. Notes: Fruiting (see spirit material). Up to 30m tall. ?= JDC 4948, Gangumi. Fruits c. 5 x 4.5cm.

Combretaceae

Anogeissus leiocarpa (DC.) Guill. & Perr.

JDC 2597, Alt: 229m, site: Baissa, (24/10/71), form: T, Habitat: Transition Woodland/Wooded Grassland. Notes: Most characteristic species.

JDC 4961, Alt: 229m, site: Gangumi, (14/05/77), freq: lf, form: T, Habitat: Savanna. Notes: Common locally in savanna, characteristic of forest margin.

JDC 5017, Alt: 229m, site: Gangumi F.R., (26/05/77), form: T, Habitat: Forest margin. Notes: Up to 24m tall. Up to 2m (6½ ft) in girth. Found along the periphery and just inside the forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Transition woodland/Young secondary forest.

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: Edge of fringing forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest, towards the forest margin. Notes: Up to 24m tall.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Transition woodland/Young secondary forest.

Combretum brassiciforme Exell

FNH 1427, Alt: 1220m, site: VP woodland, form: SH.

FNH SR, Alt: c.1220m, site: VP woodland, form: T. Notes: Also found at Kiri Plateau grassland; Hepper 1427, holotype.

Combretum glutinosum Perr. ex DC.

JDC 4719, Alt: 909m, site: VP woodland, (24/02/77), freq: o, form: T, Habitat: Open woodland. Notes: Fruits ready to fall. Steep, rocky western slopes of Vogel Peak, above Jangla.

Combretum molle R. Br. ex G. Don

JDC 4732, Alt: 1061m, site: VP woodland, (24/02/77), form: T, Habitat: Open woodland. Notes: Fruits ripe and falling. Western slopes of Vogel Peak, above Jangla. Mambilla name: Njamjar. Fulfulde name: Sakatasari or Sakasari.

JDC 4783, Alt: 1364m, site: VP woodland, (27/02/77), form: T, Habitat: Open woodland. Notes: New leaves and flowers. Near Hepper's camp. Growing nearby are *Faurea*, *Lophira* and *Syzgium*.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

JDC SR, Alt: 610-1067m, site: River Nwum F.R., form: T, Habitat: In wooded grassland.

JDC SR, Alt: From c.1067m, site: CH escarp & fringing forest, form: T.

JDC SR, Alt: n/a, site: CH upland grassland, freq: o, form: T.

Combretum paniculatum Vent.

JDC 4163, Alt: 1440m, site: Gangoro forest, (12/02/76), form: WC, Habitat: Forest margin.

Combretum racemosum P. Beauv.

JDC 4113, Alt: 1364m, site: Gangoro forest, (6/02/76), form: WC, Habitat: Forest margin.

JDC SR, Alt: 853-1067m & 1143m, site: Akwaizantar, freq: f, form: WC, Habitat: Forest.

Combretum sp.

JDC 3482, Alt: 1970m, site: CW *Albizia gummifera* forest, (11/11/74), form: WC.

JDC 3732, Alt: 2273m, site: Gangirwal *P.S.P* forest, (20/02/75), form: WC.

JDC 4815, Alt: 758m, site: River Nwum F.R., (27/03/77), form: WC, Habitat: Fringing forest. Notes: Fruits collected.

Terminalia glaucescens Planch. ex Benth.

JDC SR, Alt: From c.1067m, site: CH escarp & fringing forest, form: T.

Terminalia laxiflora Engl. & Diels

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna.

Terminalia schimperiana Hochst.

HMC 166, Alt: 212m, site: Baissa, (2/08/74), form: T, Habitat: Savanna Woodland/Wooded Grassland.

JDC 2944, Alt: 840m, site: River Nwum F.R., (6/07/72), freq: f, form: T, Habitat: In wooded grassland.

JDC 3789, Alt: 1061m, site: River Nwum F.R., (1/04/75), freq: f, form: T, Habitat: In wooded grassland.

JDC 4716, Alt: 1061m, site: VP woodland, (24/02/77), form: T, Habitat: Open woodland. Notes: Flowering. Western slopes of Vogel Peak, above Jangla.

JDC SR, Alt: n/a, site: Akwaizantar grassland, freq: a, form: T, Habitat: Forest.

Terminalia superba Engl. & Diels

HMC 167, Alt: 212m, site: Baissa, (3/08/74), form: T.

JDC 4980, Alt: 229m, site: Gangumi F.R., (18/05/77), form: T, Habitat: Forest. Notes: An 'economic'. The Gangumi enumeration recorded 29: approximately one per 2 acres.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Terminalia sp.

JDC 4785, Alt: 1364m, site: VP woodland, (27/02/77), form: T, Habitat: Ravine side. Notes: Fruits dry. In new leaf. Below Hepper's camp.

Compositae

Ageratum conyzoides L

JDC 4052, Alt: 1440m, site: Gangoro forest, (7/12/75), freq: r, form: H, Habitat: Forest margin.

Bafutia tenuicaulis C.D. Adams

RED DATA LISTED: LR/nt

JDC 3370, Alt: 1970m, site: Gangirwal upland grassland, (2/11/74), form: H.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, form: H, Habitat: On the sides of eroded cattle tracks.

Conyza subscaposa O. Hoffm.

JDC 4351, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: f, form: H, Habitat: Regularly grazed grassland. Notes: Flowering. Resistant

to trampling.

Coreopsis sp.

JDC 3383, Alt: 2121m, site: Gangirwal upland grassland, (2/11/74), freq: la, form: H. Notes: Flowers in spirit.

Crepis hypochoeridea (DC.) Thell.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f.

Echinops giganteus A. Rich.

JDC 4337, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: f, form: SHH, Habitat: Grazed grassland. Notes: Resistant to trampling.

Echinops guineensis C.D. Adams

JDC SR, Alt: 2286m, site: Gangirwal upland grassland, freq: o.

Eupatorium africanum ?

JDC 4350, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: a, form: SH, Habitat: Upland grassland. Notes: Flowering. Resistant to trampling.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f, form: SH.

Gerbera ?

JDC 4428, Alt: 1667m, site: CH upland grassland, (2/05/76), freq: o, form: H. Notes: Persisting where cattle graze.

Guizotia scabra (Vis.) Chiov.

JDC 3384, Alt: 2121m, site: Gangirwal upland grassland, (2/11/74), form: H.

Helichrysum antunesii Volken & O. Hoffm.

JDC 4481, Alt: 1667m, site: CH Toli, (14/05/76), form: H, Habitat: By forest streams.

Helichrysum cameroonense Hutch. & Dalziel

RED DATA LISTED: LR/nt

JDC SR, Alt: Rare below 2286m, site: Gangirwal upland grassland, freq: la.

Helichrysum cymosum sensu F.W.T.A.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f, Habitat: Along eroded cattle tracks.

Helichrysum mechowianum Klatt

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: o.

Lactuca lasiorhiza L.

JDC 3709, Alt: 2273m, site: Gangirwal forest grassland ecotone, (10/02/75), freq: f, form: H. Notes: Scrambling shrub.

Lactuca praevia C.D. Adams

JDC SR, Alt: Above 2134m., site: Gangirwal upland grassland, freq: a.

Microglossa pyrifolia (Lam.) Kuntze

JDC 5313, Alt: 242m, site: River Amboi F.R., (9/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Straggling shrub.

Mikaniopsis paniculata Milne-Redh.

JDC SR, Alt: n/a, site: Gangirwal *Syzgium* streamside forest, form: WC.

Piloselloides sp.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: o. Notes: ?sp.=*hirsute*. Nowhere common.

Solanecio mannii (Hook.f.) C. Jeffrey

JDC 4316, Alt: 1364m, site: CH upland forest, (17/04/76), freq: o, form: T, Habitat: Stream bank forest. Notes: Flowers over. Also collected by Hepper, 1900 at Nkambe, 1818m; Latimo and Daramola, FHI 34353 at Mayo Ndaga, 1818m.

Vernonia bamendae C.D. Adams

RED DATA LISTED: VU B1 + 2bc

Tuley 2041, Alt: 2242m, site: Cabbal Wade, (19/11/69). Notes: reported in Mt Oku checklist (Cheek et al. 2000).

Vernonia conferta Benth.

JDC 3111, Alt: n/a, site: Western escarpment of Mambilla, (3/05/73), form: T, Habitat: Forest. Notes: Fast-growing tree 7.6-9m tall. In farm fallow with *Trema orientalis*, near the foot of the escarpment above Zongo Mata (*=5184 det. Kew 21/5/80).

JDC 5184, Alt: 909m, site: Akwaizantar, (1/02/78), form: T, Habitat: Forest. Notes: In gaps.

Vernonia guineensis Benth.

JDC 4430, Alt: 1667m, site: CH upland grassland, (3/05/76), freq: f, form: SHH. Notes: Resistant to trampling.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w, form: SHH. Notes: From a woody rootstock.

Vernonia pumila Kotschy & Peyr.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w/f.

JDC SR, Alt: n/a, site: Akwaizantar grassland, freq: f, form: H, Habitat: Forest.

Vernonia smithiana Less.

JDC 4429, Alt: 1667m, site: CH upland grassland, (3/05/76), freq: a, form: SHH. Notes: Resistant to trampling.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: la, form: SHH. Notes: From a woody rootstock.

Vernonia sp.

JDC 3385, Alt: 2121m, site: Gangirwal upland grassland, (2/11/74), form: H. Notes: Fruiting.

JDC 4499, Alt: 1364m, site: River Nwum F.R., (29/06/76), form: H, Habitat: In wooded grassland. Notes: 45-60cm (1.5-2ft) tall. Large terminal capitula, white flowers.

Connaraceae

Agelaea pentagyna (Lam.) Baill.

JDC 4143, Alt: 1440m, site: Gangoro forest, (10/02/76), form: WC, Habitat: Forest. Notes: Scrambling shrub.

JDC 5274, Alt: 1136m, site: Akwaizantar, (20/02/78), form: SH, Habitat: Forest. Notes: Scrambling shrub.

Cnestis ferruginea Vahl ex DC.

JDC 5236, Alt: 1061m, site: Akwaizantar, (9/02/78), freq: o, form: WC, Habitat: Forest.

Connarus griffonianus Baill.

JDC 4285, Alt: 1440m, site: Gangoro forest, (14/03/76), form: WC, Habitat: Forest margin. Notes: In flower & fruit.

JDC 4487, Alt: 379m, site: CH escarp & fringing forest, (14/05/76), form: WC, Habitat: Gidan Kwano at the margin of Stream bank forest.

JDC 4742, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: WC.

JDC 5334, Alt: 242m, site: River Amboi F.R., (11/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Scrambling shrub.

Rourea coccinea (Schumach. & Thonn.) Benth.

JDC 4223, Alt: 1440m, site: Gangoro forest, (27/02/76), form: WC, Habitat: Forest margin.

JDC 5022, Alt: 229m, site: Gangumi F.R., (29/05/77), form: SH, Habitat: Stream banks. Notes: Fruiting. Scrambling shrub. Under light canopy.

Rourea minor (Gaertn.) Alston

JDC 4157, Alt: 1440m, site: Gangoro forest, (11/02/76), form: WC, Habitat: Forest margin. Notes: Scandent shrub.

JDC 4305, Alt: 455m, site: River Gamgam, (11/04/76), form: WC, Habitat: Stream banks. Notes: Fruiting. In transitional woodland/ forest fringing the bank of the river, close to the game rangers house.

Rourea thomsonii (Baker) Jongkind

JDC 2970, Alt: 1212m, site: Antere, (9/07/72), form: WC, Habitat: Forest margin.

Convolvulaceae

Ipomoea involucrata P. Beauv.

FNH SR, Alt: c. 1500m, site: VP amphitheatre, form: H. Notes: At the edge of a clump of trees.

Crassulaceae

Crassula vaginata Eckl. & Zeyh.

JDC 3429, Alt: 2273m, site: Gangirwal upland grassland, (5/11/74), form: H, Habitat: In Loudetia grassland.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: o, form: H.

Dilleniaceae

Tetracera alnifolia Willd.

FNH 1506, Alt: n/a, site: VP amphitheatre, freq: f, form: WC.

JDC 4132, Alt: 1440m, site: Gangoro forest, (9/02/76), form: WC, Habitat: Forest margin.

Dipsacaceae

Succisa trichotocephala Baksay

JDC SR, Alt: Above 2134m., site: Gangirwal upland grassland, freq: o/la. Notes: Flowers white.

Dipterocarpaceae

Monotes kerstingii Gilg

JDC 4690, Alt: 909m, site: VP woodland, (22/02/77), form: T. Notes: Above Dau.

Ebenaceae

Diospyros cf abyssinica (Hiern) F. White

JDC 4215, Alt: 1440m, site: Gangoro forest, (25/02/76), form: T, Habitat: Forest.

Diospyros canaliculata De Wild.

L.& D. (FHI) 28719, Alt: 229m, site: Wurkam River F.R., form: T, Habitat: Forest. Notes: Gidan Anju, Kurmin Nya.

Trappes-Lomax 32318, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest. Notes: Gangumi F.R.

JDC 4182, Alt: 1440m, site: Gangoro forest, (17/02/76), form: T, Habitat: Forest.

JDC 4194, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest.

JDC 4950, Alt: 229m, site: Gangumi F.R., (12/05/77), form: T, Habitat: Forest. Notes: Right to collect the fruits.

Diospyros ferrea (Willd.) Bakh.

L.& D. (FHI) 28911, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Stream banks. Notes: Sulli stream, Gangumi F.R.

Diospyros mespiliformis Hochst. ex A. DC.

L.& D. (FHI) 28731, Alt: 229m, site: Wurkam River F.R., form: T, Habitat: Forest. Notes: Gidan Anju.

JDC 5464, Alt: 242m, site: Baissa, (7/05/78), form: T, Habitat: Stream banks.

Diospyros monbuttensis Gürke

JDC 2955, Alt: 840m, site: River Nwum F.R., (7/07/72), form: T, Habitat: Forest understory.

JDC 3874, Alt: 758m, site: River Nwum F.R., (16/04/75), form: T, Habitat: Forest. Notes: Flowering. Small tree (6m) in understory. Arching out over a rocky stream bed below tall forest.

JDC 4484, Alt: 758m, site: CH escarp & fringing forest, (14/05/76), form: T, Habitat: Fringing forest.

JDC 4503, Alt: 909m, site: River Nwum F.R., (30/06/76), form: T, Habitat: Forest understory.

JDC 4878, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: Flowers collected, with immature fruits. 9m tall. The bole is crooked, fluted, with thin blackish bark, the slash orange-yellow. 2

JDC 5199, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat: Forest. Notes: Fruits collected-spirit material. Also a common understory tree at the head of the valley.

Diospyros sp.

JDC 5385, Alt: 242m, site: River Amboi F.R., (19/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile gathering.

Ericaceae

Agarista salicifolia (Lam.) G. Don

JDC 4418, Alt: 1667m, site: CH upland forest, (30/04/76), freq: o, form: T, Habitat: Forest margin.

Erica tenuipilosa Engl. ex Alm & T.C.E. Fr.

JDC 4470, Alt: 1667m, site: CH upland forest, (13/05/76), freq: la, form: SH, Habitat: Rock bluff. Notes: High up on Dutsin Lamba. With *Adenocarpus mannii* and *Kotschyia strigosa*.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: r, form: SH, Habitat: In open grassland stunted by fire.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, freq: o, form: SH. Notes: Scrambling shrub. Up to 3m, exceptionally 6m tall.

JDC SR, Alt: Above c.2286m., site: Gangirwal upland grassland, freq: r, form: SH.

Erythroxylaceae

Erythroxylum emarginatum Thonn.

JDC 4031, Alt: 1440m, site: Gangoro forest, (4/12/75), form: T, Habitat: Forest margin.

JDC 4282, Alt: 1440m, site: Gangoro forest, (14/03/76), form: T, Habitat: Forest margin. Notes: Flowers just about to open.

Euphorbiaceae

Acalypha ornata Hochst. ex A. Rich.

JDC 3112, Alt: 606m, site: Western escarpment of Mambilla, (3/05/73), form: SH, Habitat: Forest. Notes: Often dominant, or co-dominant with *Marantochloa*, in the initial stages of forest regrowth on abandoned farms.

Alchornea cordifolia (Schumach. & Thonn.) Müll. Arg.

JDC 5227, Alt: 1061m, site: Akwaizantar, (8/02/78), form: WC, Habitat: Forest. Notes: Stem 20cm (8in.) in diameter at the base.

FNH SR, Alt: n/a, site: VP fringing forest, form: T. Notes: At the foot of Vogel Peak.

Antidesma laciniatum Müll. Arg. subsp. *laciniata*

JDC 5405, Alt: 242m, site: River Amboi F.R., (21/04/78), form: T, Habitat: Tall secondary forest.

Antidesma membrenaceum Müll. Arg.

JDC 3883, Alt: 606m, site: River Nwum F.R., (18/04/75), form: T, Habitat: Forest margin. Notes: Flowers immature. 12.1m tall. Right on the forest edge, under the shade of a Bombax.

JDC 4486, Alt: 455m, site: CH escarp & fringing forest, (14/05/76), form: T, Habitat: Fringing forest.

Antidesma vogelianum Müll. Arg.

JDC 3143, Alt: 1667m, site: Ngel Nyaki, (10/05/73), freq: o, form: T, Habitat: Forest margin and wooded grassland adjacent.

JDC 4416, Alt: 1667m, site: CH upland forest, (30/04/76), freq: o, form: T, Habitat: Edge of stream fringing forest.

JDC 4516, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: o, form: T, Habitat: Forest margin and wooded grassland adjacent.

Bridelia ferruginea Benth.

JDC 2599, Alt: 229m, site: Baissa, (24/10/71), form: T, Habitat: Savanna Woodland/Wooded Grassland. Notes: Kaka name: Ntibi.

JDC 2943, Alt: 840m, site: River Nwum F.R., (6/07/72), form: T, Habitat: In wooded grassland.

JDC 3781, Alt: 1061m, site: River Nwum F.R., (30/03/75), freq: o, form: T, Habitat: In wooded grassland.

JDC 5019, Alt: 229m, site: Gangumi, (27/05/77), freq: f, form: T, Habitat: Savanna. Notes: Flowering. About 2.4m tall. Preparations of the bark pounded in water are used to apply to freshly-fired poles to glaze them.

Bridelia micrantha (Hochst.) Baill.

JDC 4387, Alt: 1667m, site: CH upland forest, (26/04/76), freq: r, form: T. Notes: At profile strip.

Bridelia speciosa Müll. Arg.

JDC 2710, Alt: 1515m, site: Ngel Nyaki, (1/03/72), freq: o, form: T, Habitat: Forest margin.

JDC 3289, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: o, form: T, Habitat: Forest margin.

JDC 3845, Alt: 758m, site: River Nwum F.R., (10/04/75), form: T, Habitat: Forest margin.

JDC 3990, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest margin.

JDC 4155, Alt: 1440m, site: Gangoro forest, (11/02/76), form: T, Habitat: Forest margin.

JDC 4328, Alt: 1667m, site: CH upland forest, (17/04/76), freq: o, form: T, Habitat: Forest margin. Notes: Fruiting. 9.1-12.1m tall.

JDC 4777, Alt: 1606m, site: VP amphitheatre, (26/02/77), form: T, Habitat: Forest margin.

JDC 5190, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat: Forest. Notes: Fruiting material collected. Observed from just below the saddle, to the sample plot on the valley floor at 853m, also at forest edge.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T. Notes: Can be a strangling epiphyte.

Clutia kamerunica Pax ** New to Nigeria? **

JDC 3530, Alt: n/a, site: Gangirwal forest grassland ecotone, form: H. Notes: A range extension for a narrow endemic, formerly known from the Bamenda highlands. Up to 2.4m tall.

Croton macrostachyus Hochst. ex Del.

JDC 3481, Alt: 1970m, site: CW *Albizia gummifera* forest, (10/11/74), form: T.

JDC 4369, Alt: 1667m, site: CH upland forest, (22/04/76), freq: f, form: T, Habitat: Forest margins and occasionally in grassland. Notes: At profile strip, sample plot.

JDC 4369, Alt: 1667m, site: CH upland grassland, (22/04/76), freq: f/la, form: T, Habitat: Forest margins and secondary forest. Notes: The tallest tree at the profile strip.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

Discoclaoxylon hexandrum Müll. Arg.

JDC 3343, Alt: 1515m, site: Ngel Nyaki, (12/11/73), freq: f, form: T.

JDC 4545, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot.

Drypetes gilgiana (Pax) Pax & K. Hoffm.

JDC 4254, Alt: 1440m, site: Gangoro forest, (5/03/76), form: T, Habitat: Forest.

Drypetes gossweileri S. Moore

JDC 3324, Alt: 1515m, site: Ngel Nyaki, (9/11/73), form: T. Notes: Slender understory tree. Note that 'Nigerian Trees' (Keay et al.) and F.W.T.A. describes this species as a large tree (up to 40m high) of the high forest. Recorded from Benin and Sapoba.

JDC 4542, Alt: 1515m, site: Ngel Nyaki, (2/08/76), form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot.

JDC 4572, Alt: 1515m, site: Ngel Nyaki, (4/08/76), form: T, Habitat: Submontane forest. Notes: Sterile. Small tree. At enumeration plot.

JDC 4582, Alt: 1515m, site: Ngel Nyaki, (5/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. 24m tall. At enumeration plot.

Drypetes principium (Müll. Arg.) Hutch.

JDC 3978, Alt: 1440m, site: Gangoro forest, (1/12/75), form: T, Habitat: Forest.

JDC 4014, Alt: 1440m, site: Gangoro forest, (3/12/75), form: T, Habitat: Forest.

JDC 4190, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest.

JDC 4238, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat: Forest.

JDC 4262, Alt: 1440m, site: Gangoro forest, (7/03/76), form: T, Habitat: Forest.

Drypetes sp.

JDC 3328, Alt: 1515m, site: Ngel Nyaki, (10/11/73), form: T.

Erythrococca hispida (Pax) Prain

JDC 4268, Alt: 1440m, site: Gangoro forest, (9/03/76), form: SH, Habitat: Forest margin & stream banks in grassland. Notes: In new leaf. With a profusion of small green flowers.

Erythrococca sp.

JDC 3596, Alt: 1970m, site: CW *Pouteria altissima* forest, (28/11/74), form: T, Habitat: Forest margin.

Euphorbia depauperata Hochst. ex A. Rich.

JDC 4349, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: a, form: SHH, Habitat: Upland grassland. Notes: Resistant to trampling.

Euphorbia sp.

JDC 3372, Alt: 1970m, site: Gangirwal upland grassland, (2/11/74), freq: w/f, form: SH.

Hymenocardia acida Tul.

JDC 3779, Alt: 1061m, site: River Nwum F.R., (30/03/75), form: T, Habitat: In wooded grassland.

JDC 4721, Alt: 1061m, site: VP woodland, (24/02/77), freq: f, form: T, Habitat: Open woodland. Notes: Fruiting. New leaves. Steep, rocky western slopes of Vogel Peak, above Jangla. Also around Hepper's camp at

JDC 5335, Alt: 242m, site: River Amboi F.R., (11/04/78), freq: o, form: T, Habitat: Transition woodland/Young secondary forest. Notes: Restricted to patches of wooded grassland.

JDC SR, Alt: To c.914-1067m, site: CH escarp & fringing forest, form: T.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: Baissa, form: T, Habitat: Savanna Woodland/Wooded Grassland.

JDC SR, Alt: n/a, site: Gangumi, freq: f, form: T, Habitat: Savanna.

Macaranga hurifolia Beille

JDC 5436, Alt: 242m, site: Baissa, (2/05/78), form: T.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

Macaranga monandra Müll. Arg.

JDC 3123, Alt: 606m, site: Western escarpment of Mambilla, (4/05/73), form: T, Habitat: Forest. Notes: Streambank between Batu Kamino & Buru Kassa.

JDC 5421, Alt: 242m, site: River Amboi F.R., (25/04/78), form: T, Habitat: Transition woodland/Young secondary forest.

Macaranga occidentalis Müll. Arg.

JDC 3995, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest margin.

JDC 4544, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot.

Macaranga sp.

JDC 5406, Alt: 242m, site: River Amboi F.R., (21/04/78), form: T, Habitat: Transition woodland/Young secondary forest. Notes: Sterile collection. 15m tall. Stilt roots up to 1m, and above this numerous thorny, often branched emergences from 7.6 to 40cm long, to a height of 5m.

Macrosphyra longistyla (DC.) Hiern

JDC 3836, Alt: 758m, site: River Nwum F.R., (8/04/75), freq: la, form: WC, Habitat: Secondary forest.

JDC 4276, Alt: 1440m, site: Gangoro forest, (12/03/76), form: WC, Habitat: Forest margin. Notes: Flowering.

JDC 5327, Alt: 242m, site: River Amboi F.R., (11/04/78), form: LIAN, Habitat: Wooded grassland. Notes: Scrambling shrub.

JDC SR, Alt: 606m, site: River Nwum F.R., form: T, Habitat: In forest regrowth. Notes: Occasional at the edge.

Mallotus oppositifolius (Geiseler) Müll. Arg.

JDC 3825, Alt: 758m, site: River Nwum F.R., (7/04/75), freq: la, form: T, Habitat: Forest understory and thicket stage. Notes: Small tree rarely more than 9m tall. Present in profile strip 2 and (with 218 stems) in S.P.

JDC 3834, Alt: 758m, site: River Nwum F.R., (8/04/75), freq: f/la, form: SH. Notes: Equally common as a shrub, forming thickets, or a small tree.

JDC 4854, Alt: 758m, site: River Nwum F.R., (4/04/77), freq: la, form: T, Habitat: Forest understory and thicket stage. Notes: Small tree rarely more than 9m tall. Present in profile strip 2 and (with 218 stems) in S.P.

JDC 5336, Alt: 242m, site: River Amboi F.R., (11/04/78), form: T, Habitat: Tall secondary forest.

JDC 5437, Alt: 242m, site: Baissa, (2/05/78), form: T.

JDC 5443, Alt: 242m, site: Baissa, (3/05/78), form: T.

Margaritaria discoidea (Baill.) G.L. Webster

JDC 3331, Alt: 1515m, site: Ngel Nyaki, (10/11/73), freq: o, form: T. Notes: In profile strip, trees 52 and 53.

JDC 4301, Alt: 455m, site: River Gamgam, (11/04/76), form: T, Habitat: Stream banks. Notes: Flowering. New leaves. In transitional woodland/forest fringing the bank of the river, close to the game rangers house.

JDC 5338, Alt: 242m, site: River Amboi F.R., (11/04/78), form: T, Habitat: Transition woodland/Young secondary forest.

JDC SR, Alt: 606m, site: River Nwum F.R., form: T, Habitat: In forest regrowth.

Neoboutonia melleri (Müll. Arg.) Prain var. *velutina* (Prain) Pax. & K. Hoffm.

JDC 4813, Alt: 758m, site: River Nwum F.R., (27/03/77), form: T, Habitat: River bank in forest.

Neoboutonia velutina Prain

JDC 4552, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o, form: T, Habitat: Forest margin. Notes: Sterile. Small understory tree. At enumeration plot.

Phyllanthus muellerianus (O. Kuntze) Exell

JDC 2958, Alt: 840m, site: River Nwum F.R., (7/07/72), form: WC. Notes: Scrambling over *Nauclea latifolia* in wooded grassland.

Pycnocoma cornuta Müll. Arg.

JDC 5416, Alt: 242m, site: River Amboi F.R., (24/04/78), form: SH, Habitat: Tall secondary forest.

Ricinodendron heudelotii (Baill.) Pierre ex Pax

HMC 165, Alt: 212m, site: Baissa, (2/08/74), form: T.

JDC 4960, Alt: 229m, site: Gangumi F.R., (13/05/77), freq: f, form: T, Habitat: Forest. Notes: This and *Pterygota macrocarpa* were the most common of the larger trees at this site.

JDC 5330, Alt: 242m, site: River Amboi F.R., (11/04/78), form: T, Habitat: Tall secondary forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Transition woodland/Young secondary forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Wooded grassland.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Stream banks.

Sapium ellipticum (Hochst.) Pax

JDC 3882, Alt: 606m, site: River Nwum F.R., (18/04/75), form: T, Habitat: Forest margin. Notes: Fruiting. 15m tall. Right on the forest edge, under the shade of a Bombax.

JDC 4104, Alt: 1364m, site: Gangoro forest, (5/02/76), form: T, Habitat: Forest margin & stream-fringing forest.

JDC 4133, Alt: 1440m, site: Gangoro forest, (9/02/76), form: T, Habitat: Forest margin & stream-fringing forest.

JDC 4436, Alt: 1667m, site: CH upland forest, (4/05/76), freq: o, form: T. Notes: At S.P.

JDC 4578, Alt: 1515m, site: Ngel Nyaki, (5/08/76), freq: r, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot and profile strip.

JDC 5195, Alt: 1212m, site: Akwaizantar, (3/02/78), freq: o, form: T, Habitat: Forest. Notes: Sporadic in the range 853-1,067m (incl. S.P.), & in forest clumps in grassland at the saddle.

Spondianthus preussii Engl.

JDC 3137, Alt: 758m, site: Western escarpment of Mambilla, (9/05/73), form: T, Habitat: Forest. Notes: Stream bank, Batu Amanda. Kaka name: Wahvung.

JDC 3872, Alt: 758m, site: River Nwum F.R., (16/04/75), form: T, Habitat: Forest margin. Notes: Fruits immature. Up to 12m high. Also found in secondary forest. Poison can be prepared from the inner bark.

JDC 4811, Alt: 758m, site: River Nwum F.R., (26/03/77), form: T, Habitat: Fringing forest and near forest margin. Notes: Incl. 3 trees in profile strips 1 & 4.

JDC 4904, Alt: 758m, site: River Nwum F.R., (13/04/77), form: T, Habitat: Fringing forest and near forest margin. Notes: Incl. 3 trees in profile strip 1 & 4.

JDC 4913, Alt: 758m, site: River Nwum F.R., (18/04/77), form: T, Habitat: Fringing forest and near forest margin. Notes: Seedlings. Incl. 3 trees in profile strip 1 & 4.

JDC 5350, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest.

Suregada sp.

JDC 4240, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat: Forest.

Uapaca cf guineensis Müll. Arg

JDC 5187, Alt: 833m, site: Akwaizantar, (2/02/78), form: T, Habitat: Forest. Notes: Sterile collection. With stilt roots at 762m.

Uapaca heudelotii Baill.

JDC 3116, Alt: 303m, site: Western escarpment of Mambilla, (5/05/73), form: T, Habitat: Forest. Notes: Common on the Donga bank at Abong.

JDC 5357, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile collection.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Uapaca togoensis Pax

FNH 1396, Alt: n/a, site: VP woodland, form: T. Notes: "Co-dominant with *Isobertinia doka*."

JDC 3846, Alt: 758m, site: River Nwum F.R., (10/04/75), freq: f/la, form: T, Habitat: Typical of stream banks. Notes: Stilt roots.

JDC 4114, Alt: 1364m, site: Gangoro forest, (6/02/76), form: T, Habitat: Stream fringing forest.

JDC SR, Alt: n/a, site: Gangumi F.R., freq: la, form: T, Habitat: Savanna.

JDC SR, Alt: 229m, site: Baissa, form: T, Habitat: Savanna Woodland/Wooded Grassland. Notes: May form pure stands.

Uapaca sp.

JDC 4922, Alt: 200m, site: Taraba River, (4/05/77), freq: lf, form: T, Habitat: Stream banks. Notes: 10m tall, sometimes multi-stemmed, with distinctive compound leaves. Common locally with *Syzygium* (Referred to as *U. heudelotii* by Trappes-Lomax, but no collection cited in either Nigerian Trees or F.W.T.A. ed. 2). Several together on the Taraba bank near Gangumi village.

JDC SR, Alt: n/a, site: Gashaka, form: T, Habitat: On route from Gashaka to CH.

JDC SR, Alt: n/a, site: Taraba River, freq: lf, form: T, Habitat: Stream banks. Notes: Common locally with *Syzygium* (Referred to as *U. heudelotii* by Trappes-Lomax, but no collection cited in either Nigerian Trees or F.W.T.A. ed. 2).

Fabaceae

Abrus precatorius L.

JDC 4945, Alt: 229m, site: Gangumi, (11/05/77), form: SH, Habitat: Stream banks. Notes: Twining shrub, the seeds, 'Crab's eyes', ornamental, bright red with black base. Sporadic, collected at old Gangumi village.

Flacourtiaceae

Dasylepis racemosa Oliv.

JDC 3322, Alt: 1515m, site: Ngel Nyaki, (9/11/73), form: T. Notes: Sterile material gathered. Trees 14 & 76 on the profile strip.

JDC 4583, Alt: 1515m, site: Ngel Nyaki, (7/08/76), freq: la, form: T, Habitat: Submontane forest. Notes: Sterile. 15m tall. At enumeration plot.

Homalium letestui Pellegr.

Peal 42792, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC 4952, Alt: 229m, site: Gangumi F.R., (12/05/77), form: T, Habitat: Forest.

JDC 5461, Alt: 242m, site: Baissa, (6/05/78), form: T.

Homalium sp.

JDC 3922, Alt: 606m, site: River Nwum F.R., (28/04/75), form: T, Habitat: River bank. Notes: Pods ripe.

JDC 4874, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: 30m+ tall. 2 trees in S.P.

JDC 4913, Alt: 758m, site: River Nwum F.R., (18/04/77), form: T, Habitat: Forest. Notes: 2 trees in S.P. (inc 4874).

Oncoba cf spinosa Forsk.

JDC 4006, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest margin.

Gentianaceae

Sebaea brachyphylla Griseb.

JDC 3412, Alt: 1970m, site: Gangirwal, (4/11/74), form: H, Habitat: Semi-thicket. Notes: 3 m tall.

Geraniaceae

Geranium arabicum Forssk.

JDC 3382, Alt: 2121m, site: Gangirwal upland grassland, (2/11/74), form: H.

JDC SR, Alt: Above 2134m., site: Gangirwal upland grassland, freq: lf, form: H.

Gesneriaceae

Epithema tenue C.B. Clarke

JDC 4505, Alt: 909m, site: River Nwum F.R., (30/06/76), freq: f, form: H, Habitat: Dripping rock face in forest.

Streptocarpus elongatus Engl.

JDC 3305, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: r, form: H, Habitat: Forest.

JDC 3435, Alt: 1970m, site: Gangirwal *Syzigium* streamside forest, (6/11/74), form: H.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Streptocarpus nobilis C.B. Clarke

FNH 2759, Alt: n/a, site: VP fringing forest, form: H, Habitat: Riverine forest. Notes: On mossy rock at the foot of Vogel Peak.

Guttiferae

Garcinia smeathmannii (Planch. & Triana) Oliv.

JDC 2711, Alt: 1515m, site: Ngel Nyaki, (1/03/72), freq: f, form: T.

JDC 4169, Alt: 1440m, site: Gangoro forest, (13/02/76), form: T, Habitat: Forest.

JDC 4245, Alt: 1440m, site: Gangoro forest, (4/03/76), form: T, Habitat: Forest. Notes: Fruiting.

JDC 4324, Alt: 1667m, site: CH upland forest, (17/04/76), freq: o, form: T, Habitat: Submontane stream fringing forest. Notes: Fruits abundant. Accounts for 46% of the trees in the profile strip; also in sample plot.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

Garcinia sp.

JDC 5322, Alt: 242m, site: River Amboi F.R., (10/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile gathering.

Harungana madagascariensis Lam. ex Poir.

FNH 1473, Alt: n/a, site: VP fringing forest, form: T. Notes: At the foot of Vogel Peak.

JDC 4036, Alt: 1440m, site: Gangoro forest, (5/12/75), form: T, Habitat: Stream banks in grassland.

JDC 4389, Alt: 1667m, site: CH upland forest, (26/04/76), freq: la, form: T, Habitat: Forest margins, secondary forest & grassland.

JDC 4751, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: la, form: T, Habitat: Forest margin.

JDC SR, Alt: 606m, site: River Nwum F.R., form: T, Habitat: In forest regrowth.

JDC SR, Alt: n/a, site: River Nwum F.R., form: T, Habitat: Edge of stream fringing forest.

Hypericum revolutum Vahl

JDC 4319, Alt: 1364m, site: CH upland forest, (17/04/76), freq: f, form: T, Habitat: Upland grassland. Notes: Flowering over. Sometimes on the edge of stream fringing thickets.

Hypericum roeperanum Schimp. ex A. Rich.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, freq: ld, form: SH. Notes: Scrambling shrub. Up to 3m tall.

Mammea africana Sabine

HMC 160, Alt: 212m, site: Baissa, (1/08/74), form: T.

Peal 42791, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC 5356, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile collection.

JDC 5371, Alt: 242m, site: River Amboi F.R., (17/04/78), form: T, Habitat: Tall secondary forest. Notes: Fruit in spirit.

Psorospermum aurantiacum Engl.

JDC 4327, Alt: 1667m, site: CH upland forest, (17/04/76), freq: f/la, form: SH, Habitat: In thickets fringing hillside and Stream bank forest. Notes: Flowering. Often the most abundant species, sometimes a tree (e.g. at sample plot).

JDC 4434, Alt: 1667m, site: CH upland forest, (4/05/76), freq: o, form: T. Notes: 9m tall. At S.P. Common also along forest edge (4327).

Psorospermum corymbiferum Hochr. var. *corymbiferum*

JDC 2717, Alt: 1667m, site: Ngel Nyaki, (1/03/72), freq: f, form: T, Habitat: Forest margin.

Psorospermum febrifugum Spach

JDC 4332, Alt: 1667m, site: CH upland grassland, (17/04/76), freq: o, form: T, Habitat: Upland grassland. Notes: Fruiting. Small tree, 3.6m tall.

JDC 5016, Alt: 229m, site: Gangumi, (26/05/77), freq: o, form: T, Habitat: Savanna. Notes: Fruiting. About 3m tall. Rarely over c. 3.5m (12 ft) tall. On the Kwagiri path. Bark used to treat scabies and as a guinea corn seed dressing. Kaka name: Tiku.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

JDC SR, Alt: 610-1067m, site: River Nwum F.R., form: T, Habitat: In wooded grassland.

Symphonia globulifera L.f.

JDC 3028, Alt: 1667m, site: Ngel Nyaki, (1/03/73), freq: o, form: T. Notes: At sample plot.

JDC 3860, Alt: 606m, site: River Nwum F.R., (15/04/75), form: T, Habitat: River bank in forest.

JDC 3989, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest, and stream banks in grassland.

JDC 4394, Alt: 1667m, site: CH upland forest, (26/04/76), freq: o/lf, form: T, Habitat: Fringing forest. Notes: At profile strip & sample plot. After *Syzygium guineense* (Willd.) DC., subsp. *guineense*, it is one of the most characteristic trees.

JDC 4602, Alt: 1515m, site: Ngel Nyaki, (11/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Buds and flowers. Mambilla name: Geeb, Kaka name: Beek.

JDC 4738, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: T, Habitat: On rocky stream banks.

JDC 5167, Alt: 1364m, site: Akwaizantar, (31/01/78), freq: o/lf, form: T, Habitat: Forest. Notes: Kaka name: Buck or geeb.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: r, form: T.

JDC SR, Alt: n/a, site: Gashaka, form: T, Habitat: On route from Gashaka to CH.

JDC SR, Alt: Above 800m, site: CH escarp & fringing forest, form: T, Habitat: Fringing forest.

Icacinaceae

Apodytes dimidiata E. Mey. ex Arn. ** New to West Africa? **

JDC 2718, Alt: 1667m, site: Ngel Nyaki, (1/03/72), freq: r, form: T, Habitat: Forest near the margin.

JDC 4135, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Stream fringing forest.

JDC 4749, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: T.

Leptaulus daphnoides Benth.

JDC 4547, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot.

Leptaulus zenkeri Engl.

JDC 3308, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: la, form: T. Notes: In the profile strip.

Rhaphiostylis beninensis (Hook.f. ex Planch.) Planch. ex Benth.

JDC 4160, Alt: 1440m, site: Gangoro forest, (11/02/76), form: WC, Habitat: Forest margin & in forest.

JDC 4209, Alt: 1440m, site: Gangoro forest, (24/02/76), form: WC, Habitat: Forest margin & forest.

JDC 4260, Alt: 1440m, site: Gangoro forest, (6/03/76), form: WC, Habitat: Forest margin & forest.

JDC 4747, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: WC.

Irvingiaceae

Irvingia gabonensis (Aubry-Lecomte ex O'Rorke) Baill.

FNH 2756, Alt: n/a, site: VP fringing forest, form: T, Habitat: At the foot of Vogel Peak.

L. & D. (FHI) 28870, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

JDC 3850, Alt: 758m, site: River Nwum F.R., (12/04/75), form: T, Habitat: Forest. Notes: Incl. 1 small tree in S.P.

JDC 4844, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Incl. 1 small tree in S.P.

JDC 5339, Alt: 242m, site: River Amboi F.R., (12/04/78), form: T, Habitat: Tall secondary forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: Baissa, form: T.

Klainedoxa gabonensis Pierre ex Engl.

JDC 4906, Alt: 758m, site: River Nwum F.R., (14/04/77), form: T, Habitat: Forest, by the river.

JDC 5386, Alt: 242m, site: River Amboi F.R., (19/04/78), form: T, Habitat: Tall secondary forest.

JDC 5398, Alt: 242m, site: River Amboi F.R., (20/04/78), form: T, Habitat: Tall secondary forest.

JDC 5460, Alt: 242m, site: Baissa, (6/05/78), form: T.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Labiatae

Achyropermum oblongifolium Baker

JDC 3457, Alt: 1970m, site: Gangirwal, (7/11/74), form: SH.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: SH.

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, form: SH.

Isodon ramosissimus (Hook.f.) Codd

JDC 3402, Alt: 1970m, site: Gangirwal forest grassland ecotone, (4/11/74), form: H.

Leucas oligocephala Hook.f.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f.

Platostoma rotundifolium (Briq.) A. J. Paton

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: H.

Plectranthus glandulosus Hook.f.

JDC 4015, Alt: 1440m, site: Gangoro forest, (3/12/75), form: H, Habitat: Forest margin.

Plectranthus sylvestris Gürke

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: o, form: H.

Pycnostachys eminii Gürke

FNH 1489, Alt: 1370m, site: VP amphitheatre, form: SH. Notes: At the edge of upland riverine forest.

Pycnostachys meyeri Gürke

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH. Notes: Scrambling shrub. Up to 3m tall.

Pycnostachys sp.

JDC 3341, Alt: 1515m, site: Ngel Nyaki, (11/11/73), freq: o, form: H, Habitat: Forest margin. Notes: Shrubby herb.

Satureja imbricata (Forssk.) Briq.

JDC 4393, Alt: 1667m, site: CH upland grassland, (26/04/76), freq: f, form: SHH, Habitat: At its best where cattle do not go - also amongst bracken and shrubs bordering streams, and forest margins.

Satureja pseudosimensis Brenan

JDC SR, Alt: Above 2134m., site: Gangirwal upland grassland, freq: w.

Satureja cf robusta (Hook.f.) Brenan

JDC 3414, Alt: 1970m, site: Gangirwal, (4/11/74), form: H.

Scutellaria violascens Gürke

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH. Notes: Sub-shrub, 90cm-1.2m tall.

Solenostemon cf mannii (Hook.f.) Baker

JDC SR, Alt: 1981-2286m, site: Gangirwal upland grassland, freq: f. Notes: Robust perennial.

Stachys pseudohumifusa Sebsebe subsp. *saxeri* Y.B. Harv.

RED DATA LISTED: VU D2

Previously collected from Mambilla Plateau (Gembu) (Cheek et al. 2000)

Tinnea sp.

JDC 5315, Alt: 242m, site: River Amboi F.R., (9/04/78), form: SH, Habitat: Transition woodland/Young secondary forest. Notes: Flowers collected.

1.2m tall. Under light shade on rocky river bank.

Lauraceae

Beilschmiedia foliosa (S.Moore) Robyns & Wilczek

JDC 4728, Alt: 1212m, site: VP fringing forest, (24/02/77), freq: o, form: T. Notes: Kew identification. Possibly= FNH 2748, JDC 4736 & JDC 4768 ? *B. Mannii* (Meissn. Benth. & Hook.fil.)

Beilschmiedia mannii (Meissn.) Benth. & Hook.f.

JDC 4247, Alt: 1440m, site: Gangoro forest, (4/03/76), form: T, Habitat: Forest. Notes: 24m tall in S.P.

JDC 4592, Alt: 1515m, site: Ngel Nyaki, (7/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Fruiting, but fruits impossible to collect. 21m tall.

JDC 4601, Alt: 1515m, site: Ngel Nyaki, (10/08/76), freq: r, form: T, Habitat: Relict kurmi. Notes: Fruits immature. Tree in relic valley kurmi at Yelwa village. 1 mile east of Ngel Nyaki.

Beilschmiedia sp.

JDC 4189, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4196, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4736, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: T. Notes: 15m tall. Hepper recorded *Beilschmiedia mannii* from the Kiri Plateau (FNH 2748). JDC 4728 from fringing forest on the way up Vogel Peak from Jangla has been identified by Kew as *B. foliosa*, which F.W.T.A. ed. 2, 1: 57, describes as a bushy shrub. It would appear more likely that only one species is involved.

JDC 4768, Alt: 1667m, site: VP amphitheatre, (26/02/77), form: T. Notes: 15m tall. Hepper recorded *Beilschmiedia mannii* from the Kiri Plateau (FNH 2748). JDC 4728 from fringing forest on the way up Vogel Peak from Jangla has been identified by Kew as *B. foliosa*, which F.W.T.A. ed. 2, 1: 57, describes as a bushy shrub. It would appear more likely that only one species is involved.

Lecythidaceae

Napoleona imperialis P. Beauv.

JDC 3120, Alt: 606m, site: Western escarpment of Mambilla, (4/05/73), freq: f, form: T, Habitat: Secondary Forest. Notes: Common in secondary forest below c.610m.

Peal 42794, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC 4722, Alt: 606m, site: VP fringing forest, (24/02/77), freq: f, form: T. Notes: 7.6 m tall. Jangla and environs.

Napoleona sp.

JDC 4881, Alt: 758m, site: River Nwum F.R., (8/04/77), form: T, Habitat: Stream fringing forest. Notes: Fruits collected.

JDC 4932, Alt: 229m, site: Gangumi F.R., (7/05/77), form: T, Habitat: Forest.

JDC 5317, Alt: 242m, site: River Amboi F.R., (9/04/78), form: T, Habitat: Transition woodland/Young secondary forest. Notes: Fruit collected, both

dry and in spirit.

Leeaceae

Leea guineensis G. Don

JDC 3866, Alt: 758m, site: River Nwum F.R., (15/04/75), freq: o/lf, form: SH, Habitat: Occasional in forest, common in secondary forest.

JDC 4032, Alt: 1440m, site: Gangoro forest, (4/12/75), form: SH, Habitat: Forest margin.

JDC 4536, Alt: 1515m, site: Ngel Nyaki, (1/08/76), freq: lf, form: SH, Habitat: Along paths, by streams, in windfall gaps. Notes: Flowering.

JDC 5007, Alt: 229m, site: Gangumi F.R., (23/05/77), freq: la, form: WC, Habitat: Forest. Notes: 2.4m tall, with a rambling habit. Abundant locally; along forest margins, paths in the forest, openings.

JDC SR, Alt: 606m, site: River Nwum F.R., form: SH, Habitat: In forest regrowth.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH.

Leguminosae-Caesalpinoideae

Afzelia africana Sm.

JDC 3851, Alt: 758m, site: River Nwum F.R., (12/04/75), freq: o, form: T.

JDC 3897, Alt: 606m, site: River Nwum F.R., (21/04/75), freq: o, form: T.

JDC 4920, Alt: 200m, site: Taraba River, (4/05/77), form: T, Habitat: Stream banks. Notes: Taraba river, opposite new Gangumi village.

JDC 5006, Alt: 229m, site: Gangumi F.R., (23/05/77), form: T, Habitat: Forest. Notes: About 27.3m tall. Most abundant of the 7 'economic species' enumerated in 1954.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, form: T, Habitat: Forest.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna. Notes: Rarely exceeding 12m in height. However, in the forest, a common upper canopy tree, frequently 30m or more high.

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: Along the margin of fringing forest, extending well up the escarpment. Notes: At Gidan Kwano.

JDC SR, Alt: 762m & 853-1067m, site: Akwaizantar, form: T, Habitat: Forest.

Afzelia bella Harms

JDC 4809, Alt: 758m, site: River Nwum F.R., (26/03/77), freq: o, form: T, Habitat: River bank forest.

Amphimas cf pterocarpoides Harms

JDC 4864, Alt: 758m, site: River Nwum F.R., (6/04/77), form: T, Habitat: Forest. Notes: 30m tall. Trunk cylindrical, girth 3m at 1.7m above the symmetrical buttresses which at the ground extend outwards 2.4m. Slash yellowish-orange. Branching symmetrical, the branches almost horizontal, concentrated towards the top of the tree. Leafless, but fruits (to FHO) conspicuous; flat and papery, splitting open with one or two seeds in the centre of the wing - carried long distances by the wind.

Anthonotha macrophylla P. Beauv.

HMC 161, Alt: 212m, site: Baissa, (1/08/74), form: T.

JDC 3122, Alt: 606m, site: Western escarpment of Mambilla, (4/05/73), freq: o, form: T, Habitat: Forest. Notes: Streambanks around 457m.

JDC 5407, Alt: 242m, site: River Amboi F.R., (21/04/78), form: T, Habitat: Tall secondary forest.

JDC 5430, Alt: 242m, site: Baissa, (1/05/78), form: T.

Anthonotha noldeae Rossberg (Exell & Hillc.)

** New to West Africa? **

JDC 2714, Alt: 1667m, site: Ngel Nyaki, (1/03/72), freq: f, form: T.

JDC 3287, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: f, form: T.

JDC 3335, Alt: 1515m, site: Ngel Nyaki, (11/11/73), freq: f, form: T.

JDC 4459, Alt: 1667m, site: CH Shirgu, (8/05/76), freq: f, form: T.

JDC 4539, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: T, Habitat: Forest.

JDC 4600, Alt: 1515m, site: Ngel Nyaki, (10/08/76), freq: f, form: T, Habitat: Forest margin. Notes: Flowering, a sapling.

Anthonotha sp.

JDC 5217, Alt: 1061m, site: Akwaizantar, (6/02/78), form: T, Habitat: Forest. Notes: Sterile collection.

Baikiaea insignis Benth.

JDC 4804, Alt: 758m, site: River Nwum F.R., (25/03/77), form: T, Habitat: Forest. Notes: Incl. 1 large tree in S.P.

JDC 4894, Alt: 758m, site: River Nwum F.R., (12/04/77), form: T, Habitat: Forest. Notes: Incl. 1 large tree in S.P.

Berlinia grandiflora (Vahl) Hutch. & Dalziel

JDC 3923, Alt: 530m, site: River Nwum F.R., (28/04/75), form: T, Habitat: Forest, on river bank. Notes: or? *Baikiaea insignis* (Benth).

JDC SR, Alt: 229m, site: Baissa, form: T.

JDC SR, Alt: 229m, site: Gangumi F.R., freq: o, form: T, Habitat: Forest. Notes: An 'economic'. Usually along streams.

Brachystegia eurycoma Harms

JDC 3859, Alt: 606m, site: River Nwum F.R., (15/04/75), form: T, Habitat: River banks. Notes: Rare at Kop Nti, common along the Donga River.

JDC 5412, Alt: 242m, site: River Amboi F.R., (24/04/78), form: T, Habitat: Tall secondary forest.

JDC 5433, Alt: 242m, site: Baissa, (1/05/78), form: T.

JDC 5435, Alt: 242m, site: Baissa, (1/05/78), form: T, Habitat: Stream banks.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: Up to 914m, site: VP fringing forest, form: T. Notes: With *Adina microcephala* and *Maranthes kerstingii*. One of the principal trees along the stream at Jangla and sporadic up to c. 914m.

JDC SR, Alt: 305m, site: Western escarpment of Mambilla, freq: o, form: T, Habitat: Forest. Notes: Nr. Batu Amanda: occasional on streambanks.

Burkea africana Hook.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna.

Cynometra megalophylla Harms

JDC 3987, Alt: 1440m, site: Gangoro forest, (1/12/75), form: T, Habitat: Forest.

JDC 4047, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Forest.

JDC 4797, Alt: 758m, site: VP fringing forest, (28/02/77), form: T. Notes: 9m tall. Beneath spreading *Brachystegia eurycoma* at the top of the waterfall above Jangla.

JDC 4911, Alt: 758m, site: River Nwum F.R., (18/04/77), form: T, Habitat: Stream bank forest.

Daniellia ogea (Harms) Rolfe ex Holland

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Daniellia oliveri (Rolfe) Hutch. & Dalziel

JDC 4993, Alt: 229m, site: Gangumi, (21/05/77), freq: f, form: T, Habitat: Savanna. Notes: Common farm tree which may reach a height of 18 - 21m (60 - 70 ft).

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: Persisting, but growing stunted, halfway up the escarpment.

JDC SR, Alt: 610-762m, site: River Nwum F.R., freq: o, form: T, Habitat: In wooded grassland.

JDC SR, Alt: c.914m, site: VP woodland, freq: r, form: T.

Detarium microcarpum Guill. & Perr.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna.

Detarium senegalense J.F. Gmel.

JDC 4901, Alt: 758m, site: River Nwum F.R., (13/04/77), form: T, Habitat: Forest.

JDC 5353, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest.

JDC 5459, Alt: 242m, site: Baissa, (6/05/78), form: T.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Dialium guineense Willd.

JDC 4734, Alt: 606m, site: VP fringing forest, (23/02/77), form: T, Habitat: at Jangla.

JDC 5415, Alt: 242m, site: River Amboi F.R., (24/04/78), form: T, Habitat: Tall secondary forest.

Erythrophleum suaveolens (Guill. & Perr.) Brenan

JDC 3125, Alt: 758m, site: Western escarpment of Mambilla, (4/05/73), form: T, Habitat: Forest. Notes: Characteristic streambank tree from Zongo

Mata to the Donga river.

JDC 3828, Alt: 758m, site: River Nwum F.R., (7/04/75), form: T, Habitat: Forest, but more usual near the margin. Notes: 2 small trees in profile strip 1, & a large tree in S.P.

JDC 3900, Alt: 606m, site: River Nwum F.R., (22/04/75), form: T, Habitat: Forest. Notes: Sterile. 13m tall. Most common on forest edge.

JDC 4714, Alt: 1061m, site: VP fringing forest, (24/02/77), form: T. Notes: with *Brachystegia eurycoma*.

JDC 5000, Alt: 229m, site: Gangumi, (22/05/77), freq: o, form: T, Habitat: Stream banks. Notes: 21.2m tall. Growing alongside *Ricinodendron*.

JDC 5211, Alt: 1061m, site: Akwaizantar, (6/02/78), form: T, Habitat: Forest. Notes: At S.P.

JDC 5337, Alt: 242m, site: River Amboi F.R., (11/04/78), form: T, Habitat: Tall secondary forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 606m, site: River Nwum F.R., freq: o, form: T, Habitat: In forest regrowth.

JDC SR, Alt: 229m, site: Baissa, form: T.

JDC SR, Alt: n/a, site: Gashaka, form: T, Habitat: On route from Gashaka to CH.

Hylodendron gabunense Taub.

JDC 5367, Alt: 242m, site: River Amboi F.R., (17/04/78), form: T, Habitat: Tall secondary forest.

Isoberlinia doka Craib & Stapf

JDC SR, Alt: n/a, site: VP woodland, freq: lf, form: T.

JDC SR, Alt: n/a, site: Gangumi F.R., freq: lf, form: T, Habitat: Savanna. Notes: Common locally in pure stands.

Mezoneuron angolense Welw. ex Oliv.

JDC 5380, Alt: 242m, site: River Amboi F.R., (18/04/78), form: WC, Habitat: Tall secondary forest.

Piliostigma thonningii (Schumach.) Milne-Redh.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: In wooded grassland enclaves.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: In enclaves of wooded grassland.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna.

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: Persisting well up the escarpment.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

Tamarindus indica L.

JDC 4935, Alt: 229m, site: Gangumi, (9/05/77), freq: f, form: T, Habitat: Cultivated. Notes: Planted for its shade, and for the acid edible pulp in the pods.

Leguminosae-Mimosoideae

Acacia pentagona (Schumach.) Hook.f.

JDC 4186, Alt: 1440m, site: Gangoro forest, (19/02/76), form: WC, Habitat: Forest.

JDC 4597, Alt: 1515m, site: Ngel Nyaki, (10/08/76), freq: f, form: WC, Habitat: Submontane forest. Notes: At the enumeration plot.

JDC 4983, Alt: 229m, site: Gangumi F.R., (19/05/77), form: WC, Habitat: Forest. Notes: Common high liana; stem up to 7.5cm in diameter, markedly 5-ridged, thorny.

Acacia sieberiana DC.

JDC 4938, Alt: 229m, site: Gangumi, (9/05/77), freq: o, form: T, Habitat: Savanna.

Acacia sp?

JDC 5439, Alt: 242m, site: Baissa, (2/05/78), form: WC, Habitat: Forest. Notes: Sterile collection. Thorny stem 0.8cm in diameter, collected at the profile strip.

Albizia adianthifolia (Schumach.) W.F. Wight

JDC 4824, Alt: 758m, site: River Nwum F.R., (28/03/77), freq: o, form: T, Habitat: Edge of river bank forest.

JDC 5454, Alt: 242m, site: Baissa, (5/05/78), form: T, Habitat: Forest.

Albizia ferruginea (Guill. & Perr.) Benth.

L.& D. (FHI) 28738, Alt: 229m, site: Wurkam River F.R., freq: o, form: T, Habitat: Forest. Notes: Kurmin Nya.

JDC 3809, Alt: 758m, site: River Nwum F.R., (5/04/75), freq: f, form: T, Habitat: Forest.

Albizia glaberrima (Schumach. & Thonn.) Benth.

JDC 4308, Alt: 455m, site: River Gamgam, (11/04/76), form: T, Habitat: Stream banks. Notes: Fruiting. In transitional woodland/ forest fringing the bank of the river, close to the game rangers house.

Albizia gummifera (J.F. Gmel.) C.A. Sm.

JDC 4426, Alt: 1667m, site: CH upland forest, (1/05/76), freq: o, form: T. Notes: At profile strip & S.P.

JDC 4558, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Sterile. At enumeration plot.

JDC 5261, Alt: 985m, site: Akwaizantar, (17/02/78), form: T, Habitat: Forest.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: r, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

Albizia zygia (DC.) J.F. Macbr.

L.& D. (FHI) 28918, Alt: 229m, site: Gangumi F.R., freq: o, form: T, Habitat: Forest. Notes: The enumeration does not differentiate between *Albizia* spp. as 'economics'.

JDC 3921, Alt: 606m, site: River Nwum F.R., (28/04/75), freq: o, form: T, Habitat: Forest. Notes: 21.2m tall. Standing among old second growth thickets and scattered high forest trees.

JDC 4145, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest.

JDC 4256, Alt: 1440m, site: Gangoro forest, (6/03/76), form: T, Habitat: Forest.

JDC 4755, Alt: 1576m, site: VP amphitheatre, (26/02/77), freq: f, form: T, Habitat: from c. 1372 m.

JDC 4856, Alt: 758m, site: River Nwum F.R., (5/04/77), freq: o, form: T, Habitat: Forest. Notes: Incl. 7 trees in thicket stage regrowth.

JDC 5221, Alt: 1061m, site: Akwaizantar, (6/02/78), form: T, Habitat: Forest. Notes: Observed from just below the saddle to the sample plot on the valley floor at 853m. In sample plot No.4.

JDC 5245, Alt: 1061m, site: Akwaizantar, (10/02/78), form: T, Habitat: Forest. Notes: Observed from ±1067m, just below the saddle, to the sample plot on the valley floor at 853m. In sample plot No.4.

JDC 5377, Alt: 242m, site: River Amboi F.R., (18/04/78), form: T, Habitat: Tall secondary forest.

JDC 5408, Alt: 242m, site: River Amboi F.R., (21/04/78), form: T, Habitat: Transition woodland/Young secondary forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 606m, site: River Nwum F.R., form: T, Habitat: In forest regrowth. Notes: Occasional - not yet above the general level.

Aubrevillea kerstingii (Harms) Pellegr.

JDC 3806, Alt: 758m, site: River Nwum F.R., (3/04/75), freq: f, form: T, Habitat: Forest. Notes: Incl. trees 1 & 49, profile strip 1.

JDC 3895, Alt: 606m, site: River Nwum F.R., (21/04/75), form: T, Habitat: Forest. Notes: Sterile. Kaka name: Vang.

JDC 4046, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4048, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4144, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4197, Alt: 1440m, site: Gangoro forest, (21/02/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4200, Alt: 1440m, site: Gangoro forest, (21/02/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4208, Alt: 1440m, site: Gangoro forest, (24/02/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland.

JDC 4277, Alt: 1440m, site: Gangoro forest, (13/03/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland. Notes: Fruiting. Mass of papery pods look like flowers.

JDC 4752, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: f, form: T, Habitat: 1219 - 1515 m.

JDC 4788, Alt: 1364m, site: VP amphitheatre, (27/02/77), freq: f, form: T.

JDC 5226, Alt: 1067m, site: Akwaizantar, (8/02/78), form: T, Habitat: Forest. Notes: Observed from ±1067m, just below the saddle, to the sample plot on the valley floor at 853m, also in the ravine forest on the Mawo side of the saddle, and in forest clumps in grassland at the saddle.

JDC 5253, Alt: 909m, site: Akwaizantar, (14/02/78), form: T, Habitat: Forest. Notes: Observed from ±1067m, just below the saddle, to the sample plot on the valley floor at 853m, also in the ravine forest on the Mawo side of the saddle, and in forest clumps in grassland at the saddle.

JDC 5255, Alt: 909m, site: Akwaizantar, (14/02/78), form: T, Habitat: Forest. Notes: Observed from ±1067m, just below the saddle, to the sample plot on the valley floor at 853m, also in the ravine forest on the Mawo side of the saddle, and in forest clumps in grassland at the saddle.

JDC 5413, Alt: 242m, site: River Amboi F.R., (24/04/78), form: T, Habitat: Tall secondary forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: Edge of fringing forest.

JDC SR, Alt: 229m, site: Baissa, form: T.

JDC SR, Alt: above 762m, site: VP fringing forest, freq: o, form: T.

Dichrostachys cinerea (L.) Wight & Arn.

JDC 5222, Alt: 1061m, site: Akwaizantar, (6/02/78), form: T, Habitat: Forest. Notes: One tree.

JDC 5329, Alt: 242m, site: River Amboi F.R., (11/04/78), form: T, Habitat: Transition woodland/Young secondary forest.

Entada abyssinica Steud. ex A. Rich.

JDC 4314, Alt: 1364m, site: CH upland grassland, (17/04/76), freq: o, form: T, Habitat: Submontane grassland. Notes: Flowering.

JDC SR, Alt: From c.1067m, site: CH escarp & fringing forest, form: T.

JDC SR, Alt: n/a, site: Akwaizantar grassland, freq: a, form: T, Habitat: Forest.

JDC SR, Alt: 610-1067m, site: River Nwum F.R., form: T, Habitat: In wooded grassland.

Entada africana Guill. & Perr.

JDC 4733, Alt: 909m, site: VP woodland, (21/02/77), form: T, Habitat: Open woodland. Notes: Fruiting and immature flowers. Steep, rocky western slopes of Vogel Peak, above Jangla. Common between 914m and 1067m ; Also below Hepper's Camp.

Entada mannii (Oliv.) Tisser.

JDC 5382, Alt: 242m, site: River Amboi F.R., (19/04/78), form: WC, Habitat: Tall secondary forest. Notes: Scandent shrub.

Entada rheedei Spreng.

JDC 3135, Alt: 606m, site: Western escarpment of Mambilla, (8/05/73), form: WC, Habitat: Fringing forest. Notes: Gidan Bature to Batu Amandia.

JDC 4070, Alt: 1440m, site: Gangoro forest, (2/12/75), form: WC.

JDC 4158, Alt: 1440m, site: Gangoro forest, (11/02/76), form: WC, Habitat: Forest margin, gaps.

JDC 4786, Alt: 1364m, site: VP fringing forest, (27/02/77), form: WC, Habitat: In the deep valley below Hepper's Camp.

JDC 4841, Alt: 758m, site: River Nwum F.R., (3/04/77), freq: la, form: WC, Habitat: On big trees along the river.

JDC 5319, Alt: 242m, site: River Amboi F.R., (10/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Lofty liane.

JDC SR, Alt: 853-1067m, site: Akwaizantar, freq: o, form: WC, Habitat: Forest.

Newtonia buchananii (Baker f.) G.C.C. Gilbert &

Boutique

JDC 4449, Alt: 1667m, site: CH upland forest, (6/05/76), freq: f, form: T, Habitat: Fringing forest. Notes: Also on Cabbal Tale.

JDC 4620, Alt: 1515m, site: Ngel Nyaki, (3/02/77), freq: o/lf, form: T, Habitat: Forest margin. Notes: Flowering. 21m tall. At enumeration plot and profile strip.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: o, form: T.

Parkia biglobosa (Jacq.) R. Br. ex G. Don

JDC 3910, Alt: 606m, site: River Nwum F.R., (25/04/75), freq: r, form: T, Habitat: Open woodland. Notes: Pods ripe. 6.1m tall. Growing with *Terminalia*, *Lannea*, *Piliostigma* etc. Called Garin dorowa. Daddawa is prepared from the boiled seeds. A rich food source.

JDC 4962, Alt: 229m, site: Gangumi, (14/05/77), freq: f, form: T, Habitat: Savanna. Notes: Right to collect fruit.

JDC SR, Alt: n/a, site: Gangumi, freq: f, form: T, Habitat: Cultivated. Notes: Cultivated for the sweet edible pulp in the pods. At old Gangumi there are fine trees.

Parkia filicoidea Welw. ex Oliv.

JDC 3344, Alt: 1515m, site: Ngel Nyaki, (12/11/73), freq: o/lf, form: T.

JDC 4073, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Forest.

JDC 4154, Alt: 1440m, site: Gangoro forest, (11/02/76), form: T, Habitat: Forest.

JDC 4595, Alt: 1515m, site: Ngel Nyaki, (9/08/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Material collected from a sapling. A 30m+ tree nearby, but impossible to collect from.

JDC 4605, Alt: 1515m, site: Ngel Nyaki, (11/08/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Old pods collected from the ground. 30m+ tall. At the profile strip.

JDC 4611, Alt: 1515m, site: Ngel Nyaki, (12/08/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Sapling 3m high.

JDC 4615, Alt: 1515m, site: Ngel Nyaki, (3/02/77), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Flowering. Leafless. 30m+ tall. Large tree of the upper canopy.

JDC 4744, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: r, form: T.

JDC 5263, Alt: 1061m, site: Akwaizantar, (17/02/78), form: T, Habitat: Forest. Notes: Up to 30m tall, buttressed to 3m.

Piptadeniastrum africanum (Hook.f.) Brenan

JDC 3924, Alt: 530m, site: River Nwum F.R., (28/04/75), form: T, Habitat: River bank in forest. Notes: Sterile. Up to 24m.

JDC 4253, Alt: 1440m, site: Gangoro forest, (5/03/76), form: T, Habitat: Forest.

JDC 4745, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: T.

JDC 4828, Alt: 758m, site: River Nwum F.R., (30/03/77), form: T, Habitat: River bank in forest.

JDC 5235, Alt: 1061m, site: Akwaizantar, (9/02/78), freq: o, form: T, Habitat: Forest.

Prosopis africana (Guill. & Perr.) Taub.

L.& D. (FHI) 28843, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna.

Tetrapleura tetraptera (Schumach. & Thonn.) Taub.

HMC 173, Alt: 212m, site: Baissa, (3/08/74), form: T.

L.& D. (FHI) 28797, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

JDC 3840, Alt: 758m, site: River Nwum F.R., (9/04/75), form: T, Habitat: Forest. Notes: Incl. 1 tree in profile strip 2.

JDC 4848, Alt: 758m, site: River Nwum F.R., (4/04/77), freq: o, form: T, Habitat: Forest. Notes: Incl. 1 tree in profile strip 2.

JDC 4968, Alt: 229m, site: Gangumi F.R., (16/05/77), form: T, Habitat: Forest.

JDC 4970, Alt: 229m, site: Gangumi F.R., (16/05/77), form: T, Habitat: Forest.

JDC 5351, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Leguminosae-Papilionoideae

Adenocarpus mannii (Hook.f.) Hook.f.

JDC 3317, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: o, form: SH, Habitat: Forest margin.

JDC 4759, Alt: 1667m, site: VP amphitheatre, (26/02/77), form: SH, Habitat: In thicket, fringing trees along a stream. Notes: Just below the highest summit of Vogel Peak.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH. Notes: Scrambling shrub. Occasionally a tree up to 6m tall, and 30cm dbh. Like *Gnidia glauca* and *Philippia mannii*. More abundant on the plateau

Adenodolichos paniculatus (Hua) Hutch. & Dalziel

JDC SR, Alt: n/a, site: VP woodland.

Aeschynomene baumii Harms

JDC 4476, Alt: 1667m, site: CH upland grassland, (13/05/76), freq: o, form: SH, Habitat: In grassland grazed only by buffalo.

Baphia laurifolia Baill.

JDC 2942, Alt: 840m, site: River Nwum F.R., (6/07/72), form: T, Habitat: Fringing forest; forest at the water's edge.

JDC 3858, Alt: 606m, site: River Nwum F.R., (15/04/75), freq: o, form: T, Habitat: Fringing forest; forest at the water's edge.

JDC 4908, Alt: 758m, site: River Nwum F.R., (17/04/77), form: T, Habitat: Fringing forest; forest at the water's edge.

Baphia leptostemma Baill. subsp. *gracilipes* (Harms)

Soladoye

JDC 3864, Alt: 455m, site: River Nwum F.R., (15/04/75), form: T, Habitat: Fringing forest on rocky river bank.

Craibia atlantica Dunn

FNH 2764, Alt: n/a, site: VP fringing forest, form: T. Notes: At the foot of Vogel Peak.

Crotalaria bamendae Hepper

RED DATA LISTED: VU D2

L.&D. (FHI) 34369, site: Mambilla Plateau (Gembu). Notes: Also reported in the Mt Oku checklist (Cheek et al. 2000).

Crotalaria ledermannii Baker f.

RED DATA LISTED: VU D2

Previously reported from Mambilla Plateau (*Eucalyptus* plantation). Also reported in the Mt Oku checklist (Cheek et al. 2000).

Crotalaria orthoclada Welw. ex Baker

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH. Notes: Scrambling shrub. Up to 2.4m tall.

Crotalaria quartiniana A. Rich.

FNH 1493, Alt: c.1460m, site: VP amphitheatre, form: H. Notes: On the edge of a clump of *Beilschmiedia mannii* by a water course in upland grassland. Additional to F.W.T.A. ed. 2 and the first record for the F.W.T.A.

Dalbergia heudelotii Stapf

JDC 3311, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: f, form: WC, Habitat: Forest/forest margin.

Dalbergia lactea Vatke

JDC 4134, Alt: 1440m, site: Gangoro forest, (9/02/76), form: WC, Habitat: Forest margin.

Dalbergia saxatilis Hook.f.

FNH 2765, Alt: n/a, site: VP fringing forest, form: SH, Habitat: Riverine forest. Notes: On the lower slopes of Vogel Peak.

Dalbergiella welwitschii (Baker) Baker f.

FNH 1474, Alt: n/a, site: VP fringing forest, form: SH, Habitat: Riverine forest. Notes: At the foot of Vogel Peak.

Desmodium repandum (Vahl) DC.

JDC SR, Alt: n/a, site: Ngel Nyaki, form: H, Habitat: Forest margin.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: H.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH. Notes: Undershrub.

Dolichos schweinfurthii Harms

JDC 4441, Alt: 1667m, site: CH upland grassland, (5/05/76), freq: o, form: SHH. Notes: Resistant to trampling.

Eriosema montanum Baker f.

JDC 3389, Alt: 1970m, site: Gangirwal upland grassland, (2/11/74), form: H.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH.

Notes: Sub-shrub, 90cm-1.2m tall.

Erythina sigmoidea Hua

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

Leptoderris fasciculata (Benth.) Dunn

JDC 4746, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: WC.

Leptoderris sp.

JDC 4202, Alt: 1440m, site: Gangoro forest, (23/02/76), form: WC,

Habitat: Forest margin.

Millettia chrysophylla Dunn

JDC 4909, Alt: 758m, site: River Nwum F.R., (17/04/77), form: T, Habitat: River bank in forest.

Millettia conraui Harms ** New to Nigeria? **

RED DATA LISTED: VU A1c, B1 + 2c

JDC 2715, Alt: 1667m, site: Ngel Nyaki, (1/03/72), freq: o, form: T, Habitat: Submontane forest. Notes: Forest edge.

JDC 3511, Alt: 1970m, site: CW *Albizia gummifera* forest, (14/11/74), form: T, Habitat: Montane forest. Notes: Kurmin Dutsin Dodo.

JDC 4372, Alt: 1667m, site: CH upland forest, (22/04/76), freq: o, form: T, Habitat: Forest margin. Notes: At sample plot. (?= 2715, *M. conraui* (Harms). New to Nigeria but known from Bamenda Highlands. Det. F. Dowsett-Lemaire.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: f, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

Millettia thonningii (Schumach. & Thonn.) Baker

JDC 4723, Alt: 606m, site: VP fringing forest, (24/02/77), form: T, Habitat: Jangla. Notes: 9m tall.

Millettia sp.

JDC 4433, Alt: 1667m, site: CH upland forest, (4/05/76), freq: o, form: T, Habitat: Forest margin. Notes: At S.P. ?= 2715, *M. conraui* (Harms).

JDC 4866, Alt: 758m, site: River Nwum F.R., (6/04/77), form: WC, Habitat: Stream fringing forest.

Mucuna poggei Taub. var. *occidentalis* Hepper

JDC 3623, Alt: 1364m, site: CW forest/grassland ecotone, (5/12/74), form: T.

Ormocarpum sennoides (Willd.) DC. subsp. *hispidum*

Brenan & J. Leonard

JDC 5361, Alt: 242m, site: River Amboi F.R., (16/04/78), form: SH, Habitat: Transition woodland/Young secondary forest.

Pericopsis laxiflora (Benth.) Meeuwen

L.& D. (FHI) 18764, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna.

Pterocarpus erinaceus Poir.

JDC 5213, Alt: 1061m, site: Akwaizantar grassland, (6/02/78), freq: lf, form: T, Habitat: Forest.

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: Not above Gidan Kwano.

JDC SR, Alt: 762m, site: VP woodland, form: T.

Pterocarpus mildbraedii Harms

JDC 3849, Alt: 758m, site: River Nwum F.R., (12/04/75), freq: f, form: T, Habitat: Forest. Notes: Incl. profile strip 2 (4 trees), plus 12 trees in S.P. Kaka name: Ngwa.

JDC 3925, Alt: 530m, site: River Nwum F.R., (28/04/75), form: T, Habitat: Forest. Notes: Kaka name: Ngwa.

JDC 3927, Alt: 606m, site: River Nwum F.R., (28/04/75), form: T, Habitat: Forest. Notes: Seeds germinating. Kaka name: Ngwa.

JDC 4825, Alt: 758m, site: River Nwum F.R., (29/03/77), form: T, Habitat: Forest. Notes: Incl. profile strip 2 (4 trees), plus 12 trees in S.P. Kaka name: Ngwa.

JDC 5354, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest.

JDC 5463, Alt: 242m, site: Baissa, (6/05/78), form: T. Notes: Sterile collection. 37m tall. At the profile strip, buttressed to 6m, massive branches; slash orange developing fine red streaks, tardily exuding red juice.

JDC 5465, Alt: 242m, site: Baissa, (7/05/78), form: T. Notes: Sterile collection. 37m tall. At the profile strip. Buttressed to 6m, massive branches; slash orange developing fine red streaks, tardily exuding red juice.

JDC 5466, Alt: 242m, site: Baissa, (7/05/78), form: T. Notes: Sterile collection. 37m tall. At the profile strip. Buttressed to 6m, massive branches; slash orange developing fine red streaks, tardily exuding red juice.

JDC 5467, Alt: 242m, site: Baissa, (7/05/78), form: T. Notes: Sterile collection. 37m tall. At the profile strip. Buttressed to 6m, massive branches; slash orange developing fine red streaks, tardily exuding red juice.

JDC SR, Alt: 762m & 1143m, site: Akwaizantar, freq: o, form: T, Habitat: Forest.

Pterocarpus santalinoides DC.

L.& D. (FHI) 34417, Alt: n/a, site: Taraba River, form: T, Habitat: Stream banks. Notes: Taraba river, Garbabi.

Sesbania macrantha Welw. ex E. Phillips & Hutch.

JDC 4421, Alt: 1667m, site: CH upland forest, (30/04/76), freq: la, form: SH, Habitat: Occasional at forest margin. Notes: Fruiting. A short-lived early pioneer species.

Smithia elliotii Baker f.

JDC 3374, Alt: 1970m, site: Gangirwal upland grassland, (2/11/74).

JDC SR, Alt: n/a, site: Gangirwal upland grassland, Habitat: On south-west slopes. Notes: Undershrub.

Tephrosia holstii Taub.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH. Notes: Semi-scrambling.

Tephrosia vogelii Hook.f.

JDC 3591, Alt: 1970m, site: CW forest/grassland ecotone, (26/11/74), freq: o, form: T, Habitat: Forest grassland margin. Notes: Ecotone in places only 2m wide. *Nuxia congesta* most common.

JDC 4417, Alt: 1667m, site: CH upland forest, (30/04/76), freq: o, form: SH, Habitat: Forest margin. Notes: No flowers. Fulfulde name: Yom.

Mbuh name: Toon. Tabu name: Koru.

Trifolium baccarinii Chiov.

JDC 3403, Alt: 1970m, site: Gangirwal, (4/11/74), form: H. Notes: One seen.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f, form: H, Habitat: Between *Sporobolus* tussocks on south-west slopes.

Lentibulariaceae

Utricularia mannii Oliv.

JDC 4514, Alt: 1515m, site: Ngel Nyaki, (30/07/76), freq: o, form: EH, Habitat: On moss covered branches with *Polystachya cooperi*. Notes: Yellow flowers up to 2.5cm long.

Lobeliaceae

Lobelia heyneana Roem. & Schult.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f, Habitat: Where there is heavy trampling by cattle.

Loganiaceae

Anthocleista djalonensis A. Chev.

L.& D. (FHI) 28928, Alt: n/a, site: Taraba River, form: T, Habitat: Stream banks. Notes: Taraba river, opposite Gangumi village.

JDC 3908, Alt: 606m, site: River Nwum F.R., (23/04/75), freq: f, form: T, Habitat: Secondary forest and forest margin. Notes: Flowering. One of the first trees to overtop thicket stage in regrowth.

JDC 5390, Alt: 242m, site: River Amboi F.R., (20/04/78), form: T, Habitat: Transition woodland/Young secondary forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 606m, site: River Nwum F.R., freq: o, form: T, Habitat: In forest regrowth. Notes: The first 'emergent'.

Anthocleista vogelii Planch.

JDC 4039, Alt: 1440m, site: Gangoro forest, (5/12/75), form: T, Habitat: Stream banks.

JDC 4315, Alt: 1364m, site: CH upland forest, (17/04/76), freq: f, form: T, Habitat: Stream bank forest. Notes: Fruiting. In swampy ground.

Anthocleista sp.

JDC 4782, Alt: 1515m, site: VP amphitheatre, (27/02/77), freq: o, form: T. Notes: Young flowers collected and buds; spirit material. 15 m tall.

Strychnos nigritana Baker

JDC 2972, Alt: 1212m, site: Antere, (9/07/72), form: WC, Habitat: River bank.

JDC 4147, Alt: 1440m, site: Gangoro forest, (10/02/76), form: WC, Habitat: Forest.

JDC 4921, Alt: 200m, site: Taraba River, (4/05/77), form: WC, Habitat: Stream banks. Notes: Taraba bank opposite Gangumi village.

Strychnos spinosa Lam.

JDC 4710, Alt: 909m, site: VP woodland, (24/02/77), freq: o, form: T, Habitat: Open woodland. Notes: Flower & new leaf.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna.

Loranthaceae

Loranthus sp.

JDC 4201, Alt: 1440m, site: Gangoro forest, (22/02/76), form: SH, Habitat: Parasitic on *Ochna afzelii*.

JDC 4224, Alt: 1440m, site: Gangoro forest, (27/02/76), form: SH, Habitat: Parasitic on liane.

Malvaceae

Pavonia urens Cav.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH. Notes: Scrambling shrub. Up to 3.7m tall.

Sida rhombifolia L.

JDC 3415, Alt: 1970m, site: Gangirwal *P.S.P* forest, (4/11/74), form: T.

Melastomatceae

Amphiblemma mildbraedii Gilg ex Engl.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Dissotis brazzae Cogn.

FNH 1516, Alt: 1515m, site: VP amphitheatre, form: SHH, Habitat: Forest margin.

Dissotis longisetosa Gilg & Lederm.ex Engl.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: o.

Dissotis perkinsiae Gilg

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f, Habitat: In *Sporobolus* grassland, on the south-west slopes above the col.

Dissotis cf thollonii Cogn. ex Büttner

JDC 4420, Alt: 1667m, site: CH upland grassland, (30/04/76), form: SH, Habitat: Stream banks. Notes: Flowering material was collected.

Heterotis angolensis (Gilg & Lederm. ex Engl.) var. *bambutorum* Jacq.- Fél.

JDC 3707, Alt: 2273m, site: Gangirwal, (10/02/75), form: H.

Heterotis rotundifolia (Sm.) Jacq.- Fél.

JDC 4954, Alt: 229m, site: Gangumi F.R., (13/05/77), freq: o, form: SH, Habitat: Stream banks. Notes: Decumbent, flowers mauve.

Memecylon afzelii G. Don

JDC 4198, Alt: 1440m, site: Gangoro forest, (21/02/76), form: T, Habitat: Forest.

JDC 4530, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: f, form: T.

Notes: Fruits immature. Near the old game pit beside the path.

Memecylon sp.

JDC 4000, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T.

JDC 4149, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T.

JDC 5175, Alt: 1364m, site: Akwaizantar, (31/01/78), freq: o, form: T, Habitat: Forest. Notes: Immature fruiting material collected. Infrequent.

JDC 5306, Alt: 242m, site: River Amboi F.R., (8/04/78), form: T, Habitat: Tall secondary forest. Notes: Flowers collected. Shapely, miniature tree, flowers blue.

Warneckea fosteri (Hutch. & Dalziel) Jacq.-Fél.

JDC 3799, Alt: 909m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest. Notes: Fruiting. Up to 3.6m tall.

Warneckea membranifolia (Hook.f.) Jacq.- Fél.

JDC 4467, Alt: 1667m, site: CH upland forest, (12/05/76), freq: r, form: T, Habitat: Forest margin. Notes: Does not fit description in FWTA. At Dutsin Lamba.

Xylopi sp.

JDC 4730, Alt: 1212m, site: VP fringing forest, (24/02/77), form: T.

Notes: Flowering. 6m tall.

Meliaceae

Carapa grandiflora Sprague

HMC 121, Alt: 1667m, site: Ngel Nyaki, (17/08/73), freq: f, form: T.

JDC 3320, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: f, form: T.

JDC 4354, Alt: 1667m, site: CH upland forest, (20/04/76), freq: o, form: T, Habitat: Stream fringing forest. Notes: Flowering. 9.1m tall.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: SH. Notes: Also a tree or scandent shrub.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: WC.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

Entandropbragma angolense (Welw.) C. DC.

RED DATA LISTED: VU A1cd

JDC 3026, Alt: 1667m, site: Ngel Nyaki, (1/03/73), freq: o/lf, form: T.

JDC 3347, Alt: 1515m, site: Ngel Nyaki, (13/11/73), freq: o/lf, form: T.

JDC 3501, Alt: 1829m, site: CW *Albizia gummifera* forest, (13/11/74), form: T.

JDC 4045, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Forest.

JDC 4150, Alt: 1440m, site: Gangoro forest, (11/02/76), form: T, Habitat: Forest.

JDC 4462, Alt: 1667m, site: CH upland forest, (10/05/76), freq: lf, form: T, Habitat: Restricted to forests on Dutsin Lamba & Cabbal Shirgu.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T. Notes: One seen.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: o, form: T.

Khaya grandifoliola C. DC.

RED DATA LISTED: VU A1cd

JDC 3852, Alt: 758m, site: River Nwum F.R., (12/04/75), form: T, Habitat: Forest, but like *Erythrophleum* & *Chlorophora*, usually near the margin.

JDC 4016, Alt: 1440m, site: Gangoro forest, (3/12/75), form: T, Habitat: Forest.

JDC 4146, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest.

JDC 4748, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: f, form: T, Habitat: 1219 - 1372 m.

JDC 4890, Alt: 758m, site: River Nwum F.R., (11/04/77), form: T, Habitat: Forest, but like *Erythrophleum* & *Chlorophora*, usually near the margin.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 853-1067m, site: Akwaizantar, freq: o, form: T, Habitat: Forest. Notes: Also seen at 1143m & 762m & in forest clumps in grassland.

JDC SR, Alt: ±457m, site: Western escarpment of Mambilla, freq: o, form: T, Habitat: Forest. Notes: Along streams.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

JDC SR, Alt: 229m, site: Gangumi F.R., freq: r?, form: T, Habitat: Forest. Notes: An 'economic'. Almost as scarce as *Milicia excelsa*.

JDC SR, Alt: 229m, site: Baissa, form: T.

JDC SR, Alt: n/a, site: Gashaka, form: T, Habitat: On route from Gashaka to CH.

Khaya senegalensis (Desr.) A. Juss.

JDC SR, Alt: n/a, site: Taraba River, freq: f, form: T, Habitat: Stream banks.

Lovoa trichilioides Harms

RED DATA LISTED: VU A1cd

JDC 3971, Alt: 1440m, site: Gangoro forest, (1/12/75), form: T, Habitat: Forest.

JDC 4138, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest.

JDC 4612, Alt: 1515m, site: Ngel Nyaki, (12/08/76), freq: r, form: T.

Habitat: Submontane forest. Notes: Four big trees at the foot of the slope. JDC 4781, Alt: 1515m, site: VP amphitheatre, (27/02/77), freq: r, form: T.

Trichilia priureana A. Juss.

L.& D. (FHI) 28899, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

JDC 5432, Alt: 242m, site: Baissa, (1/05/78), form: T. Notes: Sterile gathering. 14m high. The bole slightly fluted. Trees 6 & 12 on profile strip.

JDC 5446, Alt: 242m, site: Baissa, (3/05/78), form: T.

Trichilia retusa Oliv.

L.& D. (FHI) 28920, Alt: n/a, site: Taraba River, form: T, Habitat: Stream banks.

Trichilia welwitschii C. DC.

JDC 4560, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot.

JDC 5345, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T. Notes: Flowers collected. When specimens were collected the flowers were about to open. 3 trees at the profile strip: 18, 23 & 33.

JDC 5458, Alt: 242m, site: Baissa, (6/05/78), form: T. Notes: Sterile collection. 13m tall. Poss. ?*Trichilia prieuriana*. Tree 63 on the profile strip. With compound leaves up to 45cm long. Slash red.

Trichilia sp.

JDC 4140, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest.

JDC 4195, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest.

JDC 4212, Alt: 1440m, site: Gangoro forest, (24/02/76), form: T, Habitat: Forest.

JDC 4735, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: T. Notes: Sterile gathering.

JDC 4737, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: o, form: T. Notes: Fruiting. 15m tall. Occasional 1372 - 1515m.

Melanthaceae

Bersama abyssinica Fresen.

JDC 3993, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest margin.

JDC 4173, Alt: 1440m, site: Gangoro forest, (14/02/76), form: T, Habitat: Forest margin.

JDC 4608, Alt: 1515m, site: Ngel Nyaki, (12/08/76), freq: o, form: T, Habitat: Forest margin. Notes: Fruits. 12m tall.

JDC 5273, Alt: 1136m, site: Akwaizantar, (20/02/78), form: T, Habitat: Forest. Notes: Observed from just below the saddle to the sample plot on the valley floor at 853m and in open forest near the head of the valley.

Menispermaceae

Tiliacora funifera (Miers) Oliv.

JDC 4185, Alt: 1440m, site: Gangoro forest, (18/02/76), form: WC, Habitat: Forest.

Monimiaceae

Xymalos monospora (Harv.) Warb.

JDC 4329, Alt: 1667m, site: CH upland forest, (17/04/76), freq: f, form: T, Habitat: Submontane forest. Notes: Fruiting. 9.1m tall. Understory tree. Escarpment and streamfringing forest.

JDC 4569, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Sterile. Small tree. At enumeration plot and profile strip.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

Moraceae

Antiaris toxicaria (Rumph. ex Pers.) Lesch.

JDC 4180, Alt: 1440m, site: Gangoro forest, (17/02/76), form: T, Habitat: Forest & clumps amongst rocks in grassland.

JDC 4241, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat: Forest & clumps amongst rocks in grassland.

JDC 4876, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: 3 trees in S.P.

JDC 5002, Alt: 229m, site: Gangumi F.R., (23/05/77), form: T, Habitat: Forest. Notes: About 30m tall. An 'economic'; the Gangumi enumeration recorded 12 trees, the same as *Albizia*.

JDC 5013, Alt: 229m, site: Wurkam River F.R., (25/05/77), form: T, Habitat: Forest. Notes: 30m+. Kurmin Tondirim, Wurkam River F/Reserve. An 'economic'.

JDC 5462, Alt: 242m, site: Baissa, (6/05/78), form: T.

Ficus artocarpoides Warb

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, form: E. Notes: Strangling epiphyte.

Ficus chlamydocarpa Mildbr. & Burret ** New to Nigeria? **

JDC 2824, Alt: 1515m, site: Ngel Nyaki, (17/05/72), freq: o, form: T, Habitat: Forest margin. Notes: Kurmin Danko.

Ficus exasperata Vahl

JDC 2949, Alt: 840m, site: River Nwum F.R., (7/07/72), form: T, Habitat: Forest.

JDC 5376, Alt: 242m, site: River Amboi F.R., (18/04/78), form: T, Habitat: Tall secondary forest.

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, freq: o, form: T.

Ficus glumosa Del.

JDC 5163, Alt: 1364m, site: Akwaizantar grassland, (29/01/78), freq: o, form: T, Habitat: Forest. Notes: Sporadic in rocky places.

Ficus lutea Vahl

JDC 4258, Alt: 1440m, site: Gangoro forest, (6/03/76), form: T, Habitat: Forest margin & stream fringing forest.

JDC 4368, Alt: 1667m, site: CH upland forest, (22/04/76), form: T. Notes: At profile strip (Tree 2). Growing independently.

Ficus cf mucuso Ficalho

JDC 4865, Alt: 758m, site: River Nwum F.R., (6/04/77), form: T, Habitat: Forest. Notes: Incl. Tree 11 at profile strip 2. Kaka name: Mawi.

JDC 4972, Alt: 229m, site: Gangumi F.R., (17/05/77), form: T, Habitat: Forest.

Ficus oreodryadum Mildbr.

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, form: E. Notes: Strangling epiphyte.

Ficus ottoniifolia (Miq.) Miq. subsp. *ottoniifolia*

JDC 5278, Alt: 1212m, site: Akwaizantar, (21/02/78), form: WC, Habitat: Forest. Notes: Stream fringing forest on the approach from Masaboy. Det. 1996 by C.C. Berg, as "almost certainly this species".

Ficus polita Vahl

JDC 4563, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot.

Ficus sagittifolia Mildbr. & Burret

L. & D. (FHI) 28742, Alt: 229m, site: Wurkam River F.R., form: T, Habitat: Forest. Notes: Small tree, usually epiphytic. Gidan Anju, Wurkam River F.R.

Ficus sansibarica Warb. subsp. *macroserma* (Mildbr. & Burret) C.C. Berg

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, form: E. Notes: Strangling epiphyte.

Ficus sur Forssk.

JDC 4556, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Fruiting. Understory tree. At enumeration plot.

JDC 5230, Alt: 1061m, site: Akwaizantar, (8/02/78), freq: r, form: T, Habitat: Forest. Notes: Fruit collected in spirit.

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, freq: r, form: T. Notes: (syn. *F. capensis*).

Ficus cf variifolia Warb.

JDC 3831, Alt: 758m, site: River Nwum F.R., (8/04/75), form: T, Habitat: Forest. Notes: Incl. Tree 11 at profile strip 2. Kaka name: Mawi.

JDC 4975, Alt: 229m, site: Gangumi F.R., (17/05/77), form: T, Habitat: Forest.

Ficus sp.

JDC 4020, Alt: 1440m, site: Gangoro forest, (4/12/75), form: T, Habitat: Forest.

JDC 4870, Alt: 758m, site: River Nwum F.R., (6/04/77), form: T, Habitat: Forest, parasitising river bank trees particularly. Notes: Strangler.

JDC 5325, Alt: 242m, site: River Amboi F.R., (10/04/78), form: T, Habitat: Tall secondary forest. Notes: Fruits in spirit. Strangling species.

JDC SR, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest. Notes: Large strangler.

JDC SR, Alt: n/a, site: Gangirwal P.S.P. forest, form: T.

JDC SR, Alt: n/a, site: CH upland forest, form: T. Notes: Strangling epiphyte. At S.P.

Milicia excelsa (Welw.) C.C. Berg

JDC 3815, Alt: 909m, site: River Nwum F.R., (6/04/75), form: T, Habitat: Forest, but more often near the margin (incl. 2 big trees in S.P.). Notes: Kaka name: Tong.

JDC 3818, Alt: 909m, site: River Nwum F.R., (7/04/75), form: T, Habitat: Forest, but more often near the margin (incl. 2 big trees in S.P.). Notes: Kaka name: Tong.

JDC 4790, Alt: 1364m, site: VP fringing forest, (27/02/77), freq: r, form: T. Notes: 21 m tall.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, freq: o, form: T, Habitat: Forest. Notes: Also locally common in farmland secondary forest below 610m.

JDC SR, Alt: 762m & 853-914m, site: Akwaizantar, form: T, Habitat: Forest. Notes: Kaka name: Tong.

JDC 5005, Alt: 229m, site: Gangumi F.R., (23/05/77), freq: r, form: T, Habitat: Forest. Notes: About 27.3m tall. Rare, accounting for less than 3% of 'economics' at Gangumi F.R.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

JDC SR, Alt: 229m, site: Baissa, form: T.

Morus mesozygia Stapf ex A. Chev.

JDC 4896, Alt: 758m, site: River Nwum F.R., (12/04/77), form: T, Habitat: Forest. Notes: 3 trees in S.P.

JDC 5220, Alt: 1061m, site: Akwaizantar, (6/02/78), form: T, Habitat: Forest.

JDC 5233, Alt: 1061m, site: Akwaizantar, (9/02/78), freq: o, form: T, Habitat: Forest. Notes: One particularly large tree was 30m tall & 4.1m in girth.

Treculia africana Decne

JDC 3912, Alt: 606m, site: River Nwum F.R., (25/04/75), form: T, Habitat: River bank in forest. Notes: Fruiting. Found at the forest edge, and a few metres from River Nwum.

JDC 4184, Alt: 1440m, site: Gangoro forest, (18/02/76), form: T, Habitat: Forest & stream fringing forest.

JDC 4236, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat: Forest & stream fringing forest.

JDC 4947, Alt: 229m, site: Gangumi F.R., (12/05/77), freq: o, form: T, Habitat: Stream banks.

JDC 5015, Alt: 229m, site: Gangumi F.R., (26/05/77), form: T, Habitat: Forest. Notes: Fruiting. About 18.2m tall.

JDC 5370, Alt: 242m, site: River Amboi F.R., (17/04/78), form: T, Habitat: Tall secondary forest.

JDC 5397, Alt: 242m, site: River Amboi F.R., (20/04/78), form: T, Habitat: Tall secondary forest.

Trilepisium madagascariense DC.

JDC 3117, Alt: 455m, site: Western escarpment of Mambilla, (4/05/73), form: T, Habitat: Forest. Notes: Not uncommon in secondary forest. Kaka name: Gya loo.

JDC 3837, Alt: 758m, site: River Nwum F.R., (9/04/75), freq: f/la, form: T, Habitat: Forest. Notes: Incl. Profile strip 1.

JDC 4013, Alt: 1440m, site: Gangoro forest, (3/12/75), form: T, Habitat: Forest.

JDC 4248, Alt: 1440m, site: Gangoro forest, (4/03/76), form: T, Habitat: Forest. Notes: Not flowering or fruiting.

JDC 4564, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot.

JDC 5176, Alt: 1364m, site: Akwaizantar, (31/01/78), freq: a, form: T, Habitat: Forest. Notes: Up to 27m tall. Kaka name: Gya loo.

JDC 5234, Alt: 1061m, site: Akwaizantar, (9/02/78), freq: a, form: T, Habitat: Forest. Notes: Up to 27m tall. Kaka name: Gya loo.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: o, form: T.

Moringaceae

Moringa oleifera Lam.

JDC SR, Alt: n/a, site: Gangumi, form: T, Habitat: Cultivated. Notes: Kwagiri & Tonti. Planted as fence tree.

Myristicaceae

Pycnanthus angolensis (Welw.) Warb.

JDC 3904, Alt: 606m, site: River Nwum F.R., (23/04/75), freq: o/lf, form: T, Habitat: Forest. Notes: Sterile. Almost 30m tall. Valued for its soft, easily sawn wood. Kaka name: Bangang.

JDC 5196, Alt: 1212m, site: Akwaizantar, (3/02/78), freq: o, form: T, Habitat: Forest.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: Baissa, form: T.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

Myrsinaceae

Ardisia kivuensis Taton

JDC 4360, Alt: 1667m, site: CH upland forest, (20/04/76), freq: f, form: T, Habitat: Fringing forest. Notes: Flowering. Small tree, 6.1m tall.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH.

Embelia bambuseti Gilg & Schellenb.

JDC 4410, Alt: 1667m, site: CH upland forest, (28/04/76), freq: o, form: WC, Habitat: Stream fringing forest. Notes: Flowering. Another individual 4/5/76, at enumeration plot.

Maesa lanceolata Forssk.

JDC 4318, Alt: 1364m, site: CH upland forest, (17/04/76), freq: f, form: T, Habitat: Submontane forest margin. Notes: Fruiting. 6.1m tall.

JDC 4529, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: o, form: T, Habitat: Forest margin. Notes: Fruits immature.

JDC 4774, Alt: 1667m, site: VP amphitheatre, (26/02/77), freq: o, form: T, Habitat: Forest margin.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: T.

Rapanea melanophloeos (L.) Mez

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T. Notes: 9.1m tall. Previously recorded from the highlands of Cameroon to S.E. Nigeria, including Bioko.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

Myrtaceae

Eugenia gilgii Engl. & Brehmer

RED DATA LISTED: CR A1c

FNH 2727, Alt: n/a, site: VP amphitheatre, freq: f, form: T.

JDC 3476, Alt: 1970m, site: CW *Pouteria altissima* forest, (9/11/74), form: T.

JDC 3477, Alt: 1970m, site: CW *Pouteria altissima* forest, (9/11/74), form: T.

JDC 3593, Alt: 1818m, site: CW *Albizia gummifera* forest, (27/11/74), form: T.

JDC 3669, Alt: 2121m, site: Gangirwal *Syzigium* streamside forest, (3/02/75), form: T.

JDC 3701, Alt: 2121m, site: CW *Pouteria altissima* forest, (9/02/75), form: T.

JDC 3716, Alt: 2121m, site: Gangirwal *Syzigium* streamside forest, (12/02/75), form: T.

JDC 4757, Alt: 1636m, site: VP amphitheatre, (26/02/77), freq: f, form: T.

JDC 5118, Alt: 1667m, site: Mambilla Plateau, (20/11/77), form: T. Notes: At Hosere Murba on eastern boundary.

JDC SR, Alt: n/a, site: CW *Pouteria altissima* forest, form: T, Habitat: Forest margin.

Eugenia sp.

JDC 3985, Alt: 1440m, site: Gangoro forest, (1/12/75), form: T, Habitat: Forest stream.

JDC 4026, Alt: 1440m, site: Gangoro forest, (4/12/75), form: T, Habitat: Forest stream.

JDC 4026, Alt: 1440m, site: Gangoro forest, (4/12/75), form: T, Habitat: Forest stream.

JDC 4231, Alt: 1440m, site: Gangoro forest, (29/07/76), form: T. Notes: Flowering. Rocky bank of a stream in deep shade.

JDC 4374, Alt: 1667m, site: CH upland forest, (23/04/76), freq: o, form: T. Notes: Flowers in spirit. At profile strip, sample plot.

Syzygium guineense (Willd.) DC. subsp. *guineense*

JDC 3774, Alt: 1136m, site: River Nwum F.R., (29/03/75), form: T, Habitat: In wooded grassland. Notes: The 'var. *microcarpum*' of Nigerian Trees.

JDC 4101, Alt: 1364m, site: Gangoro forest, (5/02/76), form: T, Habitat: Stream banks.

JDC 4725, Alt: 1364m, site: VP woodland, (24/02/77), freq: f, form: T, Habitat: Open woodland. Notes: Flowering almost finished. Western slopes of Vogel Peak, above Jangla. Probably the most abundant tree in open woodland from 1212-1515m.

JDC 4772, Alt: 1667m, site: VP amphitheatre, (26/02/77), freq: d, form: T, Habitat: Stream banks.

JDC 5009, Alt: 229m, site: Gangumi, (24/05/77), form: T, Habitat: Stream banks. Notes: Fruiting. Up to 22m tall. Up to 22m (72 ft) tall, a stream-bank species locally common, close to the water. (cf. JDC 5024; the short low branching large-fruited var. *macrocarpum* of 'Nigerian Trees'. The two forms may occur near together but only the tall tree (Fulfulde: Sumsum) with small fruits, grows close to the water).

JDC 5024, Alt: 229m, site: Gangumi, (29/05/77), freq: lf, form: T, Habitat: Savanna. Notes: Fruiting. About 6.1m tall.

JDC 5442, Alt: 242m, site: Baissa, (2/05/78), form: T, Habitat: Savanna Woodland/Wooded Grassland. Notes: Fruits edible.

JDC 5447, Alt: 242m, site: Baissa, (3/05/78), form: T, Habitat: Stream banks. Notes: cf. JDC 5442 with larger fruits.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

(Willd.) DC. subsp. *bamendae* F. White

JDC 3333, Alt: 1515m, site: Ngel Nyaki, (10/11/73), freq: o, form: T. Notes: Tree 57 profile strip, also in sample plot.

JDC 4331, Alt: 1667m, site: CH upland forest, (17/04/76), freq: la, form: T, Habitat: Stream banks. Notes: Flowering, but sporadically. 21m tall. Frequently the only big tree along stream banks where trees are limited to a single line along the banks. Also occurs within proper stream fringing forest.

JDC 4345, Alt: 1667m, site: CH upland forest, (20/04/76), freq: o, form: T, Habitat: Submontane forest. Notes: Flowering. 18m tall. Dutsin Lamba.

JDC SR, Alt: n/a, site: Gangirwal *Syzygium* streamside forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: CH upland grassland, freq: o, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzygium* streamside forest, form: T.

Ochnaceae

Campylosperrum flavum (Schumach. & Thonn. ex Stapf) Farron

JDC 4156, Alt: 1440m, site: Gangoro forest, (11/02/76), form: T, Habitat: Forest.

JDC 4370, Alt: 1667m, site: CH upland forest, (22/04/76), freq: f, form: T. Notes: At profile strip, sample plot.

JDC 4987, Alt: 229m, site: Gangumi F.R., (20/05/77), form: T, Habitat: Forest.

JDC 5305, Alt: 242m, site: River Amboi F.R., (8/04/78), form: T, Habitat: Tall secondary forest.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: T.

Campylosperrum glaberrimum (P. Beauv.) Farron

JDC 4023, Alt: 1440m, site: Gangoro forest, (4/12/75), form: T, Habitat: Forest. Notes: Fulfulde name: Yakaro.

JDC 4234, Alt: 1440m, site: Gangoro forest, (1/03/76), form: T, Habitat: Forest. Notes: Small understory tree. Used for making sticks.

JDC 4726, Alt: 1364m, site: VP amphitheatre, (24/02/77), freq: f, form: T, Habitat: from 1364 m upwards.

Campylosperrum laeve (De Wild. & T. Durand) Farron

JDC 5180, Alt: 1067m, site: Akwaizantar, (1/02/78), form: T, Habitat: Forest. Notes: Observed from ± 1067 m, just below the saddle, to the sample plot on the valley floor at 853m. Rocky stream bank, one tree 7.9m tall.

Lophira lanceolata Tiegh. ex Keay

JDC 3847, Alt: 758m, site: River Nwum F.R., (11/04/75), form: T, Habitat: In wooded grassland.

JDC 4727, Alt: 1440m, site: VP woodland, (24/02/77), freq: f, form: T, Habitat: Open woodland. Notes: Early fruits. Steep rocky western slopes of Vogel Peak, above Jangla. Common from 758-1515m.

JDC SR, Alt: 229m, site: River Amboi F.R., freq: o, form: T, Habitat: Restricted to occasional small enclaves of wooded grassland.

JDC SR, Alt: n/a, site: Gangumi, freq: lf, form: T, Habitat: Savanna. Notes: Often left because the wood is so hard.

JDC SR, Alt: To c.914-1067m, site: CH escarp & fringing forest, form: T.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Restricted to patches of wooded grassland.

Ochna afzelii R. Br. ex Oliv.

JDC 4009, Alt: 1440m, site: Gangoro forest, (3/12/75), form: T, Habitat: Forest margin; stream banks in grassland.

JDC 4171, Alt: 1440m, site: Gangoro forest, (14/02/76), form: T, Habitat: Forest margin & stream banks in grassland.

JDC 4302, Alt: 455m, site: River Gamgam, (11/04/76), form: T, Habitat: Stream banks. Notes: Flowering. New leaves. In transitional woodland/forest fringing the bank of the river, close to the game rangers house.

JDC 4731, Alt: 1212m, site: VP fringing forest, (24/02/77), form: T, Habitat: Forest margin, near the saddle.

JDC 4867, Alt: 758m, site: River Nwum F.R., (6/04/77), form: T, Habitat:

Stream fringing forest; forest margin. Notes: Early stage of regrowth.

JDC 4907, Alt: 758m, site: River Nwum F.R., (17/04/77), freq: r, form: T, Habitat: At the edge of forest regrowth.

Ochna schweinfurthiana F. Hoffm.

JDC 4493, Alt: 379m, site: CH escarp & fringing forest, (15/05/76), form: T, Habitat: At Gidan Kwano.

Ochna sp.

JDC 4275, Alt: 1440m, site: Gangoro forest, (12/03/76), form: T, Habitat: Forest. Notes: Flowering (almost over). New leaves. Among rocks in lightly wooded grassland.

Ouratea calophylla (Hook.f.) Engl.

JDC 2953, Alt: 840m, site: River Nwum F.R., (7/07/72), freq: f, form: SH, Habitat: Forest.

Rhabdophyllum affine (Hook.f.) Tiegh.

JDC 3801, Alt: 758m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest.

Yet to be identified

JDC 4820, Alt: 758m, site: River Nwum F.R., (28/03/77), form: SH, Habitat: Forest. Notes: Ripé fruits collected.

Olacaceae

Heisteria parvifolia Sm.

JDC 5424, Alt: 242m, site: Baissa, (29/04/78), form: SH.

Olax subscorpoidea Oliv.

FNH 1453, Alt: n/a, site: VP fringing forest, form: T, Habitat: At the foot of Vogel Peak.

FNH 1453, Alt: 1515m, site: VP amphitheatre, form: T.

JDC 3787, Alt: 1061m, site: River Nwum F.R., (31/03/75), form: T, Habitat: Forest. Notes: Incl. 2 trees in profile strip 1 & 5 in S.P.

JDC 3869, Alt: 758m, site: River Nwum F.R., (15/04/75), form: T, Habitat: Forest. Notes: Incl. 2 trees in profile strip 1, & 5 in S.P.

JDC 3899, Alt: 606m, site: River Nwum F.R., (22/04/75), form: T, Habitat: Forest. Notes: Sterile. Understory tree. Kaka name: Nkwitaa. Branches are used to make the circular mouth of fishing nets.

JDC 4199, Alt: 1440m, site: Gangoro forest, (21/02/76), form: T, Habitat: Forest.

JDC 4284, Alt: 1440m, site: Gangoro forest, (14/03/76), form: T, Habitat: Forest margin. Notes: Immature fruits.

JDC 4306, Alt: 455m, site: River Gamgam, (11/04/76), form: T, Habitat: Stream banks. Notes: Fruiting. In transitional woodland/ forest fringing the bank of the river, close to the game rangers house.

JDC 5219, Alt: 1061m, site: Akwaizantar, (6/02/78), freq: o, form: T, Habitat: Forest. Notes: Up to 8m tall.

JDC 5311, Alt: 242m, site: River Amboi F.R., (9/04/78), form: T, Habitat: Tall secondary forest.

Strombosia pustulata Oliv.

Trappes-Lomax 32321, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

JDC 4951, Alt: 229m, site: Gangumi F.R., (12/05/77), form: T, Habitat: Forest.

Strombosia scheffleri Engl.

JDC 3857, Alt: 758m, site: River Nwum F.R., (14/04/75), form: T, Habitat: Forest. Notes: 1 tree in profile strip 2.

JDC 4242, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat: Forest.

JDC 4376, Alt: 1667m, site: CH upland forest, (23/04/76), freq: f, form: T, Habitat: Fringing forest.

JDC 4541, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: No flowers or fruits. In enumeration plot.

JDC 5208, Alt: 1212m, site: Akwaizantar, (4/02/78), form: T, Habitat: Forest. Notes: 20m tall.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: f, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

Ximenia americana L.

JDC SR, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Savanna. Notes: Right to collect the fruits.

Oleaceae

Chionanthus africanus (Knohl.) Stearn

JDC 3337, Alt: 1515m, site: Ngel Nyaki, (11/11/73), freq: f, form: T.

JDC 3345, Alt: 1515m, site: Ngel Nyaki, (12/11/73), form: T. Notes: Understory tree.

JDC 4540, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: T. Notes: Sterile. In enumeration plot. Tree 70 in profile strip.

JDC 4571, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot.

JDC 4576, Alt: 1515m, site: Ngel Nyaki, (5/08/76), form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot and profile strip.

JDC 4617, Alt: 1515m, site: Ngel Nyaki, (3/02/77), freq: f, form: T, Habitat: Submontane forest. Notes: Fruiting. 3m tall shrub or small tree.

JDC 4668, Alt: 1515m, site: Mambilla Plateau, (11/02/77), Habitat: Forest. Notes: Fruits just forming. Understory tree. At Leinde Fadali, high up on the escarpment of Mambilla Plateau, at the NE corner, overlooking Mayo

Chionanthus niloticus (Oliv.) Stearn

FNH 1463, Alt: n/a, site: VP fringing forest, form: T. Notes: Lower slopes of Vogel Peak.

L.& D. (FHI) 28806, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Stream banks.

Jasminum pauciflorum Benth.

JDC 4999, Alt: 229m, site: Gangumi F.R., (22/05/77), form: SH, Habitat: Stream banks. Notes: Flowering. Scrambling shrub to about 2.4m. Scandent, fragrant.

Olea capensis L.

JDC 4432, Alt: 1667m, site: CH upland forest, (4/05/76), freq: f, form: T. Notes: At S.P. Most abundant tree (27% of all trees).

JDC 4469, Alt: 1667m, site: CH upland forest, (12/05/76), freq: f, form: T. Notes: At S.P. Most abundant tree (27% of all trees).

JDC 4740, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: o, form: T.

Schrebera arborea A. Chev.

JDC 2961, Alt: 1212m, site: Antere, (7/07/72), form: T, Habitat: Forest.

Notes: Fruits in spirit to F.H.O.

JDC 4910, Alt: 758m, site: River Nwum F.R., (18/04/77), form: T, Habitat: Forest.

JDC 5011, Alt: 229m, site: Wukam River F.R., (25/05/77), form: T, Habitat: Forest. Notes: Fruiting. About 18.2m tall. Kurmin Tondirim, Wukam River F./Reserve.

Pandaceae

Microdesmis puberula Hook.f. ex Planch.

JDC 3336, Alt: 1515m, site: Ngel Nyaki, (11/11/73), form: T.

JDC 3340, Alt: 1515m, site: Ngel Nyaki, (11/11/73), form: T.

JDC 4548, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot and profile strip.

Passifloraceae

Adenia cissampeloides (Planch. ex Hook.) Harms

JDC 3487, Alt: 1829m, site: CW *Albizia gummifera* forest, (12/11/74), form: WC. Notes: In profile strip.

JDC 4269, Alt: 1440m, site: Gangoro forest, (10/03/76), form: WC, Habitat: Forest margin. Notes: Fruiting.

JDC 4477, Alt: 1667m, site: CH upland forest, (13/05/76), freq: o, form: WC, Habitat: Margins of stream fringing forest. Notes: At the edge of stream fringing forest where the path enters the wood.

Adenia lobata (Jacq.) Engl.

JDC 4607, Alt: 1515m, site: Ngel Nyaki, (12/08/76), freq: o, form: WC, Habitat: Forest, forest margin. Notes: Immature fruits.

Piperaceae

Peperomia fernandopoiana C.DC.

JDC 2709, Alt: 1515m, site: Ngel Nyaki, (1/03/72), freq: o, form: EH.

Peperomia kamerunana C.DC.

JDC 3510, Alt: 1970m, site: CW *Albizia gummifera* forest, (14/11/74), form: EH, Habitat: On a tree trunk 7.6 m from the ground.

Peperomia retusa (L.f.) A. Dietr.

JDC 2965, Alt: 1212m, site: Antere, (9/07/72), form: H, Habitat: On moss covered rocks.

Peperomia cf vulcanica Baker & C. H. Wright

JDC 3451, Alt: 1970m, site: Gangirwal *Syzigium* streamside forest, (7/11/74), form: E.

JDC 3718, Alt: 2121m, site: Gangirwal *Syzigium* streamside forest, (12/02/75), form: E.

Peperomia sp.

JDC 3440, Alt: 1970m, site: CW *Albizia gummifera* forest, (6/11/74), form: EH, Habitat: On a tree trunk in deep shade 1.8 m from the ground.

JDC 3471, Alt: 1970m, site: CW *Albizia gummifera* forest, (9/11/74), form: EH, Habitat: On the mossy stem of a small tree 1.8 m from the ground.

JDC 4022, Alt: 1440m, site: Gangoro forest, (4/12/75), form: H, Habitat: Forest.

JDC 4042, Alt: 1440m, site: Gangoro forest, (5/12/75), form: H, Habitat: Forest.

JDC 4356, Alt: 1667m, site: CH upland forest, (20/04/76), freq: o, form: H, Habitat: Submontane forest. Notes: Spreading round the base and for a few feet up the boles of trees in stream fringing forest. Abundant in kurmi subject to much mist.

JDC 4386, Alt: 1667m, site: CH upland forest, (24/04/76), freq: o, form: EH, Habitat: On tree trunks and branches in moss-hung streambank forest.

Piper capense L.f.

JDC 3888, Alt: 606m, site: River Nwum F.R., (20/04/75), freq: r, form: SH, Habitat: Forest. Notes: Sterile. 2.4m tall. On the bank of a small stream in shade.

JDC 4325, Alt: 1667m, site: CH upland forest, (17/04/76), freq: f, form: SH, Habitat: Widespread in both hill-side and stream fringing forest. Notes: Flowers immature.

JDC 4535, Alt: 1515m, site: Ngel Nyaki, (1/08/76), freq: f, form: SH, Habitat: By streams, windfall gaps. Notes: Fruiting. Fruits used in the preparation of yaji.

JDC 5179, Alt: 1061m, site: Akwaizantar, (1/02/78), freq: o, form: SH, Habitat: Forest.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T/SH.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: SH.

Piper guineense Schumach. & Thonn.

JDC 3839, Alt: 758m, site: River Nwum F.R., (9/04/75), form: WC, Habitat: Forest. Notes: Bush pepper. Hausa name: Masoro.

JDC 4251, Alt: 1424m, site: Gangoro forest, (5/03/76), form: WC, Habitat: Forest.

JDC 4504, Alt: 909m, site: River Nwum F.R., (30/06/76), form: WC, Habitat: Forest.

JDC 5344, Alt: 242m, site: River Amboi F.R., (13/04/78), form: WC, Habitat: Tall secondary forest.

JDC SR, Alt: 229m, site: Baissa, form: WC, Habitat: Forest.

Piper umbellata (L.) Miq.

JDC 4533, Alt: 1515m, site: Ngel Nyaki, (1/08/76), freq: f, form: SH, Habitat: Forest clearings, windfall gaps, by streams. Notes: Flowering.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH.

Pittosporaceae

Pittosporum viridiflorum Sims

JDC 3829, Alt: 758m, site: River Nwum F.R., (7/04/75), form: T, Habitat: Stream bank; forest margin; forest. Notes: Incl. 1 tree in profile strip 1.

JDC 4043, Alt: 1440m, site: Gangoro forest, (5/12/75), form: T, Habitat: Forest margin.

JDC 4916, Alt: 1515m, site: River Nwum F.R., (20/04/77), form: T, Habitat: Stream bank; forest margin; forest. Notes: Incl. 1 tree in profile strip 1.

JDC SR, Alt: 606m, site: River Nwum F.R., form: T, Habitat: In forest regrowth.

Sims subsp. *mannii*

JDC 4395, Alt: 1667m, site: CH upland forest, (26/04/76), freq: o, form: T, Habitat: Fringing forest.

JDC 4490, Alt: 379m, site: CH escarp & fringing forest, (15/05/76), form: T, Habitat: Secondary forest at Gidan Kwano.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

Polygalaceae

Carpolobia alba G. Don

FNH 1462, Alt: n/a, site: VP fringing forest, form: T. Notes: At the foot of Vogel Peak.

JDC 3121, Alt: 606m, site: Western escarpment of Mambilla, (4/05/73), form: T, Habitat: Forest. Notes: Also common along streams around 457m.

JDC 4929, Alt: 229m, site: Gangumi F.R., (7/05/77), form: T, Habitat: Forest.

JDC 5414, Alt: 242m, site: River Amboi F.R., (24/04/78), form: T, Habitat: Tall secondary forest.

Polygala tenuicaulis Hook.f. subsp. *tayloriana* J. Paiva

RED DATA LISTED: LR/nt

JDC 3373, Alt: 1970m, site: Gangirwal upland grassland, (2/11/74), form: H.

Also reported from Vogel Peak in Mt Oku checklist (Cheek et al.2000)

Securidaca longipedunculata Fresen.

JDC 4720, Alt: 909m, site: VP woodland, (24/02/77), freq: o, form: T, Habitat: Open woodland. Notes: Flowering. Violet smell, and frequented

by large bees. Steep, rocky western slopes of Vogel Peak, above

Securidaca welwitschii Oliv.

JDC 3979, Alt: 1440m, site: Gangoro forest, (1/12/75), form: WC, Habitat: Forest.

Proteaceae

Faurea rochetiana (A. Rich.) Chiov. ex Pic.Serm.

JDC 2957, Alt: 1212m, site: Antere F.R., (7/07/72), form: T.

JDC 4383, Alt: 1667m, site: CH upland grassland, (24/04/76), freq: r, form: T, Habitat: Festooning trees along a shady forest stream.

JDC 4718, Alt: 909m, site: VP woodland, (24/02/77), form: T, Habitat: Open woodland. Notes: Seeds beginning to fall. Steep rocky western slopes of Vogel Peak, above Jangla.

Protea madiensis Oliv.

JDC 3401, Alt: 1970m, site: Gangirwal, (4/11/74), form: SH, Habitat: rocky outcrop, grassland.

JDC 4452, Alt: 1667m, site: CH upland grassland, (7/05/76), form: SH. Notes: Rarely over 90cm high, often less. Blackened and stunted by annual fires unless protected by rocks.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w, form: T. Notes: Usually dwarfed by repeated burning.

JDC SR, Alt: 610-1067m, site: River Nwum F.R., form: T, Habitat: In wooded grassland. Notes: Usually a shrub.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: SH, Habitat: Forest.

Ranunculaceae

Clematis grandiflora DC.

JDC 4225, Alt: 1440m, site: Gangoro forest, (28/02/76), form: WC, Habitat: Forest margin.

Clematis simensis Fresen.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: SH. Notes: Scrambling shrub.

Clematis villosa (DC.) subsp. *oliveri* (Hutch.) Brummitt

JDC 5205, Alt: 1212m, site: Akwaizantar grassland, (4/02/78), freq: o, form: H, Habitat: Forest. Notes: In stony ground.

Clematis sp.

JDC 4814, Alt: 758m, site: River Nwum F.R., (27/03/77), freq: f, form: SH, Habitat: Scrambling over shrubs on river bank. Notes: Fruiting material collected.

Delphinium dasycaulon Fresen.

JDC SR, Alt: n/a, site: CH upland grassland, freq: r, form: H, Habitat: Ungrazed land at escarpment edge. Notes: Cabbal Shirgu.

Thalictrum rhynchocarpum Quart.-Dill. & A. Rich.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: H.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: o, form: H.

Notes: 0.90m, exceptionally up to 2.4 m tall.

Rhamnaceae

Maesopsis eminii Engl.

JDC 5450, Alt: 242m, site: Baissa, (4/05/78), form: T.

Ventilago africana Exell

JDC 4226, Alt: 1440m, site: Gangoro forest, (28/02/76), form: WC,

Habitat: Forest margin.

Rhizophoraceae

Cassipourea congoensis R.Br. ex DC.

JDC 4401, Alt: 1667m, site: CH upland forest, (27/04/76), freq: o, form: T. Notes: At profile strip.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: T.

Cassipourea gummiflua Tul.

JDC 4049, Alt: 1440m, site: Gangoro forest, (6/12/75), form: T, Habitat: Fringing forest.

JDC 4515, Alt: 1515m, site: Ngel Nyaki, (30/07/76), freq: r, form: T, Habitat: Forest margin.

JDC 4619, Alt: 1818m, site: Ngel Nyaki, (3/02/77), freq: r, form: T, Habitat: Forest margin. Notes: Flowering. 15m tall. At the head of a forested gully running up a short way into the grassland above the upper edge of the forest. Growing with *Bridelia* sp.

Cassipourea sp.

JDC 4141, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest.

JDC 4243, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat: Forest.

Rosaceae

Prunus africana (Hook.f.) Kalkman

RED DATA LISTED: LR/nt

JDC 4168, Alt: 1440m, site: Gangoro forest, (13/02/76), form: T.

JDC 4333, Alt: 1667m, site: CH upland forest, (17/04/76), freq: o, form: T, Habitat: Submontane forest. Notes: Fruiting. 24m tall. Also collected from Bamenda at 2121m, Keay FHI 28377.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

Rubus fellatae A. Chev.

JDC 4423, Alt: 1667m, site: CH upland forest, (1/05/76), freq: o, form: SH, Habitat: Forest margin. Notes: Fruiting? Scrambler.

Rubus pinnatus Willd.

JDC 4273, Alt: 1440m, site: Gangoro forest, (11/03/76), form: WC, Habitat: Forest margin. Notes: Flowering. Among rocks in lightly wooded grassland.

JDC 4819, Alt: 758m, site: River Nwum E.R., (28/03/77), form: SH, Habitat: Forest margin on river bank. Notes: Scrambling shrub. Ripe fruits orange - red, edible.

Rubus sp.

JDC 3706, Alt: 2121m, site: Gangirwal, (9/02/75), freq: f, form: SH, Habitat: Fringing forest. Notes: Scrambling shrub.

Rubiaceae

Argocoffeopsis eketensis (Wernh.) Robbr.

JDC 4837, Alt: 758m, site: River Nwum E.R., (3/04/77), freq: la, form: SH, Habitat: Forest. Notes: Shrub (or very small tree) in forest.

JDC 4840, Alt: 758m, site: River Nwum E.R., (3/04/77), form: SH, Habitat: Forest. Notes: Flowering. Leafless. Stream fringing forest where light filters through.

Breonadia salicina (Vahl) Hepper & J.R.I. Wood

JDC 4107, Alt: 1364m, site: Gangoro forest, (6/02/76), form: T, Habitat: Stream banks.

JDC 4706, Alt: 394m, site: VP fringing forest, (23/02/77), form: T, Habitat: Stream banks. Notes: Flowers immature. On bank of a tributary stream (Dau on the map) of the River Kirimi at the western foot of the Kirri Plateau near Dau village.

Canthium sp.

JDC 4373, Alt: 1667m, site: CH upland forest, (22/04/76), freq: o, form: T, Habitat: Forest margin. Notes: Near *C. subcordatum* DC.

Chassalia kolly (Schumach.) Hepper

FNH 1455, Alt: n/a, site: VP fringing forest, form: SH. Notes: At the foot of Vogel Peak.

Chassalia laikomensis Cheek ined.

RED DATA LISTED: CR A1

Previously reported from Mambilla Plateau in the Mt. Oku checklist (Cheek et al. 2000).

Chassalia sp.

JDC 3816, Alt: 909m, site: River Nwum E.R., (6/04/75), freq: f, form: SH, Habitat: Forest. Notes: Shrublet 45cm tall.

JDC 5326, Alt: 242m, site: River Amboi E.R., (11/04/78), form: SH, Habitat: Tall secondary forest. Notes: Flower's collected. Shrublet. ?=3816, River Nwum.

Craterispermum cerinanthum Hiern

JDC 5316, Alt: 242m, site: River Amboi F.R., (9/04/78), form: T, Habitat: Tall secondary forest.

Craterispermum laurinum (DC.) Benth.

JDC 4035, Alt: 1440m, site: Gangoro forest, (5/12/75), form: T, Habitat: Forest, including stream banks in grassland.

JDC 4193, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest & stream banks in grassland.

Cremaspora triflora (Thonn.) K. Schum.

L.& D. (FHI) 28898, Alt: 229m, site: Gangumi F.R., form: WC, Habitat: Forest. Notes: Scrambling shrub.

JDC 5340, Alt: 242m, site: River Amboi F.R., (12/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Scrambling shrub.

Crossopteryx febrifuga (G.Don) Benth.

JDC 2598, Alt: 229m, site: Baissa, (24/10/71), form: T, Habitat: Savanna Woodland/Wooded Grassland.

L.& D. (FHI) 28934, Alt: n/a, site: Gangumi, freq: f, form: T, Habitat: Savanna.

JDC 2963, Alt: 1212m, site: Antere, (7/07/72), form: T.

JDC 3778, Alt: 1061m, site: River Nwum F.R., (30/03/75), form: T, Habitat: In wooded grassland.

JDC 4717, Alt: 1061m, site: VP woodland, (24/02/77), form: T, Habitat: Open woodland. Notes: Flowering. Sweet smelling. Western slopes of Vogel Peak, above Jangla.

JDC 4995, Alt: 229m, site: Gangumi, (21/05/77), freq: f, form: T, Habitat: Savanna. Notes: Flowering. 6.1m tall.

JDC SR, Alt: To c.914m, site: CH escarp & fringing forest, form: T.

Cuviera longiflora Hiern

JDC 3330, Alt: 1515m, site: Ngel Nyaki, (10/11/73), freq: o, form: T.

JDC 4559, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Small understory tree. At enumeration plot.

Cuviera truncata Hutch. & Dalziel

L.& D. (FHI) 28861, Alt: n/a, site: Gangumi F.R., form: SH, Habitat: Stream banks. Notes: Scrambling shrub. With scattered supra-axillary spines.

Didymosalpinx abbeokutae (Hiern) Keay

JDC 5396, Alt: 242m, site: River Amboi F.R., (20/04/78), form: SH, Habitat: Tall secondary forest.

Diodia sarmentosa Sw.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: H.

Fadogia erythrophloea (K. Schum. & K. Krause)

Hutch. & Dalziel

L.& D. (FHI) 28893, Alt: n/a, site: Gangumi, form: T, Habitat: Savanna. Notes: Small tree or shrub.

Fadogia cf pobeguinii Pobeguín

JDC 4437, Alt: 1667m, site: CH upland grassland, (4/05/76), freq: f, form: SHH. Notes: Resistant to trampling.

Gaertnera paniculata Benth.

JDC 3992, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest margin.

JDC 4178, Alt: 1440m, site: Gangoro forest, (17/02/76), form: T, Habitat: Forest Notes: A medium sized forest tree.

JDC 4278, Alt: 1440m, site: Gangoro forest, (13/03/76), form: T, Habitat: Forest margin. Notes: Fruiting.

JDC 5247, Alt: 1061m, site: Akwaizantar, (11/02/78), form: T, Habitat: Forest.

FNH SR, Alt: n/a, site: VP amphitheatre, form: T, Habitat: Hepper's Camp.

Galium sp.

HMC 120, Alt: 1667m, site: Ngel Nyaki, (17/08/73), form: H, Habitat: Forest margin.

Gardenia erubescens Stapf & Hutch.

JDC 4704, Alt: 394m, site: VP woodland, (23/02/77), form: T. Notes: From Dau.

Gardenia imperialis K. Schum.

JDC 4096, Alt: 1212m, site: Gangoro forest, (4/02/76), form: T, Habitat: Stream fringing forest.

Gardenia vogelii Hook.f. ex Planch.

JDC 3915, Alt: 606m, site: River Nwum F.R., (25/04/75), form: SH, Habitat: High forest. Notes: Sterile. 3m tall. On the bank of a stream in heavy shade, low down the slope towards River Nwum.

Hallea stipulosa (DC.) Leroy

JDC 5404, Alt: 242m, site: River Amboi F.R., (21/04/78), form: T, Habitat: Tall secondary forest.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, form: T, Habitat: Forest. Notes: This sought after timber tree, called ganyen goro here and in Kurmi Division, occurs sporadically or gregariously in swampy streamheads, on and below the escarpment. On Mambilla Plateau, where sawyers know it as wawan kurmi, few sound trees remained in the 70s.

Hymenodictyon floribundum (Hochst. & Steud.) B.L.

Rob.

JDC 2969, Alt: 840m, site: River Nwum F.R., (9/07/72), form: SH, Habitat: On rocky stream bank in fringing forest near Antere school.

JDC 4455, Alt: 1667m, site: CH Shirgu, (8/05/76), freq: o, form: T, Habitat: Stream fringing forest, and on a rocky bluff in the forest at Dutsin Lamba.

Hymenodictyon pachyantha K. Krause

JDC 3867, Alt: 758m, site: River Nwum F.R., (15/04/75), form: T, Habitat: Forest.

Ixora bauchiensis Hutch. & Dalziel

JDC 3794, Alt: 909m, site: River Nwum F.R., (2/04/75), form: SH, Habitat: Fringing forest.

JDC 3873, Alt: 758m, site: River Nwum F.R., (16/04/75), form: SH, Habitat: Forest margin. Notes: Flowering, and immature fruits. Small understory tree.

JDC 3976, Alt: 1440m, site: Gangoro forest, (1/12/75), form: T, Habitat: Forest stream.

JDC 4191, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest stream.

JDC 4834, Alt: 758m, site: River Nwum F.R., (2/04/77), form: SH, Habitat: Fringing forest. Notes: Fruits immature when collected.

JDC 5246, Alt: 1061m, site: Akwaizantar, (11/02/78), form: T, Habitat: Forest. Notes: 4.5m tall understory species.

Ixora foliosa Hiern

JDC 3705, Alt: 2121m, site: Gangirwal, (9/02/75), form: T.

JDC 4475, Alt: 1667m, site: CH upland forest, (13/05/76), freq: o, form: T, Habitat: Forest. Notes: Dutsin Lamba.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T.

Leptactina involucrata Hook.f.

L.& D. (FHI) 28840, Alt: n/a, site: Gangumi F.R., form: SH, Habitat: Stream banks. Notes: Up to 6m. More or less climbing. Sulli stream.

Morelia senegalensis A. Rich. ex DC.

L.& D. (FHI) 28732, Alt: n/a, site: Wurkam River F.R., form: T, Habitat: Stream banks. Notes: Gidan Anju.

L.& D. (FHI) 28760, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Stream banks. Notes: Kwagiri.

L.& D. (FHI) 34427, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Stream banks. Notes: Taraba River.

JDC 4927, Alt: 212m, site: Gangumi, (7/05/77), form: T, Habitat: Stream banks. Notes: Sulli stream, Gangumi F.R.

JDC SR, Alt: n/a, site: Gangumi, form: T, Habitat: Stream banks.

Mussaenda arcuata Lam. ex Poir.

JDC 4307, Alt: 455m, site: River Gamgam, (11/04/76), form: WC, Habitat: Stream banks. Notes: Flowering. In transitional woodland/ forest fringing the bank of the river, close to the game rangers house.

FNH SR, Alt: n/a, site: VP amphitheatre, form: SH. Notes: Scrambling shrub.

JDC SR, Alt: n/a, site: VP fringing forest, form: SH, Habitat: Riverine forest. Notes: On the lower slopes of Vogel Peak.

Mussaenda elegans Schumach. & Thonn.

JDC 4489, Alt: 379m, site: CH escarp & fringing forest, (15/05/76), form: WC, Habitat: Gidan Kwano at the margin of Stream bank forest.

JDC 5379, Alt: 242m, site: River Amboi F.R., (18/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Scrambling shrub.

Mussaenda erythrophylla Schumach. & Thonn.

JDC 3907, Alt: 606m, site: River Nwum F.R., (23/04/75), form: SH, Habitat: Secondary forest and forest margin. Notes: Flowering. Climbing shrub in dense, second-growth thicket.

JDC 4220, Alt: 1440m, site: Gangoro forest, (26/02/76), form: WC, Habitat: Forest margin.

JDC 4485, Alt: 606m, site: CH escarp & fringing forest, (14/05/76), form: WC, Habitat: 3/4 way up, with Trema in secondary forest.

JDC 4527, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: o/lf, form: SH, Habitat: Forest margin. Notes: Fruiting. Scrambling shrub, reaching 5m from the ground.

JDC SR, Alt: 606m, site: River Nwum F.R., form: SH, Habitat: In forest regrowth. Notes: Climbing shrub.

Oxyanthus racemosus (Schumach. & Thonn.) Keay

JDC 5401, Alt: 242m, site: River Amboi F.R., (20/04/78), form: T, Habitat: Tall secondary forest.

Oxyanthus speciosus DC.

JDC 3321, Alt: 1515m, site: Ngel Nyaki, (9/11/73), freq: f/la, form: T.

JDC 4359, Alt: 1667m, site: CH upland forest, (20/04/76), freq: f, form: T, Habitat: Submontane forest. Notes: Flowering. Small tree, 6.1m tall.

JDC 4549, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f/la, form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot.

JDC 4566, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: f/la, form: T, Habitat: Submontane forest. Notes: Flowering and Fruiting. Small tree. At enumeration plot.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: T.

Pavetta corymbosa (DC.) F.N. Williams

JDC 3998, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest margin.

JDC 4283, Alt: 1440m, site: Gangoro forest, (14/03/76), form: T, Habitat: Forest margin. Notes: Flowering in profusion.

JDC 4883, Alt: 758m, site: River Nwum F.R., (10/04/77), form: SH, Habitat: Margin of stream fringing forest.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

(DC.) F.N. Williams var. *corymbosa*

L.& D. (FHI) 28846, Alt: 229m, site: Gangumi F.R., form: WC, Habitat: Forest. Notes: Erect shrub or small tree, up to 6mtall.

JDC 4984, Alt: 229m, site: Gangumi F.R., (20/05/77), form: WC, Habitat: Forest. Notes: Erect shrub or small tree, to 6m (20ft) tall.

JDC 5318, Alt: 242m, site: River Amboi F.R., (9/04/78), form: SH, Habitat: Transition woodland/Young secondary forest.

Pavetta hookeriana Hiern

JDC 4478, Alt: 1667m, site: CH upland forest, (13/05/76), freq: o, form: T, Habitat: Stream fringing forest.

Pavetta owariensis P. Beauv.

JDC 3889, Alt: 606m, site: River Nwum F.R., (20/04/75), form: T, Habitat: Forest. Notes: Flowering. Kew (H.637/77)det it as *P. corymbosa* (D.C.)

F.N. Williams var. *corymbosa*.

JDC 4524, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: o, form: T, Habitat: Forest margin. Notes: Fruits immature. Along the path through the forest reserve.

Pavetta sp.

JDC 3886, Alt: 606m, site: River Nwum F.R., (20/04/75), form: SH, Habitat: Forest. Notes: Flowering. Semi-scandent.

Pentas decora S. Moore var. *triangularis* (De Wild.)

Verdc.

JDC 4482, Alt: 1667m, site: CH upland grassland, (14/05/76), freq: f, form: H, Habitat: In grassland where normally only buffalo graze. Notes: Cabbal Toli.

Pentas purpurea Oliv.

JDC 4483, Alt: 1667m, site: CH upland grassland, (14/05/76), freq: o, form: H, Habitat: In grassland where normally only buffalo graze.

Polysphaeria arbuscula K. Schum.

FNH 1472, Alt: n/a, site: VP fringing forest, form: SH, Habitat: Riverine forest on the lower slopes of Vogel Peak.

JDC 4300, Alt: 455m, site: River Gamgam, (11/04/76), form: T, Habitat: Stream banks. Notes: Flowering. In transitional woodland/ forest fringing the bank of the river, close to the game rangers house.

Psilanthus mannii Hook.f.

JDC 5314, Alt: 242m, site: River Amboi F.R., (9/04/78), form: SH, Habitat: Tall secondary forest. Notes: Shrub 2.4m tall. The white flowers open at night and by noon are already wilting.

Psychotria peduncularis (Salisb.) Steyerem.

JDC 4323, Alt: 1667m, site: CH upland forest, (17/04/76), freq: f/la, form: SH, Habitat: Stream fringing forest. Notes: Fruiting. At the edge of a forest gap.

JDC 4381, Alt: 1667m, site: CH upland forest, (24/04/76), freq: f/la, form: SH, Habitat: Forest. Notes: Flowering.

JDC 4526, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: f, form: SH, Habitat: montane forest. Notes: Fruits immature.

JDC 4792, Alt: 1515m, site: VP amphitheatre, (27/02/77), freq: a, form: SH.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: SH.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T/SH.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: ld, form: SH.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH.

Psychotria psychotrioides (DC.) Roberty

L.& D. (FHI) 28807, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Stream banks.

Psychotria schweinfurthii Hiern

FNH 1461, Alt: n/a, site: VP fringing forest, form: SH. Notes: At the foot of Vogel Peak.

Psychotria succulenta (Hiern) E.M.A. Petit

JDC 4390, Alt: 1667m, site: CH upland forest, (26/04/76), freq: la, form: SH, Habitat: Forest margin & streambank forest. Notes: Flowering.

JDC 4525, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: f, form: T, Habitat: Forest margin. Notes: Fruits immature. In every upland forest.

JDC 4805, Alt: 758m, site: River Nwum F.R., (25/03/77), freq: f, form: SH, Habitat: Conspicuous where forest is advancing into wooded grassland.

Psychotria vogeliana Benth.

JDC 4494, Alt: 379m, site: CH escarp & fringing forest, (15/05/76), form: SH, Habitat: Gidan Kwano: abundant in secondary forest.

Psychotria sp.

JDC 3595, Alt: 1970m, site: CW *Pouteria altissima* forest, (28/11/74), form: T. Notes: 5m tall.

JDC 3691, Alt: 2121m, site: Gangirwal *Syzigium* streamside forest, (8/02/75).

JDC 3977, Alt: 1440m, site: Gangoro forest, (1/12/75), form: SH, Habitat: Forest.

JDC 4162, Alt: 1440m, site: Gangoro forest, (12/02/76), form: SH, Habitat: Forest.

JDC 4214, Alt: 1440m, site: Gangoro forest, (24/02/76), form: SH, Habitat: Forest.

JDC 4414, Alt: 1667m, site: CH upland forest, (29/04/76), freq: o, form: SH, Habitat: Stream banks. Notes: Flowering.

Psydrax acutiflora (Hiern) Bridson

FNH 1487, Alt: n/a, site: VP amphitheatre, form: SH. Notes: Scrambling/ climbing shrub.

JDC 4131, Alt: 1440m, site: Gangoro forest, (9/02/76), form: WC, Habitat: Forest margin. Notes: Scrambling shrub.

JDC 4340, Alt: 1667m, site: CH upland forest, (20/04/76), freq: o, form: WC, Habitat: Forest. Notes: Fruits, immature.

JDC 4412, Alt: 1667m, site: CH upland forest, (28/04/76), form: T. Notes: At S.P. Normally a climbing or scrambling shrub, but in the sample plot growing like a small spreading tree.

JDC 4538, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: WC, Habitat: Forest margin. Notes: Collected where the path enters forest.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: WC.

Psydrax parviflora (Afzel.) Bridson

JDC 4137, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Stream fringing forest.

Rothmannia longiflora Salisb.

JDC 4488, Alt: 379m, site: CH escarp & fringing forest, (14/05/76), form: T, Habitat: Secondary forest; Stream banks at Gidan Kwano.

JDC 4863, Alt: 758m, site: River Nwum F.R., (6/04/77), freq: o, form: T, Habitat: River bank in forest.

JDC 5403, Alt: 242m, site: River Amboi F.R., (21/04/78), form: T, Habitat: Tall secondary forest.

Rothmannia urcelliformis (Hiern) Robyns

JDC 2713, Alt: 1515m, site: Ngel Nyaki, (1/03/72), freq: f, form: T.

L.& D. (FHI) 28726, Alt: 229m, site: Wurkam River F.R., form: T, Habitat: Forest. Notes: Gidan Anju, Kurmin Nya, Wurkam River F.R.

JDC 3478, Alt: 1970m, site: CW *Albizia gummifera* forest, (9/11/74), form: T. Notes: Kurmin Dodo profile strip.

JDC 3490, Alt: 1829m, site: CW *Albizia gummifera* forest, (12/11/74), form: T. Notes: Kurmin Dodo profile strip.

JDC 3499, Alt: 1829m, site: CW *Albizia gummifera* forest, (12/11/74), form: T. Notes: Kurmin Dodo profile strip.

JDC 3500, Alt: 1829m, site: CW *Albizia gummifera* forest, (13/11/74), form: T. Notes: Kurmin Dodo profile strip.

JDC 3579, Alt: 1818m, site: CW *Albizia gummifera* forest, (25/11/74), form: T, Habitat: Montane forest. Notes: Flowering. Kurmin Dutsin Dodo (south).

JDC 3999, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest.

JDC 4313, Alt: 1364m, site: CH upland forest, (17/04/76), freq: o, form: T, Habitat: Submontane forest. Notes: Fruits immature. 7.6m tall. Understory tree.

JDC 4568, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Tree up to 9m tall. At enumeration plot. Occasional fruiting specimens.

JDC 5445, Alt: 242m, site: Baissa, (3/05/78), form: T.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

Rothmannia whitfieldii (Lindl.) Dandy

L.& D. (FHI) 28837, Alt: n/a, site: Gangumi F.R., form: T, Habitat: Stream banks. Notes: Sulli stream, Gangumi F.R.

JDC 2960, Alt: 1212m, site: Antere, (7/07/72), form: T, Habitat: Forest.

JDC 2996, Alt: 1212m, site: River Nwum F.R., (26/12/72), form: T, Habitat: Forest.

JDC 4943, Alt: 229m, site: Wurkam River F.R., (11/05/77), form: WC, Habitat: Forest.

JDC 5210, Alt: 909m, site: Akwaizantar, (18/02/78), freq: o, form: T, Habitat: Forest. Notes: Fruiting. Small understory species.

JDC 5307, Alt: 242m, site: River Amboi F.R., (8/04/78), form: T, Habitat: Tall secondary forest.

Rothmannia sp.

JDC 4930, Alt: 229m, site: Gangumi F.R., (7/05/77), form: T, Habitat: Forest.

JDC 4940, Alt: 229m, site: Gangumi F.R., (10/05/77), form: T, Habitat: Forest.

Rutidea olenotricha Hiern

JDC 4259, Alt: 1440m, site: Gangoro forest, (6/03/76), form: WC, Habitat: Forest.

Rutidea sp.

JDC 4217, Alt: 1440m, site: Gangoro forest, (25/02/76), form: WC, Habitat: Forest.

Rytigynia umbellulata (Hiern) Robyns

JDC 4341, Alt: 1667m, site: CH upland forest, (20/04/76), freq: o, form:

T, Habitat: Margins of stream fringing forest. Notes: Flowers. Deciduous.

JDC 4528, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: f, form: T, Habitat: Forest margin. Notes: Fruits immature.

Sarcocephalus latifolius (Sm.) Bruce

JDC 2940, Alt: 840m, site: River Nwum F.R., (6/07/72), form: T, Habitat: In wooded grassland.

JDC 3853, Alt: 758m, site: River Nwum F.R., (12/04/75), form: T, Habitat: In wooded grassland.

JDC 4800, Alt: 1061m, site: VP woodland, (1/03/77), form: T.

JDC 4964, Alt: 229m, site: Gangumi, (15/05/77), freq: o, form: T, Habitat: Savanna. Notes: Small tree, seldom more than 3m (10 ft.) tall.

JDC SR, Alt: 229m, site: Baissa, form: T, Habitat: Savanna Woodland/ Wooded Grassland.

JDC SR, Alt: n/a, site: Akwaizantar grassland, freq: o, form: T, Habitat: Forest.

JDC SR, Alt: To c.914-1067m, site: CH escarp & fringing forest, form: T.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Transition woodland/Young secondary forest. Notes: Restricted to patches of wooded grassland.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Restricted to patches of wooded grassland.

Sarcocephalus pobeguinii Pobég. ex Pellegr.

JDC 5468, Alt: 242m, site: Baissa, (9/05/78), form: T, Habitat: Stream banks. Notes: Fruiting. 9m tall. On the bank of a small stream close to the road at Danbiki, between Gidan Malam & Didan.

Sericanthe chevalieri (Krause) Robbrecht var. *coffeoides* (Chev.) Robbrecht

JDC 5271, Alt: 1136m, site: Akwaizantar, (20/02/78), form: T, Habitat: Forest margin. Notes: 5m tall.

Tarenna thomasii Hutch. & Dalziel

JDC SR, Alt: n/a, site: Gangirwal P.S.P. forest, form: T.

Tricalysia coriacea (Benth.) Hiern

JDC 4818, Alt: 758m, site: River Nwum F.R., (28/03/77), form: SH, Habitat: On rocky bank of forest stream.

Tricalysia okeleensis Hiern

JDC 3991, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest margin; rocky stream banks.

JDC 4108, Alt: 1364m, site: Gangoro forest, (6/02/76), form: T, Habitat: Forest margin; rocky stream banks.

Hiern var. *oblanceolata* (Hutch. & Dalziel) Keay

FNH 1464, Alt: 1067m, site: VP fringing forest, form: T, Habitat: Rocky stream bank. Notes: 6m tall.

JDC 3848, Alt: 758m, site: River Nwum F.R., (11/04/75), form: T, Habitat: Forest margin and in secondary forest.

Yet to be identified

JDC 3509, Alt: 1970m, site: CW *Albizia gummifera* forest, (14/11/74),
form: SH.

Rutaceae

Aeglopsis cf chevalieri Swingle

JDC 5241, Alt: 1061m, site: Akwaizantar, (10/02/78), freq: r, form: T,
Habitat: Forest. Notes: Fruits said to be the size of a grapefruit.

Clausena anisata (Willd.) Benth.

JDC 3865, Alt: 455m, site: River Nwum F.R., (16/04/75), form: T, Habitat:
Forest margin; secondary forest; gaps in forest.

JDC 4116, Alt: 1364m, site: Gangoro forest, (8/02/76), form: T, Habitat:
Forest margin.

JDC 4323, Alt: 1364m, site: CH upland forest, (17/04/76), freq: f, form:
T, Habitat: Stream bank forest. Notes: Fruiting. 6.1m tall. Edge of forest
gap.

JDC 4553, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: f, form: T,
Habitat: Forest margin. Notes: Fruits galled, so not collected.

JDC 4756, Alt: 1576m, site: VP amphitheatre, (26/02/77), form: T, Habitat:
sporadic.

JDC 5197, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat:
Forest margin.

JDC SR, Alt: 606m, site: River Nwum F.R., form: T, Habitat: In forest
regrowth.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

Teclea verdoorniana Exell & Mendonça

FNH 2728, Alt: 1400m, site: VP amphitheatre, form: T, Habitat: In deep
shade, forest outlier.

Teclea sp.

JDC 4741, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: T. Notes:
Fruiting. 7.6m tall. In low stream fringing forest a little above 1524 m.

Vepris allenii Verdoorn

JDC 3556, Alt: 1818m, site: CW *Pouteria altissima* forest, (21/11/74),
form: T, Habitat: Montane forest. Notes: Amongst boulders close to the
stream at the bottom of a gorge a few metres from the forest edge at
Kurmin Dutsin Dodo.

Yet to be identified ** New to West Africa? **

JDC 3970, Alt: 1440m, site: Gangoro forest, (1/12/75), form: T, Habitat:
Forest. Notes: (Trees 15 & 36 profile strip)

JDC 4172, Alt: 1440m, site: Gangoro forest, (14/02/76), form: T, Habitat:
Forest. Notes: (Trees 15 & 36 profile strip)

Zanthoxylum leprieurii (Guill. & Perr.) Engl.

JDC 4513, Alt: 1515m, site: Ngel Nyaki, (30/07/76), freq: o, form: T.

JDC 3855, Alt: 758m, site: River Nwum F.R., (14/04/75), form: T, Habitat:
Forest.

Zanthoxylum zanthoxyloides Zepern. & Timler

Trappes-Lomax SR, Alt: n/a, site: Wurkam River F.R., form: T, Habitat:
Savanna. Notes: Right to collect bark.

Zanthoxylum sp.

JDC 5264, Alt: 1061m, site: Akwaizantar, (17/02/78), form: T, Habitat:
Forest. Notes: Sterile collection. Not common.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Santalaceae

Thesium tenuissimum Hook.f.

JDC SR, Alt: Above 2124m., site: Gangirwal upland grassland, freq: o.

Sapindaceae

Allophylus africanus P. Beauv.

L.& D. (FHI) 28810, Alt: 229m, site: Gangumi F.R., form: T, Habitat:
Forest.

JDC 3902, Alt: 606m, site: River Nwum F.R., (22/04/75), freq: la, form:
T, Habitat: Forest. Notes: Sterile. Abundant in thicket growing up where
then high forest has been farmed, and the regrowth cut and burnt for farm-
ing at least once.

JDC 4326, Alt: 1667m, site: CH upland forest, (17/04/76), freq: o, form:
T, Habitat: Submontane stream fringing forest. Notes: Flowers immature.
7.6m tall.

JDC 4567, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: o, form: T,
Habitat: Submontane forest. Notes: Sterile. Small understory tree. At
enumeration plot.

Allophylus cf africanus P. Beauv.

JDC 3702, Alt: 2121m, site: Gangirwal *P.S.P.* forest, (9/02/75), form: T.

Allophylus bullatus Radlk.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: SH.

Aphania senegalensis (Juss. ex Poir.) Radlk.

L.& D. (FHI) 28718, Alt: 229m, site: Wurkam River F.R., form: T, Habitat:
Forest. Notes: Gidan Anju, Kurmin Nya, Wurkam River F.R. Right to
collect the fruits.

Blighia unijugata Baker

JDC 4235, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat:
Forest. Notes: Fruiting.

Deinbollia cf pinnata (Poir.) Schumach. & Thonn.

JDC 3550, Alt: 1818m, site: CW *Pouteria altissima* forest, (21/11/74), form: T, Habitat: Montane forest. Notes: Understory tree. Kurmin Dutsin Dodo.

JDC 3844, Alt: 758m, site: River Nwum F.R., (10/04/75), form: T, Habitat: Forest. Notes: Sterile gathering. 11m tall. Compound leaves up to 112cm (aft Bin) long. Tree 4 profile strip 2.

Deinbollia sp.

JDC 4550, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: T, Habitat: Submontane forest. Notes: Sterile. Understory tree. At enumeration plot.

Eriocoelum kerstingii Gilg ex Engl.

FNH 1518, Alt: n/a, site: VP amphitheatre, form: T.

Lecaniodiscus cupanioides Planch.

FNH 2760, Alt: n/a, site: VP fringing forest, form: T. Notes: At the foot of Vogel Peak.

L.& D. (FHI) 28915, Alt: 229m, site: Gangumi F.R., freq: r, form: T, Habitat: Forest.

JDC 4304, Alt: 455m, site: River Gamgam, (11/04/76), form: T, Habitat: Stream banks. Notes: Flowering. In transitional woodland/ forest fringing the bank of the river, close to the game rangers house.

Pancovia sp.

JDC SR, Alt: 229m, site: Gangumi F.R., form: WC, Habitat: Forest. Notes: Right to collect the fruits.

Paullinia pinnata L.

JDC 4044, Alt: 1440m, site: Gangoro forest, (5/12/75), form: WC, Habitat: Forest margin.

JDC 4392, Alt: 1667m, site: CH upland forest, (26/04/76), freq: f, form: WC, Habitat: Stream fringing forest.

JDC 5201, Alt: 1212m, site: Akwaizantar, (3/02/78), freq: f, form: WC, Habitat: Forest. Notes: Frequent especially forest edge.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: WC. Notes: One only—3 m tall(?).

JDC SR, Alt: n/a, site: River Nwum F.R., form: WC, Habitat: Forest margin & secondary forest.

JDC SR, Alt: 606m, site: River Nwum F.R., form: T, Habitat: In forest regrowth.

Yet to be identified

JDC 4599, Alt: 1515m, site: Ngel Nyaki, (10/08/76), form: T, Habitat: Submontane forest. Notes: 7.5m tall understory tree. At the enumeration plot.

Sapotaceae

Chrysophyllum albidum G. Don

L.& D. (FHI) 28851, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest. Notes: Right to collect the fruits.

JDC 3292, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: o, form: T.

JDC 3315, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: o, form: T.

JDC 4924, Alt: 212m, site: Gangumi F.R., (6/05/77), form: T, Habitat: Forest. Notes: Right to collect the fruits.

JDC 5200, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat: Forest. Notes: Fruit collected in spirit. Up to 30m tall.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: r, form: T.

Manilkara obovata (Sabine & G. Don) J.H. Hemsley

JDC 3972, Alt: 1440m, site: Gangoro forest, (1/12/75), form: T, Habitat: Forest; also clumps of forest spp. amongst rocks in grassland.

JDC 4152, Alt: 1440m, site: Gangoro forest, (18/02/76), form: T, Habitat: Forest; also clumps of forest spp. amongst rocks in grassland.

JDC 4281, Alt: 1440m, site: Gangoro forest, (14/03/76), form: T, Habitat: Forest grassland. Notes: Fruiting. In woody grassland on a ridge.

Mimusops kummel Bruce ex A. DC.

JDC 4709, Alt: 606m, site: VP fringing forest, (23/02/77), form: T, Habitat: Jangla. Notes: 9m tall.

JDC 4919, Alt: 200m, site: Taraba River, (4/05/77), form: T, Habitat: Stream banks. Notes: Taraba river, opposite Gangumi village.

JDC 5001, Alt: 229m, site: Gangumi F.R., (23/05/77), form: T, Habitat: Forest. Notes: Fruiting. About 21.2m tall.

Pouteria alnifolia (Baker) Roberty

L.& D. (FHI) 28737, Alt: 229m, site: Wurkam River F.R., form: T, Habitat: Forest. Notes: Kurmin Nya, Wurkam River F.R.

JDC 3876, Alt: 606m, site: River Nwum F.R., (16/04/75), form: T, Habitat: Forest. Notes: Sterile. New leaves just appearing. 21.2m tall.

JDC 3881, Alt: 606m, site: River Nwum F.R., (18/04/75), form: T, Habitat: Forest. Notes: Sterile. In new leaf. Understory tree. Kaka name: Shamangwi.

JDC 4791, Alt: 1364m, site: VP fringing forest, (27/02/77), form: T. Notes: 9 m tall. With *Canarium schweinfurthii* & *Chlorophora excelsa*.

JDC 5012, Alt: 229m, site: Wurkam River F.R., (25/05/77), form: T, Habitat: Forest. Notes: In new leaf. About 15.2m tall. Collection from Wurkam River F.R., Kurmin Tondirim.

JDC 5383, Alt: 242m, site: River Amboi F.R., (19/04/78), form: T, Habitat: Tall secondary forest.

Pouteria altissima (A. Chev.) Baehni

RED DATA LISTED: LR/cd

JDC 3304, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: f, form: T.

JDC 3777, Alt: 1061m, site: River Nwum F.R., (29/03/75), freq: o, form: T, Habitat: Forest. Notes: JDC's notes: 'Incl. 1 large & 2 small trees (?JDC 4852) in S.P' - but note JDC 4852 is identified as *Synsepalum cf*

JDC 3838, Alt: 758m, site: River Nwum F.R., (9/04/75), freq: o, form: T, Habitat: Forest. Notes: JDC's notes: 'Incl. 1 large & 2 small trees (?JDC 4852) in S.P' - but note JDC 4852 is identified as *Synsepalum cf*

JDC 3893, Alt: 606m, site: River Nwum F.R., (21/04/75), freq: o, form: T, Habitat: Forest. Notes: Fruiting. 30m tall. Charcoal used by local smiths. Kaka name: Nkyay.

JDC 4166, Alt: 1440m, site: Gangoro forest, (13/02/76), form: T, Habitat: Forest.

JDC 4239, Alt: 1440m, site: Gangoro forest, (2/03/76), form: T, Habitat: Forest.

JDC 4246, Alt: 1440m, site: Gangoro forest, (4/03/76), form: T, Habitat: Forest.

JDC 4312, Alt: 1364m, site: CH upland forest, (17/04/76), freq: o/lf, form: T, Habitat: Submontane forest. Notes: Sterile. Common upper canopy tree in tall forest on Dutsin Lamba & Cabbal Shirgu.

JDC 4463, Alt: 1667m, site: CH upland forest, (10/05/76), freq: o/lf, form: T, Habitat: Sporadic in fringing forest. Notes: Common upper canopy tree in tall forest on Dutsin Lamba & Cabbal Shirgu.

JDC 4473, Alt: 1667m, site: CH upland forest, (13/05/76), freq: o/lf, form: T, Habitat: Sporadic in fringing forest. Notes: Common upper canopy tree in tall forest on Dutsin Lamba & Cabbal Shirgu.

JDC 4858, Alt: 758m, site: River Nwum F.R., (5/04/77), freq: o, form: T, Habitat: Forest. Notes: JDC's notes: 'Incl. 1 large & 2 small trees (?JDC 4852) in S.P' - but note JDC 4852 is identified as *Synsepalum cf*

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: T.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: f, form: T.

Pouteria sp.

JDC 5174, Alt: 1364m, site: Akwaizantar, (31/01/78), freq: o, form: T, Habitat: Forest. Notes: Sterile collection. Observed from just below the saddle to the sample plot on the valley floor at 853m. One tree 9m tall.

Synsepalum brevipes (Baker) T.D. Penn.

FNH 1471, Alt: n/a, site: VP fringing forest, form: T. Notes: At the foot of Vogel Peak.

L.& D. (FHI) 28813, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

JDC 4001, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest; also clumps of forest spp. amongst rocks in grassland, & fringing streams.

JDC 4181, Alt: 1440m, site: Gangoro forest, (17/02/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland, & stream banks.

JDC 4279, Alt: 1440m, site: Gangoro forest, (13/03/76), form: T, Habitat: Forest & clumps of forest spp. amongst rocks in grassland, & stream banks. Notes: Fruiting.

JDC 5355, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest.

Synsepalum cerasiferum (Welw.) T.D. Penn.

JDC 4179, Alt: 1440m, site: Gangoro forest, (17/02/76), form: T, Habitat: Forest & stream banks in grassland.

JDC 4192, Alt: 1440m, site: Gangoro forest, (20/02/76), form: T, Habitat: Forest & stream banks in grassland.

JDC 4216, Alt: 1440m, site: Gangoro forest, (25/02/76), form: T, Habitat: Forest & stream banks in grassland.

JDC 4753, Alt: 1515m, site: VP amphitheatre, (25/02/77), freq: f, form: T.

JDC 4852, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. Fruits in spirit. 15m tall. Exuding white latex sparingly. Fruits said to be edible. 1 tree in S.P.

Synsepalum passargei (Engl.) T.D. Penn.

JDC 4712, Alt: 1061m, site: VP fringing forest, (24/02/77), freq: f, form: T.

JDC 4879, Alt: 758m, site: River Nwum F.R., (8/04/77), freq: f, form: T, Habitat: On rocky river bank.

Vitellaria paradoxa C. F. Gaertn.

JDC 4994, Alt: 229m, site: Gangumi, (21/05/77), freq: f, form: T, Habitat: Savanna. Notes: Shea butter, a common 'farm tree'.

JDC SR, Alt: c.610 - 914m, site: VP woodland, form: T.

Scrophulariaceae

Cycnium adonense E. Mey. ex Benth. subsp. *camporum* (Engl.) O.J. Hansen

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w/la.

Sopubia mannii Skan

JDC SR, Alt: n/a, site: CH upland grassland, freq: o, form: H, Habitat: Where only buffalo graze.

Sopubia ramosa (Hochst.) Hochst.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w/f, Habitat: Except where there is heavy grazing.

Sopubia simplex (Hochst.) Hochst.

JDC 5206, Alt: 1212m, site: Akwaizantar grassland, (4/02/78), freq: o, form: H, Habitat: Forest.

Simaroubaceae

Hannoa klaineana Pierre & Engl.

JDC 4252, Alt: 1440m, site: Gangoro forest, (5/03/76), form: T, Habitat: Forest.

JDC 4264, Alt: 1440m, site: Gangoro forest, (9/03/76), form: T, Habitat: Forest. Notes: 40m tall. At enumeration plot.

JDC 4884, Alt: 758m, site: River Nwum F.R., (10/04/77), form: T, Habitat: Stream bank forest.

JDC 5448, Alt: 242m, site: Baissa, (4/05/78), form: T.

JDC 5453, Alt: 242m, site: Baissa, (5/05/78), form: T.

Solanaceae

Discopodium penninervium Hochst.

JDC 3742, Alt: 2273m, site: Gangirwal *P.S.P* forest, (23/02/75), Habitat: Forest margin.

Solanum aculeastrum Dunal

JDC 3578, Alt: c.2134-2286m., site: Gangirwal upland grassland, (24/11/74), freq: o. Notes: Brought by cattle.

Solanum giganteum Jacq.

JDC 4004, Alt: 1440m, site: Gangoro forest, (2/12/75), form: SH, Habitat: Forest margin.

Solanum indicum L. subsp. *distichum* (Thonn.) Bitter

JDC 3434, Alt: 2121m, site: Gangirwal *Syzigium* streamside forest, (6/11/74), form: SH.

JDC 4342, Alt: 1667m, site: CH upland forest, (20/04/76), freq: o, form: SH, Habitat: Margins of stream fringing forest. Notes: Flowers & immature fruits.

Solanum sp.

JDC 4454, Alt: 1667m, site: CH upland grassland, (7/05/76), freq: f, form: SH. Notes: The Fulani use this very thorny shrub for making hedges round their rugas.

Sterculiaceae

Cola cf anomala K. Schum.

JDC 4187, Alt: 1440m, site: Gangoro forest, (19/02/76), form: T, Habitat: Forest.

Cola gigantea A. Chev.

HMC 163, Alt: 212m, site: Baissa, (1/08/74), form: T.

JDC 3830, Alt: 758m, site: River Nwum F.R., (8/04/75), form: T, Habitat: Forest. Notes: Fruits collected. Spirit material. Incl. Tree 2 in profile strip 2. Kaka name: Nguu.

JDC 4219, Alt: 1440m, site: Gangoro forest, (25/02/76), form: T, Habitat: Stream banks.

JDC 4889, Alt: 758m, site: River Nwum F.R., (11/04/77), form: T, Habitat: Forest at S.P. Notes: Seedling collection.

JDC 5008, Alt: 229m, site: Gangumi F.R., (23/05/77), form: T, Habitat: Forest. Notes: Fruiting.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

Cola hispida Brenan & Keay

FNH 2763, Alt: n/a, site: VP fringing forest, form: T. Notes: At the foot of Vogel Peak.

JDC 3129, Alt: 455m, site: Western escarpment of Mambilla, (4/05/73), freq: f, form: T, Habitat: Forest. Notes: Fairly common along streams, around 455m (1500ft).

JDC 3820, Alt: 1061m, site: River Nwum F.R., (7/04/75), form: T, Habitat: Forest margin.

JDC 4997, Alt: 229m, site: Gangumi F.R., (22/05/77), form: T, Habitat: Fringing forest. Notes: Fruiting, 3.6m tall.

JDC 5194, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat: Forest. Notes: Understory tree. Located in forest clump in grassland between 853-1067m & 1143m.

JDC 5324, Alt: 242m, site: River Amboi F.R., (10/04/78), form: T, Habitat: Tall secondary forest.

JDC SR, Alt: 229m, site: Baissa, form: T.

Cola laurifolia Mast.

L.& D. (FHI) 34431, Alt: n/a, site: Taraba River, form: T, Habitat: Stream banks. Notes: Taraba river, Bali.

Cola verticillata (Thonn.) Stapf ex A. Chev.

JDC 4030, Alt: 1440m, site: Gangoro forest, (4/12/75), form: T, Habitat: Forest.

JDC 4165, Alt: 1440m, site: Gangoro forest, (13/02/76), form: T, Habitat: Forest.

Cola sp.

JDC 4213, Alt: 1440m, site: Gangoro forest, (24/02/76), form: T.

Dombeya cf buettneri K. Schum.

JDC 4041, Alt: 1440m, site: Gangoro forest, (5/12/75), form: T, Habitat: Forest margin.

JDC 5183, Alt: 909m, site: Akwaizantar, (1/02/78), form: T, Habitat: Forest. Notes: ± 5m tall. Forming thickets in gaps.

Dombeya cf ledermannii Engl.

JDC 3835, Alt: 758m, site: River Nwum F.R., (8/04/75), form: T, Habitat: Forest margin at top of the slope.

JDC 4336, Alt: 1667m, site: CH upland forest, (20/04/76), freq: o/lf, form: T, Habitat: Forest margins & fringing forest. Notes: Flowering. Fruiting over except for the occasional tree.

JDC 5188, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat: Forest.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: T, Habitat: Forest margin.

Dombeya sp.

JDC 3896, Alt: 606m, site: River Nwum F.R., (21/04/75), form: T, Habitat: Forest. Notes: Flowering. Spreading shrub up to 5m tall. Conspicuous in early stage of secondary forest.

Octolobus grandis Exell

JDC 4928, Alt: 229m, site: Gangumi F.R., (7/05/77), freq: a, form: T, Habitat: Forest. Notes: Understory tree. At sample plot. Right to take the wood for bows - local name, Gamtentino.

Pterygota macrocarpa K. Schum.

JDC 4969, Alt: 229m, site: Gangumi F.R., (16/05/77), form: T, Habitat: Forest. Notes: Large tree.

JDC SR, Alt: 229m, site: Baissa, form: T.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

Pterygota mildbraedii Engl. ** New record for West Africa? **

JDC 4468, Alt: 1667m, site: CH upland forest, (12/05/76), freq: o, form: T, Habitat: Tall forest on Dutsin Lamba. Notes: With *Aningeria*, *Entandrophragma*, etc.

JDC 4593, Alt: 1515m, site: Ngel Nyaki, (8/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Sterile. Large tree, 21m+ tall. Also collected at Kurmin Dodo.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: f, form: T.

Pterygota sp.

JDC 4860, Alt: 758m, site: River Nwum F.R., (5/04/77), form: T, Habitat:

Forest. Notes: 16 trees in S.P.

JDC 4875, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: 16 trees in S.P.

Sterculia oblonga Mast.

HMC 174, Alt: 212m, site: Baissa, (3/08/74), form: T.

JDC 4971, Alt: 229m, site: Gangumi F.R., (16/05/77), form: T, Habitat: Forest.

JDC 5431, Alt: 242m, site: Baissa, (1/05/78), form: T.

Sterculia setigera Del.

JDC SR, Alt: n/a, site: Gangumi, freq: r, form: T, Habitat: Savanna.

Sterculia tragacantha Lindl.

JDC 3795, Alt: 909m, site: River Nwum F.R., (2/04/75), freq: f, form: T, Habitat: Forest; but usually near the upper margin. Notes: E.g. Profile strip 1, where there were 11 trees: Kaka name: Sakop.

JDC 5169, Alt: 1364m, site: Akwaizantar, (31/01/78), form: T, Habitat: Forest. Notes: Found at forest edge and also isolated clumps in grassland. Kaka name: Sakop.

JDC 5193, Alt: 1212m, site: Akwaizantar, (3/02/78), form: T, Habitat: Forest & forest margin. Notes: Also found at forest clumps in grassland at the saddle. Kaka name: Sakop.

JDC 5387, Alt: 242m, site: River Amboi F.R., (19/04/78), form: T, Habitat: Tall secondary forest.

Thymelaeaceae

Craterosiphon scandens Engl. & Gilg

JDC 3963, Alt: 1440m, site: Gangoro forest, (29/11/75), form: WC, Habitat: Forest.

JDC 4130, Alt: 1440m, site: Gangoro forest, (9/02/76), form: WC, Habitat: Forest.

Dicranolepis grandiflora Engl.

HMC 144, Alt: 303m, site: Nr. Bissaula, (3/08/74), form: T, Habitat: Forest. Notes: Treelet.

JDC 3312, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: la, form: T.

JDC 4510, Alt: 1515m, site: Ngel Nyaki, (30/07/76), freq: la, form: T.

JDC 4616, Alt: 1515m, site: Ngel Nyaki, (3/02/77), freq: la, form: T, Habitat: Submontane forest. Notes: Flowering. 6m tall understory tree. Evergreen.

JDC 4986, Alt: 229m, site: Gangumi F.R., (20/05/77), form: WC, Habitat: Forest. Notes: (Treelet).

JDC 5420, Alt: 242m, site: Baissa, (25/04/78), form: T.

Gnidia glauca (Fresen.) Gilg

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: T. Notes: Much less common than on the high plateau.

Peddiea fisheri Engl.

JDC 3326, Alt: 1515m, site: Ngel Nyaki, (9/11/73), freq: r, form: T.

JDC 4518, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: r, form: T.

JDC SR, Alt: n/a, site: Gangirwal P.S.P. forest, form: SH.

Tiliaceae

Glyphaea brevis (Spreng.) Monach.

JDC 3115, Alt: 303m, site: Western escarpment of Mambilla, (5/05/73), form: T, Habitat: Forest. Notes: Monachino one tree, in a compound at Sabon Gida.

Glyphaea sp.

JDC 5384, Alt: 242m, site: River Amboi F.R., (19/04/78), form: T, Habitat: Tall secondary forest. Notes: Fruits collected.

Grewia sp.

JDC 4574, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: o, form: SH, Habitat: Forest margin. Notes: Flowering and fruiting. A scandent shrub.

JDC 4796, Alt: 606m, site: VP woodland, (28/02/77), freq: f, form: T, Habitat: Open woodland. Notes: Flowering. On the steep slope immediately above Jangla village on the path to Vogel Peak.

JDC 4941, Alt: 229m, site: Gangumi, (10/05/77), form: T, Habitat: Savanna. Notes: Small tree. Flowers collected.

Ulmaceae

Celtis gomphophylla Baker

JDC 4546, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Sterile. At enumeration plot.

JDC 4580, Alt: 1515m, site: Ngel Nyaki, (5/08/76), freq: o, form: T, Habitat: Submontane forest. Notes: Fruiting. 21m tall. At enumeration plot.

JDC 4974, Alt: 229m, site: Gangumi F.R., (17/05/77), form: T, Habitat: Forest.

JDC 5451, Alt: 242m, site: Baissa, (5/05/78), form: T.

Celtis philippensis Blanco

L.& D. (FHI) 28885, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

JDC 3824, Alt: 758m, site: River Nwum F.R., (7/04/75), form: T, Habitat: Forest. Notes: Incl. Tree 2 in profile strip, and 3 trees in S.P.

JDC 3854, Alt: 758m, site: River Nwum F.R., (14/04/75), form: T, Habitat: Forest. Notes: Incl. Tree 2 in profile strip, and 3 trees in S.P.

JDC 4978, Alt: 229m, site: Gangumi F.R., (18/05/77), form: T, Habitat: Forest.

JDC 5323, Alt: 242m, site: River Amboi F.R., (10/04/78), form: T, Habitat: Tall secondary forest.

JDC 5347, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest.

Celtis zenkeri Engl.

L.& D. (FHI) 28903, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

Holoptelea grandis (Hutch.) Mildbr.

L.& D. (FHI) 28894, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest.

JDC 3832, Alt: 758m, site: River Nwum F.R., (8/04/75), form: T, Habitat: Forest. Notes: Incl. 3 large trees in S.P. plus tree 10 in profile strip 2.

JDC 4862, Alt: 758m, site: River Nwum F.R., (5/04/77), form: T, Habitat: Forest. Notes: Incl. 3 large trees in S.P., plus tree 10 in profile strip 2.

JDC 4967, Alt: 229m, site: Gangumi F.R., (16/05/77), form: T, Habitat: Forest.

JDC 4981, Alt: 229m, site: Gangumi F.R., (19/05/77), form: T, Habitat: Forest.

JDC 5374, Alt: 242m, site: River Amboi F.R., (18/04/78), form: T, Habitat: Tall secondary forest.

JDC 5427, Alt: 242m, site: Baissa, (30/04/78), form: T.

JDC 5456, Alt: 242m, site: Baissa, (6/05/78), form: T.

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

Trema orientalis (L.) Blume

JDC 3800, Alt: 758m, site: River Nwum F.R., (3/04/75), freq: r/la, form: T, Habitat: Gap in forest, forest regrowth.

JDC 4438, Alt: 1667m, site: CH upland forest, (5/05/76), freq: r, form: T. Notes: 18 m tall. At S.P.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, freq: la, form: T, Habitat: Secondary forest. Notes: Forming pure stands near the foot of the escarpment above Zongo Mata.

JDC SR, Alt: 606m, site: River Nwum F.R., freq: la, form: T, Habitat: In forest regrowth.

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: Abandoned farm at Gidan Tonga.

JDC SR, Alt: n/a, site: Ngel Nyaki, freq: o, form: T, Habitat: Forest margin.

Urticaceae

Boehmeria macrophylla Hornem.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: SH.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH.

Elatostema sp.

JDC 4446, Alt: 1667m, site: CH upland forest, (6/05/76), freq: la, form: H, Habitat: Bank of forest stream in deep shade. Notes: Material sterile.

Girardinia diversifolia (Link) Friis

JDC 3448, Alt: 1970m, site: Gangirwal, (7/11/74), form: H. Notes: At Kurmin Dodo.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: H.

Laportea alatipes Hook.f.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Pilea rivularis Wedd.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: f, form: H, Habitat: Damp ground.

Urera cordifolia Engl.

JDC 5428, Alt: 242m, site: Baissa, (30/04/78), form: WC, Habitat: Forest. Notes: Scrambling. In thicket at the forest edge.

Verbenaceae

Clerodendrum capitatum (Willd.) Schumach. & Thonn.

FNH 2762, Alt: n/a, site: VP fringing forest, form: SH. Notes: At the foot of Vogel Peak.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: LIAN.

Clerodendrum schweinfurthii Gürke

JDC 5256, Alt: 909m, site: Akwaizantar, (14/02/78), form: SH, Habitat: Forest. Notes: Climbing shrub, flowers white, ornamental; occasional.

Clerodendrum silvanum Henriq. var. *buchholzii* (Gürke) Verdc.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: LIAN.

Clerodendrum violaceum Gürke

JDC 5198, Alt: 1212m, site: Akwaizantar, (3/02/78), form: SH, Habitat: Forest margin. Notes: Scrambling shrub. Infrequent.

Clerodendrum volubile P. Beauv.

JDC 3997, Alt: 1440m, site: Gangoro forest, (2/12/75), form: WC, Habitat: Forest.

JDC 4221, Alt: 1440m, site: Gangoro forest, (26/02/76), form: WC, Habitat: Forest. Notes: Climbing shrub.

Lippia multiflora Moldenke

JDC 5023, Alt: 229m, site: Gangumi, (29/05/77), form: H, Habitat: Savanna. Notes: Flowering. Up to 3m tall. Robust perennial. Strongly aromatic. Locally dominant where the Gangumi forest was farmed prior to

Vitex doniana Sweet

L.& D. (FHI) 34485, Alt: n/a, site: Gangumi, freq: w, form: T, Habitat: Savanna. Notes: A 'farm tree' on account of its edible fruits: Hausa name: Dinya. Collections from Jamtari and Mai Idanu.

JDC 3827, Alt: 758m, site: River Nwum F.R., (7/04/75), freq: f, form: T, Habitat: Within and along forest margin. Notes: Incl. 3 trees in profile strip 1 and 11 in S.P.

JDC 4007, Alt: 1440m, site: Gangoro forest, (3/12/75), form: T, Habitat: Stream banks.

JDC 4471, Alt: 1667m, site: CH upland forest, (13/05/76), freq: o, form: T, Habitat: Forest. Notes: On a rock inside the forest at Dutsin Lamba (& Gidan Kwano to Tonga).

JDC 4776, Alt: 1515m, site: VP amphitheatre, (26/02/77), form: T.

JDC 4963, Alt: 229m, site: Gangumi, (14/05/77), form: T, Habitat:

Savanna. Notes: Widespread. A 'farm tree' on account of its edible fruits (Hausa: Dinya).

JDC 5272, Alt: 1136m, site: Akwaizantar, (20/02/78), form: T, Habitat: Forest margin. Notes: Sweet. With trees from 0.3-1.8m g.b.h. represented in S.P. Also at 1143m and 762m; sporadic in wooded grassland.

JDC 5426, Alt: 242m, site: Baissa, (30/04/78), freq: o, form: T, Habitat: Stream banks. Notes: Forest margin, also streambanks in savanna and in transition woodland.

JDC SR, Alt: Up to 1067m, site: VP fringing forest, freq: o, form: T. Notes: With *Brachystegia eurycoma* and *Maranthes kerstingii* at Jangla, and up to 1067m.

JDC SR, Alt: 229m, site: Baissa, freq: o, form: T, Habitat: Transition Woodland/Wooded Grassland.

JDC SR, Alt: 229m, site: Baissa, freq: o, form: T, Habitat: Savanna Woodland/Wooded Grassland.

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T, Habitat: From c. 2/3rds the way up. Notes: With *Combretum*, *Terminalia*, *Entada*.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

JDC SR, Alt: ± 457m, site: Western escarpment of Mambilla, freq: o, form: T, Habitat: Forest. Notes: Sweet sporadic with *Pandanus candelabrum* and *Upaca* along stream at Batu Kamino.

Vitex ferruginea Schumach. & Thonn.

JDC 4002, Alt: 1440m, site: Gangoro forest, (2/12/75), form: T, Habitat: Forest.

JDC 4271, Alt: 1440m, site: Gangoro forest, (11/03/76), form: T, Habitat: Forest.

Vitex madiensis Oliv. subsp. *madiensis*

JDC 5020, Alt: 229m, site: Gangumi, (27/05/77), freq: o, form: SH, Habitat: Savanna. Notes: Fruiting. About 2.4m tall. Usually a shrub.

Vitex oxycuspis Baker

JDC 4210, Alt: 1440m, site: Gangoro forest, (24/02/76), form: T, Habitat: Forest.

Vitex rivularis Gürke

JDC 5438, Alt: 242m, site: Baissa, (2/05/78), form: T.

JDC SR, Alt: 229m, site: Gangumi F.R., form: T, Habitat: Forest. Notes: With *Picralima nitida*, an understory species frequently recorded at Gangumi in 1954.

Violaceae

Rinorea brachypetala (Turcz.) O. Kütze

JDC 3821, Alt: 758m, site: River Nwum F.R., (7/04/75), freq: f/la, form: T, Habitat: Forest.

Rinorea dentata (P. Beauv.) O. Kütze

JDC 3797, Alt: 909m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Forest.

Rinorea kibbiensis Chipp

JDC 2952, Alt: 840m, site: River Nwum F.R., (7/07/72), freq: f/la, form: T, Habitat: Forest.

JDC 3126, Alt: 455m, site: Western escarpment of Mambilla, (4/05/73), freq: la, form: T, Habitat: Forest. Notes: Batu Kamino - Buru Kassa.

Rinorea sp.

JDC 4933, Alt: 229m, site: Gangumi F.R., (7/05/77), form: T, Habitat: Forest.

JDC 5239, Alt: 1061m, site: Akwaizantar, (9/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 3.6m tall.

JDC 5411, Alt: 242m, site: River Amboi F.R., (24/04/78), form: T, Habitat: Tall secondary forest. Notes: Fruiting material collected.

JDC 5411, Alt: 242m, site: Baissa, (24/04/78), form: T. Notes: Fruiting material collected. 3 - 4.6m tall. Abundant in understory.

Viola abyssinica Steud. ex Oliv.

JDC 4431, Alt: 1667m, site: CH upland forest, (4/05/76), freq: r, form: H, Habitat: Beneath bracken and herbs at forest margin.

Viscaceae

Viscum cf decurrens (Engl.) Baker & Sprague

JDC 4405, Alt: 1667m, site: CH upland forest, (27/04/76), freq: f, form: SH, Habitat: Hemiparasite on *Symphonia globulifera*. Notes: Parasitic. Very common on high branches, perhaps the very top ones, usually of *Symphonia* trees.

ANGIOSPERMAE

MONOCOTYLEDONAE

Amaryllidaceae

Crinum zeylanicum L.

JDC SR, Alt: 610-1067m, site: River Nwum F.R., freq: f, form: H, Habitat: In wooded grassland.

Scadoxus multiflorus (Martyn) Raf.

JDC 4905, Alt: 758m, site: River Nwum F.R., (14/04/77), freq: la, form: H, Habitat: In an open situation in sandy soil, on flat ground abutting on fringing forest.

Araceae

Cercestis mirabilis (N.E.Br.) Bogner

JDC 5342, Alt: 242m, site: River Amboi F.R., (13/04/78), form: H, Habitat: Tall secondary forest. Notes: Stout climber with clasping roots round the supporting stem.

Culcasia scadens P. Beauv.

JDC 4025, Alt: 1440m, site: Gangoro forest, (4/12/75), form: H, Habitat: Forest.

Commelinaceae

Aneilema umbrosum (Vahl) Kunth subsp. *umbrosum*

FNH 1494, Alt: c.1460m, site: VP amphitheatre, form: H. Notes: At the edge of an isolated clump of *Beilschmiedia mannii*.

Commelina cameroonensis J.K. Morton

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: H.

Cyanotis barbata D. Don

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: o.

Cyanotis caespitosa Kotschy & Peyr.

JDC SR, Alt: n/a, site: Akwaizantar grassland, form: H, Habitat: Forest.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w/a.

Floscopa glomerata (Willd. ex Schult. & Schult.f.)

Hassk. subsp. *lelyi* (Hutch.) Brenan

FNH 1454, Alt: n/a, site: VP fringing forest, form: H, Habitat: In 25 cm deep water in riverine forest at the foot of Vogel Peak.

Palisota ?

JDC 3890, Alt: 606m, site: River Nwum F.R., (20/04/75), form: H, Habitat: Forest. Notes: Flowering. By a small stream.

Palisota hirsuta (Thunb.) K. Schum. ex Engl.

JDC 4880, Alt: 758m, site: River Nwum F.R., (8/04/77), form: H, Habitat: Fringing forest on river bank.

JDC 5310, Alt: 242m, site: River Amboi F.R., (9/04/78), form: H, Habitat: Tall secondary forest.

Palisota mannii C.B. Clarke

JDC 2698, Alt: n/a, site: Ngel Nyaki, (25/02/72), freq: f, form: H, Habitat: Forest. Notes: Flowering. In a kurmi (Leinde Koyli) in a hillside hollow between Dorofi and Hainare.

Palisota sp.

HMC 145, Alt: 303m, site: Nr. Bissaula, (3/08/74), freq: f, form: T, Habitat: Forest. Notes: See fruiting material in spirit collection at FHO.

HMC 146, Alt: 303m, site: Nr. Bissaula, (3/08/74), freq: la, form: T, Habitat: Forest. Notes: See fruiting material in spirit collection at FHO.

JDC 3811, Alt: 833m, site: River Nwum F.R., (5/04/75), freq: a, form: H, Habitat: Most characteristic plant in the herb layer. Notes: Leaves in a rosette, up to 1.8m tall, with the blade 1.2m. Inflorescence 23cm (gin) with a 15cm (bin) peduncle (see spirit collection).

JDC 4227, Alt: 1440m, site: Gangoro forest, (28/02/76), form: H, Habitat: Forest.

JDC SR, Alt: 853-1067m & 1143m, site: Akwaizantar, freq: o/lf, form: H, Habitat: Forest. Notes: Rosette of large leaves at ground level.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, freq: o, form: H, Habitat: Secondary forest. Notes: Sabon Gida to Gidan Bature.

JDC SR, Alt: 229m, site: Baissa, form: H.

JDC SR, Alt: 229m, site: River Amboi F.R., freq: a, form: H, Habitat: Tall secondary forest. Notes: Most likely = JDC 3811 (River Nwum).

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: o, form: H.

Pollia condensata C.B. Clarke

JDC 5399, Alt: 242m, site: River Amboi F.R., (20/04/78), form: H, Habitat: Tall secondary forest.

Pollia mannii C.B. Clarke

JDC 3793, Alt: 909m, site: River Nwum F.R., (2/04/75), form: H, Habitat: Forest.

JDC 4501, Alt: 909m, site: River Nwum F.R., (30/06/76), form: H, Habitat: Forest.

JDC 4827, Alt: 758m, site: River Nwum F.R., (29/03/77), form: H, Habitat: Forest.

Costaceae

Costus lucanusianus J. Braun & K. Schum.

JDC 4832, Alt: 758m, site: River Nwum F.R., (2/04/77), freq: f, form: H, Habitat: Edge of stream fringing forest.

Costus spectabilis (Fenzl) K. Schum.

JDC SR, Alt: 610-1067m, site: River Nwum F.R., form: H, Habitat: In wooded grassland.

JDC SR, Alt: To c.975m, site: CH escarp & fringing forest, form: H.

Costus sp.

JDC 3130, Alt: 303m, site: Western escarpment of Mambilla, (7/05/73), form: H, Habitat: Forest. Notes: 3.7m tall, flowers white and yellow with pink tip. In clumps at the edge of secondary forest: Sabon Gida to

Cyperaceae

Abildgaardia abortiva (Ridley) Lye

JDC SR, Alt: n/a, site: Gangirwal upland grassland, form: H.

Abildgaardia cf oritrephes (Gilly) J. Raynal

JDC 3697, Alt: 2121m, site: Gangirwal upland grassland, (9/02/75), form: H.

Afrotrilepis sp.

JDC 4585, Alt: 1515m, site: Ngel Nyaki, (7/08/76), form: EH, Habitat: Submontane forest. Notes: Amongst moss and small ferns on a high branch of a forest tree.

Bulbostylis erratica (Ridley) C.B. Clarke

JDC SR, Alt: 2134 - 2438m, site: Gangirwal upland grassland, freq: f, form: H.

Bulbostylis oritrephes C.B. Clarke

JDC 3782, Alt: 1061m, site: River Nwum F.R., (30/03/75), freq: la, form: H. Notes: Bright green clumps prominent among the blackened stubble of the grassland burnt two months before.

Carex chlorosaccus C.B. Clarke

JDC 3710, Alt: 2273m, site: Gangirwal forest grassland ecotone, (10/02/75), form: H.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: H.

Carex preussii K. Schum.

RED DATA LISTED: LR/nt

Previously reported from Mambilla Plateau in the Mt Oku checklist (Cheek et al. 2000)

Cyperus mannii Retz.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: H, Habitat: Damp ground.

Mariscus sumatrensis (Retz) J. Reynal

JDC 4353, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: la, form: H, Habitat: Regularly grazed grassland. Notes: Flowering. Resistant to trampling.

Pycreus fibrillosus (Kük.) Cherm.

JDC SR, Alt: c. 2134m, site: Gangirwal upland grassland, freq: lf.

Yet to be identified

JDC 3133, Alt: 606m, site: Western escarpment of Mambilla, (8/05/73), form: H, Habitat: Forest. Notes: Firmly rooted in rock crevices, frequently submerged; stream at Batu Amanda.

Dioscoreaceae

Dioscorea hirtiflora Benth.

JDC 4551, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o, form: H, Habitat: Forest margin. Notes: Flowering. Twining on a bush 3m high. At enumeration plot.

Dracaenaceae

Dracaena arborea (Willd.) Link

JDC SR, Alt: n/a, site: CH escarp & fringing forest, form: T. Notes: Gidan Tonga: left when a small patch of forest was farmed.

JDC SR, Alt: 857-1067m, site: Akwaizantar, form: T, Habitat: Forest. Notes: On steep rocky slopes.

JDC SR, Alt: n/a, site: Ngel Nyaki, freq: r, form: T.

Dracaena aubryana Brongn. ex C. Morren

JDC 4244, Alt: 1440m, site: Gangoro forest, (3/03/76), form: H, Habitat: Forest stream. Notes: Flowering. Rocky bank of a stream.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Dracaena fragrans (L.) Ker-Gawl.

JDC 2716, Alt: 1667m, site: Ngel Nyaki, (1/03/72), freq: fl/la, form: SH.

JDC 4230, Alt: 1440m, site: Gangoro forest, (29/07/76), freq: lf, form: SH, Habitat: Forest. Notes: Fruiting. Material from rocky stream bank in shade of forest.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: SH.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: T/SH.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: SH.

Dracaena laxissima Engl.

JDC 2966, Alt: 1212m, site: Antere, (9/07/72), freq: f, form: SH, Habitat: Forest, on river bank.

JDC 4598, Alt: 1515m, site: Ngel Nyaki, (10/08/76), freq: o, form: SH, Habitat: Submontane forest. Notes: Weak stemmed shrub 2.4m high.

Dracaena surculosa Lindl.

JDC 4250, Alt: 1440m, site: Gangoro forest, (5/03/76), form: SH, Habitat: Forest.

Dracaena thalioides Makoy ex C. Morren

JDC 3785, Alt: 1061m, site: River Nwum F.R., (31/03/75), form: H, Habitat: Forest.

JDC 4836, Alt: 758m, site: River Nwum F.R., (2/04/77), form: H, Habitat: Forest.

JDC 5309, Alt: 242m, site: River Amboi F.R., (9/04/78), form: H, Habitat: Tall secondary forest.

Dracaena sp.

JDC 3885, Alt: 606m, site: River Nwum F.R., (20/04/75), freq: f, form: SH, Habitat: Forest. Notes: Sterile. Semi-scandent sparsely branched, 2.5m tall.

JDC 5360, Alt: 242m, site: River Amboi F.R., (15/04/78), form: SH, Habitat: Tall secondary forest. Notes: Sterile collection.

Eriocaulaceae

Ericaulon asteriodes S.M. Phillips

RED DATA LISTED: VU D2

Previously reported from Mambilla Plateau (Cabbal Wade) in the Mt Oku checklist (Cheek et al. 2000)

Ericaulon bamendae S.M. Phillips

RED DATA LISTED: VU D2

Hall 1748, site: Mambilla Plateau - Mayo Daga, (1970). Notes: reported in the Mt Oku checklist (Cheek et al. 2000)

Hyacinthaceae

Albuca sp.

JDC 3761, Alt: 2273m, site: Gangirwal upland grassland, (2/03/75), freq: r. Notes: One plant seen.

Dipcadi viride (L.) Moench

JDC SR, Alt: 2286m, site: Gangirwal upland grassland, freq: o.

Drimia elata Jacq. ex Willd.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f.

Drimia sp.

JDC 3713, Alt: 2273m, site: Gangirwal upland grassland, (10/02/75), freq: lf.

Scilla sudanica A.Chev.

JDC 3804, Alt: 758m, site: River Nwum F.R., (3/04/75), form: H, Habitat: In wooded grassland.

Hypoxidaceae

Curculigo cf pilosa (Schumach.) & Thonn.) Engl.

JDC 4833, Alt: 758m, site: River Nwum F.R., (2/04/77), form: H, Habitat: In wooded grassland. Notes: Whole plant collected.

Hypoxis angustifolia Lam.

JDC 4424, Alt: 1667m, site: CH upland grassland, (1/05/76), freq: f, form: H. Notes: Resistant to trampling.

Hypoxis iridifolia Baker

JDC 4346, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: f, form: H, Habitat: Upland grassland. Notes: Resistant to trampling.

JDC SR, Alt: 2286m, site: Gangirwal upland grassland, freq: f, form: H.

Hypoxis suffruticosa Nel

JDC SR, Alt: Around 2134m, site: Gangirwal upland grassland, freq: a.

Iridaceae

Gladiolus melleri Baker

JDC 4310, Alt: 1667m, site: Gashaka, (13/04/76), form: H, Habitat: Upland grassland. Notes: Flowering. At Cabbal Tale, on the path up to selbe from Gidan Kwano. Trampled out by cattle - common where only

Gladiolus unguiculatus Baker

JDC 3803, Alt: 758m, site: River Nwum F.R., (3/04/75), form: H, Habitat: In wooded grassland.

Moraea schimperii (Hochst.) Pic.Serm.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w/la.

Marantaceae

Marantochloa leucantha (K. Schum.) Milne-Redh.

HMC 147, Alt: 303m, site: Nr. Bissaula, (3/08/74), form: T, Habitat: Forest.

JDC 2947, Alt: 840m, site: River Nwum F.R., (7/07/72), freq: la, form: H, Habitat: Fringing & secondary forest.

JDC 3822, Alt: 758m, site: River Nwum F.R., (7/04/75), freq: la, form: H, Habitat: Fringing & secondary forest.

Marantochloa purpurea (Ridl.) Milne-Redh.

HMC 148, Alt: 303m, site: Nr. Bissaula, (3/08/74), form: T, Habitat: Forest.

JDC 4925, Alt: 212m, site: Gangumi F.R., (7/05/77), form: SH, Habitat: Stream banks. Notes: Forming dense stands up to 2.5m (8 ft) tall, in swampy ground. Flowers purple, fruit red.

JDC 5343, Alt: 242m, site: River Amboi F.R., (13/04/78), form: H, Habitat: Tall secondary forest.

Marantochloa sp.

JDC 3110, Alt: 606m, site: Western escarpment of Mambilla, (3/05/73), form: H, Habitat: Forest. Notes: Robust herb, 4.6-6m tall. Frequently arching, flowers bluish-purple. Prominent in recently abandoned farms nr.

JDC 3128, Alt: 455m, site: Western escarpment of Mambilla, (4/05/73), freq: la, form: H, Habitat: Secondary Forest. Notes: Robust herb c.1. 8m tall; flowers purple. Batu Kamino to Buru Kassa.

JDC SR, Alt: 853-1067m, site: Akwaizantar, form: H, Habitat: Forest. Notes: 4-5m, exceptionally up to 6m tall. Common bamboo-like plant forming extensive clumps.

Musaceae

Ensete gillettii (De Wild.) Cheesman

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H. Notes: Giant herb.

Orchidaceae

Angraecum sp.

JDC 4512, Alt: 1515m, site: Ngel Nyaki, (30/07/76), freq: lf, form: EH, Habitat: Epiphytic on small moss covered trees in forest glades, or high in the crowns of emergent trees. Notes: Flowers pure white star-like, the spur up to 9cm long.

Bulbophyllum cochleatum Lindl.

FNH 1507, Alt: c.1490m, site: VP amphitheatre, form: EH, Habitat: Stream fringing forest. Notes: On *Syzygium*.

JDC 4397, Alt: 1667m, site: CH upland grassland, (26/04/76), freq: r, form: EH, Habitat: Amongst moss and lichen on *Entada abyssinica*.

Bulbophyllum sp.

JDC SR, Alt: 762m, 853-1067m & 1143m, site: Akwaizantar, form: EH, Habitat: Forest. Notes: Crown epiphytes. Often abundant, conspicuous only when the host tree is leafless.

JDC SR, Alt: n/a, site: Ngel Nyaki, form: EH.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: E.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: EH.

Calyptrochilum christyanum (Rchb.f.) Summerh.

FNH 1479, Alt: n/a, site: VP fringing forest, form: EH, Habitat: Riverine forest. Notes: At the foot of Vogel Peak.

JDC 3136, Alt: 606m, site: Western escarpment of Mambilla, (8/05/73), form: EH, Habitat: Fringing forest. Notes: Flowers fragrant: near Batu Amanda.

JDC 4303, Alt: 455m, site: River Gamgam, (11/04/76), form: EH, Habitat: Stream banks. Notes: Flowering. In transitional woodland/ forest fringing the bank of the river, close to the game rangers house.

JDC 5392, Alt: 242m, site: River Amboi F.R., (20/04/78), form: EH, Habitat: Transition woodland/Young secondary forest.

Corymborkis corymbosa Thou.

JDC 5373, Alt: 242m, site: River Amboi F.R., (18/04/78), form: H, Habitat: Tall secondary forest.

Diaphanathe bidens (Sw. ex Pers.) Schltr.

JDC 5391, Alt: 242m, site: River Amboi F.R., (20/04/78), form: EH, Habitat: Transition woodland/Young secondary forest.

Disa equestris Rchb.f.

JDC 4427, Alt: 1667m, site: CH upland grassland, (2/05/76), freq: o, form: H, Habitat: Usually occurs where plants are protected from trampling, for example by *Echinops giganteus*.

Disa welwitschii Rchb.f.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: la.

Eulophia cristata (Sw.) Steud.

JDC 4838, Alt: 758m, site: River Nwum F.R., (3/04/77), form: H, Habitat: In wooded grassland.

Eulophia horsfallii (Batem.) Summerh.

JDC SR, Alt: n/a, site: CH upland forest, freq: o, form: H, Habitat: Amongst bracken at the margin of Stream bank forest. Notes: 3m tall.

Habenaria mannii Hook.f.

JDC 2865, Alt: 2273m, site: Gangirwal upland grassland, (3/06/72), freq: o/lf.

Polystachya bennettiana Rchb.f.

JDC 4399, Alt: 1667m, site: CH upland grassland, (27/04/76), freq: o, form: EH, Habitat: In the crowns of *Entada* & *Combretum*, also high in the branches of forest trees.

Polystachya cooperi Summerh.

HMC 207, Alt: 1515m, site: Ngel Nyaki, (1/08/76), freq: f, form: EH, Habitat: on small moss-draped trees in forest glade. Notes: Flowers white.

Polystachya modesta Rchb.f.

JDC 4311, Alt: 1364m, site: Gashaka, (13/04/76), form: EH, Habitat: Upland grassland. Notes: Flowering. At Cabbal Tale. Found on *Cussonia* & *Combretum* at Plateau lip.

Vanilla imperialis Kraenzl.

JDC 4869, Alt: 758m, site: River Nwum F.R., (6/04/77), freq: r, form: H, Habitat: Fringing forest. Notes: Fruiting. Trailing over rocky ground and among shrubs for 27m before climbing 5m up the trunk of a small river-

Yet to be identified

JDC 4451, Alt: 1667m, site: CH upland forest, (6/05/76), freq: o, form: EH, Habitat: On trees over-hanging forest stream. Notes: Fruiting material collected.

JDC 4926, Alt: 212m, site: Gangumi F.R., (7/05/77), form: SH, Habitat: Stream banks. Notes: Flowers pinkish-purple, stem 38cm (15 in) high; in light shade;.

Palmae

Borassus aethiopum Mart.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Savanna. Notes: Scattered groups.

JDC SR, Alt: 229m, site: Baissa, form: T, Habitat: Savanna Woodland/ Wooded Grassland. Notes: Sporadic in wooded grassland, occasionally inside small forest patches.

Calamus deërratus Mann & Wendl.

JDC 5010, Alt: 229m, site: Gangumi F.R., (24/05/77), form: WC, Habitat: Forest. Notes: To 15m. Common locally along water courses in forest, climbing tree trunks to 15m (50 ft) or lacing the crowns of understory trees. The lower part of the stem extremely spiny, smooth above, pliable, and used as 'bush rope' for many purposes.

JDC 5423, Alt: 242m, site: Baissa, (29/04/78), form: WC, Habitat: Forest.

Calamus sp.

HMC SR, Alt: 229m, site: Nr. Bissaula, form: T, Habitat: Forest.

Elaeis guineensis Jacq.

JDC 5270, Alt: 758m, site: Akwaizantar, (17/02/78), form: T, Habitat: Forest. Notes: Sporadic between 853-1,067m, abundant in farms in the Mawo valley at 762m. Hausa name: Kwakwa.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

JDC SR, Alt: 229m, site: Baissa, form: T.

JDC SR, Alt: n/a, site: Gashaka, form: T, Habitat: On route from Gashaka to CH.

JDC SR, Alt: n/a, site: Gangumi, freq: o, form: T, Habitat: Stream banks.

Trappes-Lomax SR, Alt: 229m, site: Gangumi F.R., freq: r, form: T, Habitat: Forest.

HMC SR, Alt: 229m, site: Nr. Bissaula, form: T, Habitat: Forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Transition woodland/Young secondary forest.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Transition woodland/Young secondary forest.

JDC SR, Alt: n/a, site: River Nwum F.R., form: T, Habitat: Forest. Notes: Of 7 plants recorded at the S.P., 6 were stemless.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, form: T, Habitat: Forest. Notes: From Zongo Mata to the Donga river, oil palm bush had replaced virtually all the valley kurame away from streams.

Laccosperma opacum (G. Mann & H. Wendl.) Drude

JDC 3861, Alt: 606m, site: River Nwum F.R., (15/04/75), freq: o/lf, form: WC, Habitat: Forest & forest margin;. Notes: syn. *Ancistrophyllum*. Kaka name: Nkonko. Used for weaving baskets and for cane furniture. Climbing palm forming impenetrable thickets or climbing high.

JDC 5202, Alt: 1212m, site: Akwaizantar, (3/02/78), freq: o, form: WC, Habitat: Forest. Notes: Climbing palm.

JDC 5331, Alt: 242m, site: River Amboi F.R., (11/04/78), form: WC, Habitat: Tall secondary forest.

Phoenix reclinata Jacq.

JDC 4127, Alt: 1440m, site: Gangoro forest, (9/02/76), form: T, Habitat: Forest margin and clumps of forest spp. round rocks in grassland, also boulder strewn slopes.

JDC 4406, Alt: 1667m, site: CH upland forest, (27/04/76), freq: f, form: T, Habitat: Stream bank forest & forest margins. Notes: Also found amongst rocks in grassland.

JDC SR, Alt: 853-1067m, site: Akwaizantar, form: T, Habitat: Forest. Notes: Scattered groups, forest edge at the saddle.

JDC SR, Alt: n/a, site: VP amphitheatre, freq: o, form: T, Habitat: On cliff ledges.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: r, form: T.

JDC SR, Alt: ± 1000m, site: River Nwum F.R., form: T, Habitat: Forest margin at the top of the slope.

Raphia mambillensis Otedoh

RED DATA LISTED: LR/cd

JDC SR, Alt: n/a, site: Mambilla Plateau, freq: f, form: T, Habitat: Stream banks. Notes: e.g. Sighted at Hainare, Kabri and between Njawai and Kan Iyaka. Occurs gregariously in swampy stream-source hollows, and retained when other trees were felled Tapped for Palm wine. Hausa: Tukuruwa.

Raphia sp.

JDC SR, Alt: n/a, site: Wurkam River F.R., freq: o, form: T, Habitat: Stream banks. Notes: Sporadic along streams with *Syzygium guineense* subsp. *guineense* & *Uapaca* ? *beudelotii*. Right to collect midribs & fronds at Wurkam River and Kamatan Forest Reserves.

Pandanaceae

Pandanus candelabrum P. Beauv.

JDC 4808, Alt: 758m, site: River Nwum F.R., (26/03/77), form: T, Habitat: River bank in forest.

JDC 4810, Alt: 758m, site: River Nwum F.R., (26/03/77), form: T, Habitat: River bank in forest.

JDC 5165, Alt: 1364m, site: Akwaizantar, (29/01/78), form: T, Habitat: Forest. Notes: Fruit Only. Fruit collected in spirit. See F.T.W.A. 3:1 (170-171).

Peal No.?, Alt: 229m, site: Bissaula River F.R., form: T, Habitat: Forest.

JDC SR, Alt: n/a, site: Gashaka, form: T, Habitat: On route from Gashaka to CH.

JDC SR, Alt: 229m, site: River Amboi F.R., form: T, Habitat: Tall secondary forest.

JDC SR, Alt: n/a, site: Western escarpment of Mambilla, freq: f, form: T, Habitat: Forest. Notes: Streams at the foot of the escarpment.

JDC SR, Alt: 229m, site: Baissa, form: T.

Poaceae

Andropogon gayanus Kunth var. *polycladus* (Hack.)

Clayton

L.& D. (FHI) 18774, Alt: n/a, site: Gangumi, form: H, Habitat: Savanna. Notes: Tufted perennial up to 3m high.

Andropogon cf schirensis A. Rich.

JDC 3387, Alt: 2121m, site: Gangirwal upland grassland, (2/11/74), form: H.

Arundinella pumila (Hochst. ex A. Rich.) Steud.

JDC 3368, Alt: 1970m, site: Gangirwal upland grassland, (2/11/74), form: H.

JDC 4028, Alt: 1440m, site: Gangoro forest, (4/12/75), form: H, Habitat: On rocks in forest stream.

Elionurus argenteus Nees

JDC 4361, Alt: 1667m, site: CH upland grassland, (21/04/76), freq: la, form: H. Notes: Scattered distribution but dominant in one area.

Eragrostis camerunensis Clayton

JDC 4344, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: f, form: H, Habitat: Upland grassland. Notes: Persisting despite cattle pressures.

Eragrostis tenuifolia (A. Rich.) Steud.

JDC 4347, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: f, form: H, Habitat: Upland grassland. Notes: Persisting despite cattle pressures.

Helictotrichon elongatum (Hochst. ex A. Rich.) C.E. Hubb.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: o.

Hyparrhenia mutica Clayton

L.& D. (FHI) 28794, Alt: n/a, site: Gangumi F.R., form: H, Habitat: Stream banks. Notes: 1.5 - 2.5m tall. Coarse grass in swampy ground.

Hyparrhenia subplumosa Stapf

L.& D. (FHI) 18776, Alt: n/a, site: Gangumi, form: H, Habitat: Savanna. Notes: 2-3m tall. Perennial.

Imperata cylindrica (L.) Raeusch.

JDC 5207, Alt: 1212m, site: Akwaizantar grassland, (4/02/78), freq: lf, form: H, Habitat: Forest.

Leptaspis cf zeylandica Nees ex Steud.

JDC 3127, Alt: 455m, site: Western escarpment of Mambilla, (4/05/73), form: H, Habitat: Fringing forest. Notes: Batu Kamino to Buru Kassa.

JDC 3776, Alt: 1061m, site: River Nwum F.R., (29/03/75), freq: f/la, form: H, Habitat: Forest.

JDC 4266, Alt: 1440m, site: Gangoro forest, (9/03/76), freq: a, form: H, Habitat: Forest. Notes: Flowers April.

JDC 4603, Alt: 1515m, site: Ngel Nyaki, (11/08/76), freq: la, form: H, Habitat: Submontane forest. Notes: Sterile.

Loudetia simplex (Nees) C.E. Hubb.

JDC 4453, Alt: 1667m, site: CH upland grassland, (7/05/76), freq: la, form: H, Habitat: Dominant where buffalo graze, sporadic elsewhere.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: d, form: H, Habitat: Late phase grass.

Olyra latifolia L.

JDC 2959, Alt: 1212m, site: Antere F.R., (7/07/72), freq: f/la, form: H, Habitat: Forest and fringing forest.

JDC 3792, Alt: 909m, site: River Nwum F.R., (2/04/75), freq: f/la, form: H, Habitat: Forest and fringing forest.

JDC 3973, Alt: 1440m, site: Gangoro forest, (1/12/75), form: H, Habitat: Forest.

JDC 5168, Alt: 1364m, site: Akwaizantar, (31/01/78), freq: f, form: H, Habitat: Forest. Notes: Cane-like grass up to 3m (10ft.) high.

JDC 5388, Alt: 242m, site: River Amboi F.R., (19/04/78), form: H, Habitat: Tall secondary forest.

JDC SR, Alt: c.305m, site: Western escarpment of Mambilla, freq: o, form: H, Habitat: Fringing forest. Notes: Sabon Gida to Gidan Bature.

Oplismenus birtellus (L.) P. Beauv.

JDC 3307, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: f, form: H, Habitat: Light canopy.

JDC 3445, Alt: 1970m, site: Gangirwal, (7/11/74), form: H.

JDC 3884, Alt: 606m, site: River Nwum F.R., (20/04/75), freq: f/la, form: H, Habitat: Forest margin. Notes: Creeping grass. Near edge of canopy where it is more open.

JDC 3974, Alt: 1440m, site: Gangoro forest, (1/12/75), form: H, Habitat: Forest.

JDC SR, Alt: 853-1067m & 1143m, site: Akwaizantar, freq: f, form: H, Habitat: Forest. Notes: Low straggling grass under light shade.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: H.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: f, form: H, Habitat: Where canopy is open.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: H.

Oxytenanthera abyssinica (A. Rich.) Munro

JDC 4787, Alt: 1364m, site: VP woodland, (27/02/77), form: SHH, Habitat: Fringe of gallery forest. Notes: A bamboo. Below Hepper's Camp.

Panicum ecklonii Nees

JDC 5204, Alt: 1212m, site: Akwaizantar grassland, (4/02/78), form: H, Habitat: Forest.

Paspalum scrobiculatum L.

JDC 4450, Alt: 1667m, site: CH upland grassland, (6/05/76), form: H. Notes: Also on Cabbal Tale.

Pennisetum clandestinum Chiov.

JDC SR, Alt: 2134 - 2286 m, site: Gangirwal upland grassland, freq: f, form: H, Habitat: At old ruga sites. Notes: Scattered patches.

JDC SR, Alt: n/a, site: CH upland grassland, freq: la, form: H. Notes: Introduced from Bamenda by the Veterinary Dept. planted by the Fulani at their rugas. Forms a dense sward.

Pennisetum macrourum Trin.

L.& D. (FHI) 18762, Alt: n/a, site: Gangumi F.R., form: SH, Habitat: Stream banks. Notes: Up to 5m tall. Stout perennial. On streambank nr. Kwagiri, Gangumi F.R.

Rhytachne rottboellioides Desv.

JDC 4348, Alt: 1667m, site: CH upland grassland, (18/04/76), freq: o/lf, form: H, Habitat: Upland grassland. Notes: Not common except where cattle do not graze.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: o/lf, form: H.

Setaria megaphylla (Steud.) T. Durand & Schinz

JDC SR, Alt: n/a, site: CH upland forest, freq: la, form: H, Habitat: Prominent at Selbe on abandoned farms.

JDC SR, Alt: n/a, site: Ngel Nyaki, freq: la, form: H.

Setaria sphacelata (Schumach.) Stapf & C.E. Hubb. ex Chipp var. *aurea* (A.Br.) Clayton

JDC 4338, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: f, form: H, Habitat: Grazed grassland.

Setaria sp.

JDC 4033, Alt: 1440m, site: Gangoro forest, (4/12/75), form: H, Habitat: Beside path in forest. Notes: (?= *S. chevalieri*)

Sporobolus africanus (Poir.) Robyns & Tournay

JDC 4343, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: o, form: H, Habitat: Upland grassland. Notes: Absent where only buffalo graze. Rarely seen in this grassland, although there are a few areas of approx. 1/4 acre where it is abundant.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: f/l, form: H, Habitat: Above the col and on the south-west slopes where cattle graze.

Sporobolus natalensis (Steud.) T. Durand & Schinz

JDC 4456, Alt: 1667m, site: CH upland grassland, (8/05/76), freq: o, form: H.

Sporobolus subulatus Hack.

JDC SR, Alt: n/a, site: Gangirwal upland grassland, freq: w/f, form: H.

Streptogyna crinita P. Beauv.

L.& D. (FHI) 18770, Alt: n/a, site: Gangumi F.R., form: H, Habitat: Stream banks. Notes: Broad-leaved perennial forest grass 0.3 - 1.7m (1-5½ ft) tall. Collected in Gangumi F./Reserve near Kwagiri.

Yet to be identified

JDC 3559, Alt: 2121m, site: Gangirwal upland grassland, (22/11/74).

JDC 3698, Alt: 2121m, site: Gangirwal upland grassland, (9/02/75).

Smilacaceae

Smilax anceps Willd.

L.& D. (FHI) 28745, Alt: n/a, site: Wurkam River F.R., freq: lf, form: WC, Habitat: Stream banks. Notes: Common in secondary growth and forest margins.

JDC 3897, Alt: 606m, site: River Nwum F.R., (21/04/75), form: SH, Habitat: Forest margin, gaps and secondary thicket. Notes: Scrambling shrub.

JDC 4010, Alt: 1440m, site: Gangoro forest, (3/12/75), form: WC, Habitat: Forest margin. Notes: Scandent shrub, the stem prickly.

JDC 4391, Alt: 1667m, site: CH upland forest, (26/04/76), freq: o, form: WC, Habitat: Margins of stream fringing forest. Notes: Extremely thorny.

JDC SR, Alt: 606m, site: River Nwum F.R., freq: a, form: T, Habitat: In forest regrowth.

Xyridaceae

Xyris sp.

POTENTIAL RED DATA LISTING?

JDC 3560, Alt: 2121m, site: Gangirwal upland grassland, (22/11/74), freq: o, Habitat: On the upper slopes, also in shallow depressions on rock outcrops.

Zingiberaceae

Aframomum angustifolium (Sonn.) K. Schum.

JDC 4176, Alt: 1440m, site: Gangoro forest, (16/02/76), form: H.

JDC 4334, Alt: 1667m, site: CH upland forest, (18/04/76), freq: a, form: SHH, Habitat: Submontane forest. Notes: Fruiting. Often occurs in pure stands at the edge of stream fringing forests and for some distance inside submontane hillside forest.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: H.

Aframomum daniellii (Hook.f.) K. Schum.

JDC 5419, Alt: 242m, site: River Amboi F.R., (24/04/78), form: H, Habitat: Transition woodland/Young secondary forest.

Aframomum limbatum (Oliv. & Hanb.) K. Schum.

JDC 5359, Alt: 242m, site: River Amboi F.R., (15/04/78), form: H, Habitat: Tall secondary forest.

Aframomum melegueta K. Schum.

JDC 4265, Alt: 1440m, site: Gangoro forest, (9/03/76), form: H, Habitat: Forest. Notes: Not flowering or fruiting. Flowers April?.

Aframomum sp.

JDC 3790, Alt: 909m, site: River Nwum F.R., (2/04/75), freq: f/la, form: H, Habitat: Forest.

JDC 4826, Alt: 758m, site: River Nwum F.R., (29/03/77), freq: f/la, form: H, Habitat: Forest towards the margin, and in secondary forest.

JDC 5265, Alt: 985m, site: Akwaizantar, (17/02/78), freq: la, form: H, Habitat: Forest. Notes: = JDC 3790 & 4826, River Nwum F.R.

Siphonochilus nigericus (Hepper) B. L. Burtt

JDC 4831, Alt: 758m, site: River Nwum F.R., (2/04/77), form: H, Habitat: In wooded grassland. Notes: New name for *Kaempferia nigerica*.

JDC SR, Alt: To c.914-1067m, site: CH escarp & fringing forest, form: H.

GYMNOSPERMAE

PINOPSIDA

Podocarpaceae

Podocarpus latifolius (Thunb.) R.Br. ex Mirb.

FNH SR, Alt: n/a, site: VP amphitheatre, form: T.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, freq: r, form: T.

Notes: One seedling but see Profile 4.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: T.

PTERIDOPHYTA

LYCOPSIDA

Lycopodiaceae

Lycopodium brachystachys (Baker) Alston

JDC 2939, Alt: 1667m, site: River Nwum F.R., (6/07/72), form: FA, Habitat: Fringing forest. Notes: Epiphyte.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: r, form: FA.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F.

Lycopodium clavatum L.

JDC 3711, Alt: 2273m, site: Gangirwal, (10/02/75), Habitat: In damp hollow.

Lycopodium mildbraedii Hert.

JDC 3704, Alt: 2121m, site: Gangirwal, (9/02/75), form: Br.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: E.

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: E.

JDC SR, Alt: n/a, site: Ngel Nyaki, freq: r, form: FA.

Selaginellaceae

Selaginella cf tenerrima A. Br. ex Kuhn

JDC 3131, Alt: 606m, site: Western escarpment of Mambilla, (8/05/73), freq: la, form: FA, Habitat: Forest. Notes: Forest floor by stream, Gidan Bature to Batu Amandu.

JDC 4517, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: la, form: FA.

Selaginella versicolor Spring

JDC 2967, Alt: 840m, site: River Nwum F.R., (9/07/72), freq: la, form: FA. Notes: Covering boulders above the level of the water in a shady forest stream bed.

PTERIDOPHYTA

FILICOPSIDA

Adiantaceae

Adiantum philippense L.

JDC 2941, Alt: 840m, site: River Nwum F.R., (6/07/72), freq: la, form: F. Notes: Steep banks in fringing forest; common also on the walls of old buffalo pits within the forest

JDC 3810, Alt: 909m, site: River Nwum F.R., (5/04/75), freq: la, form: F. Habitat: Steep banks in fringing forest; common also on the walls of old buffalo pits within the forest.

JDC 5410, Alt: 242m, site: River Amboi F.R., (22/04/78), form: H, Habitat: Transition woodland/Young secondary forest.

Adiantum poiretii L.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F.

Cheilanthes inaequalis (Kunze) Mett. var. *inaequalis*

JDC 4355, Alt: 1667m, site: CH upland grassland, (20/04/76), freq: r, form: F, Habitat: Crevices - low basaltic rock outcrop. Notes: Unusual little fern, on basaltic rock outcrops in upland grassland.

Aspleniaceae

Asplenium aethiopicum (Burm. f.) Bech.

JDC 4335, Alt: 1667m, site: CH upland forest, (18/04/76), freq: f, form: EF, Habitat: Forest.

JDC 4534, Alt: 1515m, site: Ngel Nyaki, (1/08/76), freq: a, form: EF, Habitat: Forest margin. Notes: Collected where the path through the forest emerges onto the grass/tree ridge.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: f, form: EF, Habitat: Tree trunks and branches.

Asplenium dregeanum Kunze

JDC 3980, Alt: 1440m, site: Gangoro forest, (1/12/75), form: F, Habitat: Epiphyte on rocks in shade.

JDC 4362, Alt: 1667m, site: CH upland forest, (21/04/76), freq: fl/a, form: EF, Habitat: On tree trunks, lianes and rocks.

JDC 4520, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: a, form: EF.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, form: EF.

Asplenium emarginatum Kunze

JDC 5378, Alt: 242m, site: River Amboi F.R., (18/04/78), form: F, Habitat: Tall secondary forest. Notes: Terrestrial fern.

Asplenium formosum Willd.

JDC 2964, Alt: 1212m, site: Antere, (9/07/72), freq: o, form: F, Habitat: By stream in forest. Notes: Terrestrial.

Asplenium geppii Carruth.

JDC 4587, Alt: 1515m, site: Ngel Nyaki, (7/08/76), freq: o, form: EF, Habitat: Submontane forest. Notes: Widespread in forest, but not as common as many of the other ferns.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: r, form: EF, Habitat: On the branches of trees.

Asplenium inaequilaterale Willd.

JDC 3981, Alt: 1440m, site: Gangoro forest, (1/12/75), form: F, Habitat: Epiphyte on damp rock face by stream in forest.

Asplenium preussii Hieron ex Brause

JDC 3300, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: a, form: F

JDC 3982, Alt: 1440m, site: Gangoro forest, (1/12/75), form: F, Habitat: Epiphyte on damp rock face by stream in forest.

JDC 4474, Alt: 1667m, site: CH upland forest, (13/05/76), freq: f, form: F, Habitat: On rocks and fallen trees. Notes: Cabbal Toli.

JDC 4521, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: a, form: F

JDC 4537, Alt: 1515m, site: Ngel Nyaki, (1/08/76), freq: lf, form: F, Habitat: Along paths, by streams, in windfall gaps.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: lf, form: F, Habitat: Damp ground.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F

Asplenium quintasii Gandoger

JDC 4363, Alt: 1667m, site: CH upland forest, (21/04/76), freq: o, form: F, Habitat: On stream banks in deep shade.

Asplenium theciferum (Kunth) Mett.

JDC 4398, Alt: 1667m, site: CH upland forest, (27/04/76), freq: f, form: EF, Habitat: High in the crowns of forest trees, also on small trees in grassland adjoining forest.

JDC 4537, Alt: 1515m, site: Ngel Nyaki, (2/08/76), freq: f, form: EF

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: f/la, form: EF, Habitat: On tree trunks and branches.

Asplenium unilaterale Lam.

JDC 2951, Alt: 840m, site: River Nwum F.R., (7/07/72), freq: o, form: F, Habitat: By stream in forest. Notes: Terrestrial.

JDC 3286, Alt: 1515m, site: River Nwum F.R., (27/10/73), form: F, Habitat: By stream in forest. Notes: Terrestrial.

Cyatheaceae

Cyathea dregei Kunze

JDC 4287, Alt: 1440m, site: Gangoro forest, (15/03/76), form: F, Habitat: Forest stream. Notes: Linedi Burmey on walk out from Gangoro.

JDC 4403, Alt: 1667m, site: CH upland grassland, (27/04/76), freq: o, form: F, Habitat: By streams in grassland but more common in fringing forest. Notes: Up to 6m tall.

Cyathea manniana Hook.

JDC 4422, Alt: 1667m, site: CH upland forest, (30/04/76), form: F, Habitat: In swampy ground by streams in fringing forest at several scattered localities.

JDC 4610, Alt: 1515m, site: Ngel Nyaki, (12/08/76), freq: r, form: F, Habitat: Submontane forest. Notes: One of a few plants at the edge of a wet, sedgy hollow deep inside Ngel Nyaki.

Dennstaedtiaceae

Pteridium aquilinum (L.) Kuhn

JDC 4055, Alt: 1440m, site: Gangoro forest, (7/12/75), form: F, Habitat: Forest margin.

JDC 4770, Alt: 1667m, site: VP amphitheatre, (26/02/77), freq: o, form: H, Habitat: Occasional along the edge of stream fringing forest. Also in open grassland just below the main summit. Notes: May reach a height

JDC 4839, Alt: 758m, site: River Nwum F.R., (3/04/77), freq: f, form: F, Habitat: Margin of stream fringing forest. Notes: Bracken Fern. Cosmopolitan but divisible into several subspecies; the West African form is similar to that of Western Europe (F.W.T.A. ed. 2, 1959).

JDC SR, Alt: n/a, site: CH upland forest, freq: la, form: F, Habitat: Forest margins. Notes: Fulfulde name: Agugu.

JDC SR, Alt: n/a, site: Gangirwal forest grassland ecotone, form: H.

Dipteridaceae

Phymatodes scolopendria (Burm.) Ching

JDC 3141, Alt: 758m, site: Western escarpment of Mambilla, (9/05/73), form: F, Habitat: Fringing forest. Notes: Upstream from Batu Amanda.

Dryopteridaceae

Ctenitis cirrhosa (Schum.) Ching

JDC 4590, Alt: 1515m, site: Ngel Nyaki, (7/08/76), freq: f, form: F, Habitat: Submontane forest. Notes: Collected in a damp gully.

Diplazium proliferum (Lam.) Kaulf.

JDC 2946, Alt: 840m, site: River Nwum F.R., (7/07/72), form: F, Habitat: By stream in forest. Notes: Terrestrial.

JDC 3926, Alt: 530m, site: River Nwum F.R., (28/04/75), form: F, Habitat: Stream bank forest. Notes: Terrestrial.

Dryopteris athamantica Kuntze

JDC 4425, Alt: 1667m, site: CH upland forest, (1/05/76), freq: o, form: F, Habitat: On the grassland edge of thicket bordering forest.

Dryopteris discolor (Langsd. & Fisch.) Kuhn cf. var. *kirkii*

JDC 4411, Alt: 1667m, site: CH upland forest, (28/04/76), freq: o, form: F, Habitat: Forest. Notes: Terrestrial.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F.

Dryopteris kirkii (Hook.) Alston

JDC 3988, Alt: 1440m, site: Gangoro forest, (1/12/75), form: F, Habitat: Forest. Notes: Terrestrial.

Tectaria fernandensis (Baker) C. Chr.

JDC 3298, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: a, form: F.

JDC 3813, Alt: 909m, site: River Nwum F.R., (6/04/75), freq: a, form: F. Notes: Terrestrial in forest.

JDC 4021, Alt: 1440m, site: Gangoro forest, (4/12/75), form: F, Habitat: Forest. Notes: Terrestrial.

JDC 4364, Alt: 1667m, site: CH upland forest, (21/04/76), freq: f, form: F. Notes: Terrestrial.

JDC 4588, Alt: 1515m, site: Ngel Nyaki, (7/08/76), freq: a, form: F, Habitat: Submontane forest.

JDC SR, Alt: 762m, site: Akwaizantar, freq: o, form: F, Habitat: Forest.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: f, form: F.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F.

Gleicheniaceae

Gleichenia linearis (Burm.) C.B. Clarke

JDC 3714, Alt: 2273m, site: Gangirwal upland grassland, (10/02/75).

Hymenophyllaceae

Trichomanes chevalieri Chr.

JDC 4885, Alt: 758m, site: River Nwum F.R., (10/04/77), freq: la, form: F, Habitat: Draping tree trunks in forest. Notes: To a height of 2m.

Trichomanes mannii (Hook.) Copel.

JDC 4384, Alt: 1667m, site: CH upland forest, (24/04/76), freq: la, form: EF, Habitat: On tree trunks.

JDC 4591, Alt: 1515m, site: Ngel Nyaki, (7/08/76), freq: la, form: EF, Habitat: Submontane forest. Notes: On tree trunks.

Trichomanes melanotrichum Schltdl.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: o, form: EF, Habitat: On tree trunks. Notes: Up to c. 90cm from the ground.

Trichomanes pyxidiferum L. var. *melanotrichum*

(Schlechtend) Schelpe

JDC 4377, Alt: 1667m, site: CH upland forest, (23/04/76), freq: la, form: EF, Habitat: On tree trunks. Notes: Often with moss and liverworts.

Trichomanes sp.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: E.

Lomariopsidaceae

Bolbitis acrostichoides (Afzel. ex Sw.) Ching

FNH 1476, Alt: n/a, site: VP fringing forest, form: F, Habitat: Riverine forest. Notes: At the foot of Vogel Peak.

FNH 1496, Alt: n/a, site: VP amphitheatre, form: F, Habitat: Riverine forest. Notes: Towards the summit of Vogel Peak. (Also, Hepper 1476, at the foot of the massif).

JDC 3812, Alt: 909m, site: River Nwum F.R., (6/04/75), form: F, Habitat: Forest. Notes: Terrestrial.

JDC 3975, Alt: 1440m, site: Gangoro forest, (1/12/75), form: F.

JDC 5185, Alt: 1061m, site: Akwaizantar, (2/02/78), freq: lf, form: F, Habitat: Forest. Notes: Gemmae present, borne at the apex of the frond.

JDC 5341, Alt: 242m, site: River Amboi F.R., (13/04/78), form: F, Habitat: Tall secondary forest. Notes: Terrestrial or epiphytic fern up to 1m from the ground.

Bolbitis heudelotii (Bory ex Fée) Alston

JDC 4110, Alt: 1364m, site: Gangoro forest, (6/02/76), form: F, Habitat: Forest stream - beside the water and intermittently submerged.

JDC 4111, Alt: 1364m, site: Gangoro forest, (6/02/76), form: F, Habitat: Forest stream - beside the water and intermittently submerged.

JDC 4229, Alt: 1440m, site: Gangoro forest, (29/02/76), form: F, Habitat: Forest stream - beside the water and intermittently submerged.

Bolbitis sp.

JDC 3301, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: la, form: F.

JDC 3547, Alt: 1818m, site: CW *Pouteria altissima* forest, (20/11/74), form: F.

Marattiaceae

Marattia fraxinea Sm.

FNH 1508, Alt: n/a, site: VP amphitheatre, form: F. Notes: At Hepper's Camp.

JDC 4174, Alt: 1440m, site: Gangoro forest, (15/02/76), form: F, Habitat: Forest stream.

JDC 4413, Alt: 1667m, site: CH upland forest, (29/04/76), freq: o, form: F, Habitat: On stream banks in forest close to the water.

JDC 4750, Alt: 1515m, site: VP amphitheatre, (25/02/77), form: F, Habitat: Stream fringing kurmi. Notes: Right on the stream bank, although no water runs for 3-4 months of the dry season. At Hepper's Camp.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: F, Habitat: Stream bank.

Oleandraceae

Arthropteris monocarpa (Cordem.) C. Chr.

JDC 4444, Alt: 1667m, site: CH upland forest, (6/05/76), freq: o, form: F, Habitat: Growing along a fallen tree trunk in the forest.

JDC 4596, Alt: 1515m, site: Ngel Nyaki, (9/08/76), freq: la, form: F, Habitat: Submontane forest. Notes: Climbing fern. On rocks and tree trunks in the forest.

Nephrolepis undulata (Afzel. ex Sw.) J. Sm.

JDC 4522, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: la, form: F, Habitat: Forest.

Osmundaceae

Osmunda regalis L.

JDC 3708, Alt: 2273m, site: Gangirwal, (10/02/75), form: F.

Polypodiaceae

Drynaria volkensii Hieron.

JDC 4408, Alt: 1667m, site: CH upland grassland, (28/04/76), freq: o, form: EF, Habitat: On *Combretum molle* (and in forest).

JDC 4408, Alt: 1667m, site: CH upland forest, (28/04/76), form: EF, Habitat: *Combretum* in open grassland. Notes: Large. With creeping rhizome & dimorphous fronds.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: o, form: EF, Habitat: Tree trunks where the canopy is open. Notes: On a branch 7.6 m from the ground.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: E.

Microsorium punctatum (L.) Copel.

JDC 3132, Alt: 606m, site: Western escarpment of Mambilla, (8/05/73), form: EF, Habitat: Fringing forest. Notes: On a sapling 1.5m from the ground. Gidan Bature to Batu Amandia.

Platyserium angolense Welw. ex Hook.

JDC 2763, Alt: 1515m, site: Mambilla Plateau, (19/04/72), form: EF, Notes: At Gembu.

JDC SR, Alt: 229m, site: River Amboi F.R., form: EF, Habitat: Tall secondary forest. Notes: In the crowns of tall trees but at the forest edge, less than 5m (16 ft.) from the ground on *Terminalia glaucescens*.

JDC SR, Alt: 229m, site: Baissa, form: EH. Notes: High epiphyte.

Platyserium cf elephantotis Schweinf.

JDC SR, Alt: 853-1067m & 1143m, site: Akwaizantar, form: EF, Habitat: Forest. Notes: High epiphyte. Conspicuous when trees are leafless. Exceptionally only 2-3m from the ground on small trees in wooded grassland close to forest edge.

Platyserium sp.

JDC SR, Alt: n/a, site: River Nwum F.R., freq: o/lf, form: EF, Habitat: In the crowns of tall forest trees, or on trees of the savanna woodland close to the forest margin. Notes: Presumably=JDC 2763 of Gembu, Mambilla, viz. *Platyserium angolense* Welw. ex Hook. (syn. With *P. elephantotis* Schweinf.).

Pleopeltis excavata (Bory ex Willd.) Sledge

JDC 4402, Alt: 1667m, site: CH upland forest, (27/04/76), freq: la, form: EF, Habitat: High in the crowns of forest trees, and on the boles of stream bank trees. Notes: With moss and epiphytic orchids.

Pleopeltis macrocarpa (Bory ex Willd.) Kaulf.

JDC 4400, Alt: 1667m, site: CH upland forest, (27/04/76), freq: f, form: EF, Habitat: On the branches of forest trees, also on small trees in grassland adjoining the forest.

Pyrrosia schimperiana Hieron

JDC 3878, Alt: 606m, site: River Nwum F.R., (16/04/75), form: EF, Habitat: Forest. Notes: Small. Growing high up in the crown of a tall forest tree.

Pteridaceae

Pteris acanthoneura Alston

JDC 3784, Alt: 1061m, site: River Nwum F.R., (31/03/75), form: F, Habitat: Rocky stream bank in fringing forest.

Pteris hamulosa H. Christ

JDC 5364, Alt: 242m, site: River Amboi F.R., (16/04/78), form: H, Habitat: Tall secondary forest. Notes: Terrestrial.

Pteris pteridioides (Hook.f.) Ballard

JDC 3302, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: o, form: F.

JDC 4365, Alt: 1667m, site: CH upland forest, (21/04/76), freq: f, form: F, Notes: Terrestrial.

JDC 4457, Alt: 1667m, site: CH Shirgu, (8/05/76), form: F.

JDC 4554, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: o, form: F, Habitat: Submontane forest. Notes: At enumeration plot.

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: F, Habitat: Damp ground.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: o, form: F, Habitat: Damp ground.

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F.

Pteris togoensis Hieron.

JDC 3297, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: a, form: F.

JDC 3891, Alt: 606m, site: River Nwum F.R., (20/04/75), form: F, Habitat: Forest. Notes: Terrestrial. Widespread, but seen only occasionally.

JDC 4024, Alt: 1440m, site: Gangoro forest, (4/12/75), form: F, Habitat: Forest. Notes: Terrestrial.

JDC 4388, Alt: 1667m, site: CH upland forest, (26/04/76), freq: f, form: F, Notes: Terrestrial.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: f, form: F

JDC SR, Alt: 1829m, site: CW *Pouteria altissima* forest, form: F

JDC SR, Alt: n/a, site: Gangirwal *P.S.P.* forest, form: F

JDC SR, Alt: n/a, site: Gangirwal *Syzigium* streamside forest, form: F

Thelypteridaceae

Amauropelta bergiana (Schltdl.) Holtt var. *bergiana*

JDC 4385, Alt: 1667m, site: CH upland forest, (24/04/76), freq: o, form: F, Habitat: In open forest on swampy ground. Notes: Terrestrial.

Christella pseudogueintziana (Bonap.) Alston

JDC 3783, Alt: 1061m, site: River Nwum F.R., (30/03/75), freq: r, form: F, Habitat: Rocky banks in fringing forest.

JDC 3983, Alt: 1440m, site: Gangoro forest, (1/12/75), form: F

JDC 4232, Alt: 1440m, site: Gangoro forest, (29/07/76), freq: lf, form: F

Habitat: Forest. Notes: On moss covered boulders.

Pneumatopteris afra (C. Chr.) Holtt.

JDC 5178, Alt: 1212m, site: Akwaizantar, (1/02/78), freq: lf, form: F

Habitat: Forest. Notes: In light shade towards forest edge.

Pseudocyclosorus pulcher (Bory ex Willd.) Sledge

JDC 4458, Alt: 1667m, site: CH Shirgu, (8/05/76), freq: r, form: F, Habitat: Close to shady stream. Notes: Terrestrial.

Vittariaceae

Antrophyum mannianum Hook.

JDC 5237, Alt: 1061m, site: Akwaizantar, (9/02/78), freq: o, form: EF, Habitat: Forest. Notes: (= 5209, River Amboi Forest Reserve). Epiphyte 2m from the ground, several together.

JDC 5409, Alt: 242m, site: River Amboi F.R., (22/04/78), form: EF, Habitat: Tall secondary forest. Notes: 2.5m from the ground on oil palms at the enumeration plot. (Uncommon = 5237, Akwaizantar).

Vittaria guineensis Desv. var. *camerooniana* Schelpe

JDC 4367, Alt: 1667m, site: CH upland forest, (21/04/76), freq: la, form: F, Habitat: On tree trunks and large branches. Notes: Epiphyte.

JDC 4523, Alt: 1515m, site: Ngel Nyaki, (31/07/76), freq: f, form: EF

Habitat: Tree trunks.

JDC SR, Alt: n/a, site: CW *Albizia gummifera* forest, freq: r, form: EF

Notes: 2.7m from the ground. On the (smooth) bole of *Albizia gummifera*.

BRYOPHYTA

Bryophyta

Acanthocladium trichocolea (C. Muell.) Broth.

JDC 4604, Alt: 1515m, site: Ngel Nyaki, (11/08/76), freq: a, form: Br, Habitat: Submontane forest. Notes: Fruiting. Carpeting a big tree stump 1m above the ground.

Acanthocladium cf trichocolea (C. Muell.) Broth.

JDC 4511, Alt: 1515m, site: Ngel Nyaki, (30/07/76), freq: a, form: Br.

Floribundularia vaginans (Broth.) Welw. & Duby

JDC 4379, Alt: 1667m, site: CH upland forest, (24/04/76), freq: o, form: Br, Habitat: Draping the leaning stem of a small tree in forest subject to heavy mist. Notes: Vivid green, luxuriant.

Groutiella sarcotricha (Broth.) Wijk & Marg.

JDC 5425, Alt: 242m, site: Baissa, (30/04/78), form: Br.

Pilotrichella latiramea C. Muell. ex Dus.

JDC 3913, Alt: 606m, site: River Nwum F.R., (25/04/75), freq: la, form: Br, Habitat: High forest. Notes: By streams. Covering stems and branches of small trees, shrubs and climbers.

Pilotrichella pentasticha (Brid.) Wijk & Marg.

JDC 4358, Alt: 1667m, site: CH upland forest, (20/04/76), freq: la, form: Br, Habitat: Submontane forest. Notes: Draping branches and woody climbers in forest where misty conditions are common.

Pilotrichella sp.

JDC 3446, Alt: 1970m, site: Gangirwal P.S.P forest, (7/11/74), form: Br.

LICHENES

Lichenes

Heterodermia leucomela subsp. *boryi* (Fée) Swinscow

& Krog et. P.W. James

JDC 4404, Alt: 1667m, site: CH upland forest, (27/04/76), freq: la, form: L, Habitat: Along horizontal branches in the crowns of stream-bank trees.

Notes: With *Usnea pulvinulata*.

JDC 4573, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: f, form: L, Habitat: Submontane forest. Notes: Common, but not as abundant as some other lichens. Where the path enters the forest.

Parmelia andina Müll. Arg.

JDC 4317, Alt: 1364m, site: CH upland forest, (17/04/76), freq: la, form: L, Habitat: Stream bank forest. Notes: Abundant along branches of forest

& streamside trees.

Parmelia eunita Müll. Arg.

JDC SR, Alt: n/a, site: Gangirwal *Syzygium* streamside forest, freq: a, form: L.

Usnea articulata (L.) Hoffm.

HMC 131, Alt: 1667m, site: Ngel Nyaki, (17/08/73), form: L.

JDC 4769, Alt: 1667m, site: VP amphitheatre, (26/02/77), form: L, Habitat: In the crowns of streambank trees.

JDC SR, Alt: n/a, site: Gangirwal *Syzygium* streamside forest, freq: a, form: L.

Usnea jigas Motkya

JDC 4562, Alt: 1515m, site: Ngel Nyaki, (3/08/76), freq: a, form: L, Habitat: Submontane forest. Notes: Pendant lichen up to 1m long. Found on the upper branches of the tall forest trees, and along the upper edge of

Usnea pulvinulata Dodge

JDC 4320, Alt: 1364m, site: CH upland forest, (17/04/76), freq: f, form: L, Habitat: Submontane forest. Notes: Outermost branches of the crowns of forest trees, on bushes, or sometimes even on rock.

Usnea submollis Steiner

JDC 4575, Alt: 1515m, site: Ngel Nyaki, (4/08/76), freq: f, form: L, Habitat: Forest margin. Notes: Collected where the path enters the forest.

JDC 4771, Alt: 1667m, site: VP amphitheatre, (26/02/77), form: L. Notes: Common along the branches of streamside trees just below the main summit of Vogel Peak.

JDC SR, Alt: n/a, site: Gangirwal *Syzygium* streamside forest, freq: a, form: L.

Usnea trichodeoides Vainio

JDC 4038, Alt: 1440m, site: Gangoro forest, (5/12/75), form: L, Habitat: Festooning the upper branches of streambank trees.

JDC 4419, Alt: 1667m, site: CH upland forest, (30/04/76), form: L, Habitat: Festooning the crowns of trees where mist is specially frequent.

YET TO BE IDENTIFIED

- HMC 205, Alt: 1515m, site: Ngel Nyaki, (1/08/76), form: EH, Habitat: Amongst moss and epiphytic ferns on small trees in a forest glade. Notes: Epiphytic orchid with greenish cream flowers on a long, pendent
- JDC 2997, Alt: 1212m, site: River Nwum F.R., (26/12/72), form: T, Habitat: River bank below Antere School. Notes: Fruits sent to F.H.O. 12.7 x 8.9cm (5 x 3.5in) 'pomegranate' structure, with sticky seeds.
- JDC 2999, Alt: 1212m, site: River Nwum F.R., (26/12/72), form: T, Habitat: Forest. Notes: One fruit in spirit to F.H.O. 6.4 x 3.8cm (2.5 x 1.5in) containing a yellowish pulp.
- JDC 3001, Alt: 1212m, site: River Nwum F.R., (26/12/72), form: T, Habitat: Forest. Notes: Fruits sent to F.H.O. Fruits wing-shaped, with winged seeds.
- JDC 3109, Alt: 606m, site: Western escarpment of Mambilla, (3/05/73), form: SH, Habitat: Forest. Notes: Semi-scandent shrub: handsome red flowers with orange centre. Zongo Mata village.
- JDC 3114, Alt: 303m, site: Western escarpment of Mambilla, (5/05/73), form: T, Habitat: Forest. Notes: Small tree in a compound at Sabon Gida.
- JDC 3118, Alt: 455m, site: Western escarpment of Mambilla, (4/05/73), form: T, Habitat: Secondary Forest. Notes: 7.6m tall.
- JDC 3124, Alt: 606m, site: Western escarpment of Mambilla, (4/05/73), form: SH, Habitat: Fringing forest. Notes: Climbing shrub. Batu Kamino to Buru Kassa.
- JDC 3140, Alt: 758m, site: Western escarpment of Mambilla, (9/05/73), form: T, Habitat: Fringing forest. Notes: 7.6m tall. Upstream from Batu Amanda.
- JDC 3288, Alt: 1515m, site: Ngel Nyaki, (8/11/73), form: H, Habitat: Forest margin. Notes: ?Acanthaceae
- JDC 3293, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: la, form: H, Habitat: Forest. Notes: ?Acanthaceae
- JDC 3294, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: f, form: H, Habitat: Forest. Notes: ?Acanthaceae
- JDC 3295, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: o, form: H, Habitat: light canopy.
- JDC 3296, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: f, form: SH. Notes: At profile strip.
- JDC 3306, Alt: 1515m, site: Ngel Nyaki, (8/11/73), form: H, Habitat: Forest margin. Notes: ?Acanthaceae
- JDC 3309, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: la, form: H, Habitat: Forest. Notes: ?Acanthaceae
- JDC 3314, Alt: 1515m, site: Ngel Nyaki, (8/11/73), freq: la, form: H, Habitat: Forest. Notes: ?Acanthaceae
- JDC 3316, Alt: 1515m, site: Ngel Nyaki, (8/11/73), form: T.
- JDC 3323, Alt: 1515m, site: Ngel Nyaki, (9/11/73), form: T. Notes: Sterile material gathered. Tree 15 on the profile strip?.
- JDC 3339, Alt: 1515m, site: Ngel Nyaki, (11/11/73), form: T.
- JDC 3342, Alt: 1515m, site: Ngel Nyaki, (12/11/73), form: T.
- JDC 3470, Alt: 1970m, site: CW *Albizia gummifera* forest, (9/11/74), form: T.
- JDC 3483, Alt: 1970m, site: CW *Albizia gummifera* forest, (11/11/74), form: T.
- JDC 3502, Alt: 1829m, site: CW *Albizia gummifera* forest, (13/11/74), freq: f, form: Br, Habitat: stems of small trees and lianes.
- JDC 3539, Alt: 1818m, site: CW *Pouteria altissima* forest, (19/11/74), form: LIAN. Notes: Fruits collected.
- JDC 3582, Alt: 1818m, site: CW *Pouteria altissima* forest, (25/11/74), form: LIAN. Notes: Fruits collected.
- JDC 3695, Alt: 2121m, site: Gangirwal *Syzigium* streamside forest, (8/02/75), form: T/SH.
- JDC 3700, Alt: 2121m, site: Gangirwal *P.S.P.* forest, (9/02/75), form: T.
- JDC 3721, Alt: 2121m, site: Gangirwal upland grassland, (12/02/75). Notes: Flowering. Fleshy root, white flowers
- JDC 3723, Alt: 2121m, site: Gangirwal *Syzigium* streamside forest, (15/02/75), form: H. Notes: Robust perennial.
- JDC 3728, Alt: 2273m, site: Gangirwal *P.S.P.* forest, (19/02/75), form: T.
- JDC 3802, Alt: 758m, site: River Nwum F.R., (3/04/75), form: T, Habitat: Stream bank forest. Notes: Fruits in spirit. 21m tall.
- JDC 3823, Alt: 758m, site: River Nwum F.R., (7/04/75), form: WC, Habitat: Forest and secondary forest. Notes: Flowers collected.
- JDC 3833, Alt: 758m, site: River Nwum F.R., (8/04/75), freq: f, form: T, Habitat: Forest. Notes: Tree 6 profile strip 2. (also, ?= trees 8, 18 and 37 profile strip 1). Sterile gathering. Leaves cordate, 45 x 30cm.
- JDC 3843, Alt: 758m, site: River Nwum F.R., (10/04/75), form: T, Habitat: Forest. Notes: 18m tall. Tree 14 on profile strip 2. sterile gathering. Orange-yellow exudation from slash.
- JDC 3875, Alt: 758m, site: River Nwum F.R., (16/04/75), form: T, Habitat: Forest. Notes: Ripe fruits red, collected in spirit. 7.6m tall understory tree. Compound leaves.
- JDC 3877, Alt: n/a, site: River Nwum F.R., (16/04/75), form: WC, Habitat: Forest. Notes: Opposite leaves, copious white latex; immature fruits collected.
- JDC 3898, Alt: 606m, site: River Nwum F.R., (22/04/75), form: T.
- JDC 3901, Alt: 606m, site: River Nwum F.R., (22/04/75), freq: o/lf, form: T, Habitat: Forest. Notes: Sterile. Small, low-branching, spreading tree with compound leaves. Kaka name: Mang.
- JDC 3903, Alt: 606m, site: River Nwum F.R., (23/04/75), form: WC, Habitat: Forest. Notes: Sterile. High-climbing liane, stem 10cm in diameter. Copious white latex. Large opposite leaves.
- JDC 3906, Alt: 606m, site: River Nwum F.R., (23/04/75), form: T, Habitat: Forest. Notes: Sterile gathering. Tree 28 in profile strip 1.
- JDC 3918, Alt: 606m, site: River Nwum F.R., (25/04/75), freq: f, form: WC, Habitat: Forest. Notes: Flowers (see spirit material) purple.
- JDC 3920, Alt: 606m, site: River Nwum F.R., (26/04/75), form: T, Habitat: Stream bank forest. Notes: Fruits in spirit. 21m tall. Leaves compound, the size of grapes, blue-black when ripe. (incl. 6 trees in S.P.
- JDC 4008, Alt: 1440m, site: Gangoro forest, (3/12/75), form: T, Habitat: Forest tree, also stream banks in grassland.
- JDC 4012, Alt: 1440m, site: Gangoro forest, (3/12/75), form: T, Habitat: Forest, forest margin.
- JDC 4027, Alt: 1440m, site: Gangoro forest, (4/12/75), form: Br.
- JDC 4139, Alt: 1440m, site: Gangoro forest, (10/02/76), form: T, Habitat: Forest (sample plot and elsewhere).
- JDC 4249, Alt: 1440m, site: Gangoro forest, (4/03/76), form: T, Habitat: Forest. Notes: 15m tall in S.P.
- JDC 4375, Alt: 1667m, site: CH upland forest, (23/04/76), freq: la, form: Br, Habitat: Draping tree trunks, branches and woody climbers. Notes: Includes at least one moss plus one liverwort. At BM awaiting determination by Dr. A. Harrington.
- JDC 4439, Alt: 1667m, site: CH upland forest, (5/05/76), form: Br, Habitat: 15m up on the main branches of a tree in fringing forest. Notes: Mate-

- rial at BM awaiting determination. Includes 8 or 9 liverworts and at least
- JDC 4447, Alt: 1667m, site: CH upland forest, (6/05/76), freq: f, form: Br, Habitat: Growing along the whole length of a liane, from the ground up into the crown. Notes: Material at BM awaiting determination.
- JDC 4708, Alt: 606m, site: VP fringing forest, (23/02/77), form: T. Notes: Flowering material collected, with immature fruits. 6m tall. At Jangla.
- JDC 4711, Alt: 909m, site: VP fringing forest, (24/02/77), form: T. Notes: 7.6m tall. Fruits distinctive, red to orange-red, tri-locular, hard, borne in trusses. (Spirit as well as dried material collected).
- JDC 4724, Alt: 1061m, site: VP woodland, (24/02/77), freq: f, Habitat: Open woodland. Notes: Flowering. Common above 1067m, up to the summit at 1667m. With *Syzigium* and *Lophira*.
- JDC 4729, Alt: 1212m, site: VP fringing forest, (24/02/77), form: T. Notes: Flowering & immature fruiting material collected. 4.5 m tall.
- JDC 4793, Alt: 1515m, site: VP amphitheatre, (27/02/77), freq: f, form: WC. Notes: Flowers collected. Forms dense tangles.
- JDC 4798, Alt: ?m, site: VP fringing forest, (28/02/77), form: T. Notes: Flowering specimens collected. 7.6 m tall. At Jangla.
- JDC 4812, Alt: 758m, site: River Nwum F.R., (26/03/77), form: WC, Habitat: River bank in forest. Notes: Pale yellow flowers. Climbs with tendrils.
- JDC 4816, Alt: 758m, site: River Nwum F.R., (28/03/77), form: T, Habitat: Rocky stream bank at forest margin. Notes: Fruits in spirit. Small tree. Ripe fruits red, leaves compound.
- JDC 4817, Alt: 758m, site: River Nwum F.R., (28/03/77), form: SH, Habitat: On rocky stream bank in fringing forest. Notes: Shrub 2m tall. Opposite leaves, flowers white, fragrant.
- JDC 4821, Alt: 758m, site: River Nwum F.R., (28/03/77), form: SH, Habitat: Margin of stream fringing forest. Notes: Twiggy shrub 2.5m tall. Small opposite leaves, and small white flowers.
- JDC 4835, Alt: 758m, site: River Nwum F.R., (2/04/77), freq: la, form: T, Habitat: Forest. Notes: Very small tree, rarely > 3.7m tall. Flowers white, fruits immature.
- JDC 4842, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Tree up to 1.4m in girth. Large compound leaves. 3 trees in S.P.
- JDC 4843, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: 34 trees in the sample plot; saplings and poles to large trees.
- JDC 4845, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. New leaves. 10.7m tall with fluted bole. 1 tree in S.P.
- JDC 4846, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 9m tall. Slash reddish with narrow white lines. Compound leaves. 1 tree in S.P.
- JDC 4847, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. Up to 12m tall. Bole straight, bark smooth, slash yellowish. Leaves compound, leaflets with a silvery sheen on lower surface. 3 trees in S.P.
- JDC 4849, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 12m tall. Compound leaves 1.2m (oft) long. 1 tree in S.P.
- JDC 4850, Alt: 758m, site: River Nwum F.R., (4/04/77), form: T, Habitat: Forest. Notes: Fruits 6-seeded, Immature. 15m tall. Fluted bole, forking 1.5m (5ft) from the ground, heavily branched with a wide spreading crown. Compound leaves. 2 trees in S.P.
- JDC 4855, Alt: 758m, site: River Nwum F.R., (5/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 9m tall. 1 tree in S.P.
- JDC 4857, Alt: 758m, site: River Nwum F.R., (5/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 12m tall. Slash pale red exuding minute blood-coloured droplets. 2 trees in S.P.
- JDC 4861, Alt: 758m, site: River Nwum F.R., (5/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 10m tall. Slash red. 2 trees in S.P.
- JDC 4871, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 9m tall. Bole slender, bark smooth but lower part of bole studded with single and branched thorn-like emergences. Stilt roots up to 45cm (1½ ft) from the ground. Inc. 3 trees in S.P.
- JDC 4872, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 9m tall. Opposite leaves. 1 tree in S.P.
- JDC 4873, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 9m tall. Slash pink. Opposite leaves. 1 tree in S.P.
- JDC 4877, Alt: 758m, site: River Nwum F.R., (7/04/77), form: T, Habitat: Forest. Notes: Sterile gathering. 9m tall. Leaves compound, up to 1m long. 3 trees in S.P.
- JDC 4895, Alt: 758m, site: River Nwum F.R., (12/04/77), form: T, Habitat: Forest. Notes: No flowers or fruits. Would have been quite tall tree, but broken off at 9m. Leaves collected from an epicormic branch. Wood very soft, used for xylophones. 1 tree in S.P.
- JDC 4897, Alt: 758m, site: River Nwum F.R., (12/04/77), form: T, Habitat: Forest. Notes: Small tree, 4.6-6m tall. Creamy-white, slightly fragrant flowers.
- JDC 4898, Alt: 758m, site: River Nwum F.R., (12/04/77), form: T, Habitat: Fringing forest understory. Notes: Flowers collected, with immature fruits in spirit. 7.6m tall.
- JDC 4899, Alt: 758m, site: River Nwum F.R., (13/04/77), form: T, Habitat: Forest. Notes: Fruiting material collected. 9m tall. 1 tree in S.P.
- JDC 4900, Alt: 758m, site: River Nwum F.R., (13/04/77), form: T, Habitat: Forest. Notes: Sterile collection. 15m tall. Leaves distinctive. 1 tree in S.P.
- JDC 4902, Alt: 758m, site: River Nwum F.R., (13/04/77), form: WC, Habitat: Forest. Notes: High climbing liane. Copious white latex, opposite leaves. Follicles horizontally spreading, 18cm (7in) long.
- JDC 4923, Alt: 212m, site: Gangumi F.R., (6/05/77), form: T, Habitat: Forest.
- JDC 4934, Alt: 229m, site: Gangumi, (9/05/77), freq: f, form: T, Habitat: Cultivated. Notes: Compound leaves, fruits more or less globular. 13.7m tall. Thin bark peeling in strips. Cut branchlets and leaf petioles exuding white latex. A common fence tree, grown from truncheons.
- JDC 4937, Alt: 229m, site: Gangumi F.R., (9/05/77), form: H, Habitat: Forest. Notes: Locally common monocot, with pale purple flowers; flowering stem 15 cm (6 inches) high, appearing before the leaves. Entire plant
- JDC 4949, Alt: 229m, site: Gangumi F.R., (12/05/77), form: T, Habitat: Forest.
- JDC 4953, Alt: 229m, site: Gangumi F.R., (13/05/77), form: T, Habitat: Forest.
- JDC 4955, Alt: 229m, site: Gangumi F.R., (13/05/77), form: T, Habitat: Forest.
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- JDC 4957, Alt: 229m, site: Gangumi F.R., (13/05/77), form: T, Habitat: Forest.
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- JDC 4982, Alt: 229m, site: Gangumi F.R., (19/05/77), form: T, Habitat: Forest.
- JDC 5003, Alt: 229m, site: Gangumi F.R., (23/05/77), form: T, Habitat:

- Forest. Notes: Fruits immature. 7.6m tall.
- JDC 5004, Alt: 229m, site: Gangumi F.R., (23/05/77), form: T, Habitat: Forest. Notes: Fruiting. About 12.1m tall.
- JDC 5021, Alt: 229m, site: Gangumi, (28/05/77), form: T, Habitat: Stream banks. Notes: Fruiting. About 3.6m tall understory tree or shrub. Fruits fleshy 1.3 x 1.9 cm (0.5 x 0.75 in) green streaked with brown.
- JDC 5166, Alt: 1364m, site: Akwaizantar, (31/01/78), form: T, Habitat: Forest. Notes: Sterile collection. 21m tall. Very large compound leaves - seen once on rocky stream bank.
- JDC 5177, Alt: 1212m, site: Akwaizantar, (1/02/78), freq: lf, form: F, Habitat: Forest. Notes: Under light shade near forest edge.
- JDC 5181, Alt: 909m, site: Akwaizantar, (1/02/78), form: T, Habitat: Forest. Notes: Flowering/fruitlet collection. 5m tall.
- JDC 5186, Alt: 1061m, site: Akwaizantar, (2/02/78), form: T, Habitat: Forest. Notes: Flowers collected. 6m tall. Flowers white, sweetly scented. Fruits an ingredient of Yaje (Hausa: pepper).
- JDC 5214, Alt: 1061m, site: Akwaizantar, (6/02/78), freq: o, form: T, Habitat: Forest. Notes: Sterile collection. 12m tall.
- JDC 5215, Alt: 1061m, site: Akwaizantar, (6/02/78), form: T, Habitat: Forest. Notes: Immature fruits collected. Common small understory tree. ? = 3901 of River Nwum F/R. & 5348 of River Amboi F.R.
- JDC 5216, Alt: 1061m, site: Akwaizantar, (6/02/78), freq: a, form: T, Habitat: Forest. Notes: Understory tree, 9-15m tall. ? *Millettia* sp., perhaps *M. conraui* (Harms). Fluted bole, orange slash, frequently multi-stemmed. Kaka name: Dayt.
- JDC 5223, Alt: 1061m, site: Akwaizantar, (8/02/78), freq: o, form: T, Habitat: Forest. Notes: With Fruits. Understory tree to 9m tall.
- JDC 5224, Alt: 1061m, site: Akwaizantar, (8/02/78), freq: o, form: T, Habitat: Forest. Notes: Sterile collection. Understory tree to 9m tall.
- JDC 5228, Alt: 1061m, site: Akwaizantar, (8/02/78), form: T, Habitat: Forest. Notes: Sterile collection. Two trees, the tallest 13m.
- JDC 5229, Alt: 1061m, site: Akwaizantar, (8/02/78), form: T, Habitat: Forest. Notes: Sterile collection. Understory tree 12m tall. Seen once.
- JDC 5231, Alt: 1061m, site: Akwaizantar, (8/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 9m tall understory tree. Seen once.
- JDC 5232, Alt: 1061m, site: Akwaizantar, (9/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 9m tall understory tree. Very large, compound leaves. Seen once.
- JDC 5238, Alt: 1061m, site: Akwaizantar, (9/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 15m tall. One tree seen.
- JDC 5240, Alt: 1061m, site: Akwaizantar, (10/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 8m tall. One tree seen.
- JDC 5244, Alt: 1061m, site: Akwaizantar, (10/02/78), form: T, Habitat: Forest. Notes: Sterile collection. (?=JDC 5259). One small tree.
- JDC 5248, Alt: 909m, site: Akwaizantar, (13/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 15m tall. Seen once. Bole fluted, bark smooth, with occasional thorny woody emergences up to 15cm long. Small low stilt roots.
- JDC 5249, Alt: 909m, site: Akwaizantar, (13/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 11m tall. One tree seen.
- JDC 5250, Alt: 909m, site: Akwaizantar, (14/02/78), form: T, Habitat: Forest. Notes: Sterile collection. 24m tall. One tree only. Slash reddish-brown.
- JDC 5251, Alt: 1061m, site: Akwaizantar, (14/02/78), form: T, Habitat: Forest. Notes: Fruits (in spirit) distinctive. 24m tall. Not uncommon.
- JDC 5260, Alt: 1061m, site: Akwaizantar, (17/02/78), freq: a, form: T, Habitat: Forest. Notes: Sterile. 9-15m tall understory tree. ? *Millettia* sp., perhaps *M. conraui* (Harms). Fluted bole, orange slash, frequently multi-stemmed. Kaka name: Dayt.
- JDC 5266, Alt: 985m, site: Akwaizantar, (17/02/78), form: T, Habitat: Forest. Notes: Fruits collected. 4m tall (but said to grow much larger). Cf. JDC 5365 'Kukan daji', River Amboi F.R. After pounding, the edible fruits are mixed in water with the sugary pulp from Tetrapleura pods & used to flavour soup, etc. Fulfulde name: Konkoli.
- JDC 5328, Alt: 242m, site: River Amboi F.R., (11/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: Liane, stem up to 7.5 cm (3 inches) in diameter. Fruits (spirit material) in pendant spikes to 30cm long, sessile, close-packed, two-seeded, with persistent styles.
- JDC 5346, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile gathering. 8m tall. At the enumeration plot.
- JDC 5348, Alt: 242m, site: River Amboi F.R., (14/04/78), freq: f, form: T, Habitat: Tall secondary forest. Notes: Sterile gathering. Up to 10m tall. At the enumeration plot. ?=3901 River Nwum. Kaka name: Mang.
- JDC 5349, Alt: 242m, site: River Amboi F.R., (14/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile gathering. 10m tall. At the enumeration plot.
- JDC 5362, Alt: 242m, site: River Amboi F.R., (16/04/78), form: SH, Habitat: Wooded grassland. Notes: Both dried and spirit collections. Flowers fleshy, with recurved corolla and red stigma.
- JDC 5365, Alt: 242m, site: River Amboi F.R., (16/04/78), form: T, Habitat: Transition woodland/Young secondary forest. Notes: Spirit collection (Fruits). 8m tall. Young leaves aromatic. Fruits c. 3.8cm long, tapering at each end, 2.5 cm diameter. Reputed to be edible. Hausa name: Kukan daji.
- JDC 5369, Alt: 242m, site: River Amboi F.R., (17/04/78), form: T, Habitat: Tall secondary forest. Notes: 30m tall. ?*Holarrhena floribunda*. One tree at the enumeration plot; bole 0.55m d.b.h. Small white flowers.
- JDC 5393, Alt: 242m, site: River Amboi F.R., (20/04/78), form: LIAN, Habitat: Transition woodland/Young secondary forest. Notes: One fruit collected, in spirit. Liane, stem slender, fruits yellow, more or less spherical, 3.8cm in diameter, enclosed by the persistent calyx.
- JDC 5394, Alt: 242m, site: River Amboi F.R., (20/04/78), form: WC, Habitat: Tall secondary forest. Notes: Fruits in spirit. Stem 10cm in diameter. ?Annonaceae. Young plants which have not found a support resemble
- JDC 5395, Alt: 242m, site: River Amboi F.R., (20/04/78), form: T, Habitat: Tall secondary forest. Notes: Sterile gathering. 9m tall. At the enumeration plot.
- JDC 5402, Alt: 242m, site: River Amboi F.R., (21/04/78), form: WC, Habitat: Tall secondary forest. Notes: Flowers collected. Twining, slender stemmed, soft-wooded liane.
- JDC 5441, Alt: 242m, site: Baissa, (2/05/78), form: WC, Habitat: Forest. Notes: Slender-stemmed, twining, with small green flowers borne along the stem. Collected at the profile strip.
- JDC 5444, Alt: 242m, site: Baissa, (3/05/78), form: T. Notes: Sterile collection. 8m tall. Tree 28 at the profile strip. Leaves compound, up to 76cm long, leaflets more or less opposite with a terminal leaflet, c. 18 x 9 cm, petioles/ petiolules bristly hairy.
- JDC 5469, Alt: 242m, site: River Amboi F.R., (15/05/78), form: H, Habitat: Tall secondary forest. Notes: Fruits in spirit. Climber, leafless but fruiting. Fruits almost spherical, 10-12.5cm in diameter, green with yellowish-green stippling and mottling. Cucurbitaceae.

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Table 29 List of Synonyms

	Synonyms	Name Usually after Lebrun & Stork, sometimes after a more recent publication	Authority (Brummitt & Powell 1992)
Dicotyledonae			
Acanthaceae	<i>Hypoestes verticillaris</i>	<i>Hypoestes aristata</i>	(Vahl) Sol. ex Roem. & Schult. var. <i>aristata</i>
Amaranthaceae	<i>Cyathula pedicellata</i>	<i>Cyathula prostrata</i>	(L.) Blume var <i>pedicellata</i> (C.B.Clarke) Cavaco
Amaryllidaceae	<i>Crinum ornatum</i>	<i>Crinum zeylanicum</i>	L.
Anacardiaceae	<i>Lannea kerstingii</i>	<i>Lannea barteri</i>	(Oliv.) Engl.
Annonaceae	<i>Oxymitra</i> sp.	<i>Friesodielsia</i>	
Apiaceae	<i>Caucalis melanantha</i>	<i>Agrocharis melanantha</i>	Hochst.
Apocynaceae	<i>Landolphia cf comorensis</i>	<i>Saba comorensis</i>	(Bojer) Pichon
Apocynaceae	<i>Conopharyngia</i> sp.	<i>Tabernaemontana</i>	
Araceae	<i>Rhektophyllum mirabile</i>	<i>Cercestis mirabilis</i>	(N.E.Br.) Bogner
Araliaceae	<i>Cussonia barteri</i>	<i>Cussonia arborea</i>	Hochst. ex A. Rich.
Aristolochiaceae	<i>Pararistolochia flos-avis</i>	<i>Pararistolochia macrocarpa</i>	(Duch.) Poncy
Celastraceae	<i>Maytenus ovatus</i>	<i>Maytenus gracilipes</i>	(Welw. ex Oliv.) Excell
Combretaceae	<i>Terminalia glaucescens</i>	<i>Terminalia schimperiana</i>	Hochst.
Compositae	<i>Sonchus ledermannii</i>	<i>Lactuca lasiorhiza</i>	L.
Compositae	<i>Crassocephalum mannii</i>	<i>Solanecio mannii</i>	(Hook. f.) C. Jeffrey
Connaraceae	<i>Agelaea obliqua</i>	<i>Agelaea pentagyna</i>	(Lam.) Baill.
Connaraceae	<i>Byrsocarpus coccineus</i>	<i>Rourea coccinea</i>	(Schumach. & Thonn.) Benth.
Connaraceae	<i>Santaloides afzeli</i>	<i>Rourea minor</i>	(Gaertn.) Alston
Cyperaceae	<i>Bulbostylis capillaris</i>	<i>Abildgaardia abortiva</i>	(Ridley) Lye
Cyperaceae	<i>Bulbostylis cf. oritrephes</i>	<i>Abildgaardia cf. oritrephes</i>	(Ridley) Lye
Cyperaceae	<i>Pycneus scaettae</i>	<i>Pycneus fibrillosus</i>	(Kük.) Cherm.
Euphorbiaceae	<i>Claoxylon hexandrum</i>	<i>Discoclaoxylon hexandrum</i>	Müll. Arg.
Euphorbiaceae	<i>Phyllanthus discoideus</i>	<i>Margaritaria discoidea</i>	(Baill.) G. L. Webster
*Ericaceae	<i>Philippia mannii</i>	<i>Erica mannii</i>	(Hook.f.) Beentje
Guttiferae	<i>Garcinia polyantha</i>	<i>Garcinia smeathmannii</i>	(Planch. & Triana) Oliv.
Guttiferae	<i>Hypericum lanceolatum</i>	<i>Hypericum revolutum</i>	Vahl sub. <i>revolutum</i>
Guttiferae	<i>Hypericum riparium</i>	<i>Hypericum roeperanum</i>	Schimp. ex A. Rich.
Guttiferae	<i>Dipcadi tacazeaeum</i>	<i>Dipcadi viride</i>	(L.) Moench
Hyacinthaceae	<i>Urginia</i>	<i>Drimia</i>	
Hyacinthaceae	<i>Drimia zombensis</i>	<i>Drimia elata</i>	Jacq. ex Willd.
Hyacinthaceae	<i>Hypoxis retracta</i>	<i>Hypoxis iridifolia</i>	Baker
Hypoxidaceae	<i>Hypoxis urceolata</i>	<i>Hypoxis suffruticosa</i>	Nel

	Synonyms	Name Usually after Lebrun & Stork, sometimes after a more recent publication	Authority (Brummitt & Powell 1992)
Labiatae	<i>Homalochelios ramosissimus</i>	<i>Isodon ramosissimus</i>	(Hook.f.) Codd
Labiatae	<i>Geniosporum rotundifolium</i>	<i>Platostoma rotundifolium</i>	(Briq.) A. J. Paton
Leguminosae-	<i>Entada pursaetha</i>	<i>Entada rheedei</i>	Spreng.
Mimosoideae			
Leguminosae-	<i>Baphia gracilipes</i>	<i>Baphia leptostemma</i>	Baill. subsp. <i>gracilepes</i> (Harms) Soladoye
Papilionoideae			
Leguminosae-	<i>Eriosema montanus</i>	<i>Eriosema montanum</i>	Bak. f.
Papilionoideae			
Leguminosae-	<i>Afrormosia laxiora</i>	<i>Pericopsis laxiflora</i>	(Benth.) Meeuwen
Papilionoideae			
Leguminosae-	<i>Tephrosia paniculata</i>	<i>Tephrosia holstii</i>	Taub.
Papilionoideae			
Melastomaceae	<i>Memecylon fosteri</i>	<i>Warneckia fosteri</i>	(Hutch. & Dalziel.) Jacq.-Fél.
Melastomaceae	<i>Memecylon membranifolium</i>	<i>Warneckia membranifolia</i>	(Hook.f.), Jacq.- Fél.
Melastomataceae	<i>Dissotis cf D. elliotii</i>	<i>Dissotis cf thollonii</i>	Cogn. ex Büttner var. <i>elliotii</i> (Gilg.) Jacq. -Fél.
Melastomataceae	<i>Dissotis rotundifolia</i>	<i>Heterotis rotundifolia</i>	(Smith) Jacq.- Fél.
Moraceae	<i>Ficus vogelii</i>	<i>Ficus lutea</i>	Vahl
Moraceae	<i>Ficus capensis</i>	<i>Ficus sur</i>	Forssk
Moraceae	<i>Chlorophora excelsa</i>	<i>Milicia excelsa</i>	(Welw.) C.C. Berg
Moraceae	<i>Bosqueia angolensis</i>	<i>Trilepisium madagascariense</i>	DC.
Myrsinaceae	<i>Afrardisia cymosa</i>	<i>Ardisia kivuensis</i>	Taton
Myrsinaceae	<i>Rapanea neurophylla</i>	<i>Rapanea melanophloeos</i>	(L.) Mez
Ochnaceae	<i>Ouratea flava</i>	<i>Campylospermum flavum</i>	(Schum. & Thonn. ex Stapf) Farron
Ochnaceae	<i>Ouratea glaberrima</i>	<i>Campylospermum glaberrimum</i>	(P. Beauv.) Farron
Ochnaceae	<i>Ouratea sp. cf. O. (lava)</i>	<i>Campylospermum laeve</i>	(De Wild. & T. Durand.) Farron
Ochnaceae	<i>Ouratea myrionaura</i>	<i>Rhabdophyllum affine</i>	(Hook.f.) Tiegh.
Oleaceae	<i>Linociera africana</i>	<i>Chionanthus africanus</i>	(Knobl.) Stearn
Oleaceae	<i>Linociera nilotica</i>	<i>Chionanthus niloticus</i>	(Oliv.) Stearn
Piperaceae	<i>Peperomia mannii</i>	<i>Peperomia retusa</i>	(L.f.) A. Dietr.
Pitosporaceae	<i>Pittosporum mannii</i>	<i>Pittosporum viridiflorum</i>	Sims subsp. <i>mannii</i>
Proteaceae	<i>Faurea speciosa</i>	<i>Faurea rochetiana</i>	(A. Rich.) Chiov.ex Pic.-Serm.
Ranunculaceae	<i>Clematopsis scabiosifolia</i>	<i>Clematopsis villosa</i>	(DC.) subsp. <i>oliveri</i> (Hutch.) Brummitt
Rosaceae	<i>Dictyandra involucrata</i>	<i>Leptactina involucrata</i>	Hook.f.
Rosaceae	<i>Psychotria obscura</i>	<i>Psychotria schweinfurthii</i>	Hiern
Rubiaceae	<i>Coffea eketensis</i>	<i>Argocoffeopsis ektensis</i>	(Wernh.) Robbr.
Rubiaceae	<i>Adina microcephala</i>	<i>Breonadia salicina</i>	(Vahl) Hepper & J.R.I. Wood
Rubiaceae	<i>Diodia scandens</i>	<i>Diodia sarmentosa</i>	Sw.

	Synonyms	Name	Authority
		Usually after Lebrun & Stork, sometimes after a more recent publication	(Brummitt & Powell 1992)
Rubiaceae	<i>Mitragyna stipulosa</i>	<i>Hailea stipulosa</i>	(DC.) Leroy
Rubiaceae	<i>Canthium henriquesianum</i>	<i>Psydrax acutiflora</i>	(Hiern) Bridson
Rubiaceae	<i>Canthium vulgare</i>	<i>Psydrax parviflora</i>	(Afzel.) Bridson
Rubiaceae	<i>Nauclea latifolia</i>	<i>Sarcocephalus latifolius</i>	(Sm.) Bruce
Rubiaceae	<i>Nauclea pobeguinii</i>	<i>Sarcocephalus pobeguinii</i>	Pobég. ex Pellegr.
Rutaceae	<i>Fagara</i>	<i>Zanthoxylum</i>	
Sapotaceae	<i>Malacantha alnifolia</i>	<i>Pouteria alnifolia</i>	(Baker) Roberty
Sapotaceae	<i>Aningeria altissima</i>	<i>Pouteria altissima</i>	(A.Chev.) Baehni
Sapotaceae	<i>Pachystela brevipes</i>	<i>Synsepalum brevipes</i>	(Baker) T. D. Penn.
Sapotaceae	<i>Afrosalsisia cerasifera</i>	<i>Synsepalum cerasiferum</i>	(Welw.) T. D. Penn.
Sapotaceae	<i>Vincetella passargei</i>	<i>Synsepalum passargei</i>	(Engl.) T. D. Penn.
Sapotaceae	<i>Butyrospermum paradoxum</i>	<i>Vitellaria paradoxa</i>	C. F. Gaertn.
Smilacaceae	<i>Smilax kraussiana</i>	<i>Smilax anceps</i>	Willd.
Sterculiaceae	<i>Octolobus angustatus</i>	<i>Octolobus grandis</i>	Exell
Ulmaceae	<i>Celtis durandii</i>	<i>Celtis gomphophylla</i>	Baker
Ulmaceae	<i>Celtis brownii</i>	<i>Celtis philippensis</i>	Blanco
Ulmaceae	<i>Trema guineensis</i>	<i>Trema orientalis</i>	L. Blume
Urticaceae	<i>Boehmeria platyphylla</i>	<i>Boehmeria macrophylla</i>	Hornem.
Urticaceae	<i>Girardinia heterophylla</i>	<i>Girardinia diversifolia</i>	(Link) Friis
Verbenaceae	<i>Clerodendrum buchholzii</i>	<i>Clerodendrum silvanum</i>	Henriq. var <i>buchholzii</i> (Gürke) Verdc.
Verbenaceae	<i>Vitex simplicifolia</i>	<i>Vitex madiensis</i>	Oliv. subsp. <i>madiensis</i>
Violaceae	<i>Rinorea poggei</i>	<i>Rinorea brachypetala</i>	(Turcz.) O. Kütze.
Zingiberaceae	<i>Cienkowskiella nigerica</i>	<i>Siphonochilus nigericus</i>	(Hepper) B. L. Burtt
Monocotyledonae			
Dracaenaceae	<i>Dracaena deisteliana</i>	<i>Dracaena fragrans</i>	(L.) Ker-Gawl
Dracaenaceae	<i>Dracaena humilis</i>	<i>Dracaena aubryana</i>	Brongen. ex C. Morren
Gramineae	<i>Setaria chevalieri</i>	<i>Setaria megaphylla</i>	(Steud.) T. Durand. & Schinz
Gramineae	<i>Sporobolus mauritanus</i>	<i>Sporobolus subulatus</i>	Hack. ex Scott-Elliot
Orchidaceae	<i>Polystachya stricta</i>	<i>Polystachya bennettiana</i>	Rchb.f.
Poaceae	<i>Leptaspis cochleata</i>	<i>Leptaspis zeylandica</i>	Nees ex Steud.

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* not in the checklist, but in the text.

