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A REVISION OF THE SPECIES OF  
*TRICHILIA* P. BROWNE (*MELIACEAE*)  
ON THE AFRICAN CONTINENT

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# 1. INTRODUCTION AND ACKNOWLEDGEMENTS

When the present study was started, more than 80 names described in *Trichilia* from the African continent had to be taken into account; among these 16 proved to be the correct names for the here adopted species. Two new species were described, which brought the total number of *Trichilia* species known today from continental Africa to 18. Two widely known species needed a name-change. During botanical collecting expeditions in Africa, sponsored by the University for Agriculture at Wageningen, 8 out of the 18 *Trichilia* species occurring on the African continent could be studied in the field, which was of great value.

The majority of the species ascribed to *Trichilia* (ca. 250 names) occurs in America. These species are in need of critical revision. It seemed premature to change the current generic delimitation of *Trichilia*, as long as a monograph dealing with the American species is not available. No species appears to occur both in America and Africa.

Due to the kind co-operation of the Directors and Curators of the herbaria listed below, it was possible to study a large amount of herbarium material, including the types of nearly all names dealt with. I wish to express my sincere gratitude for their indispensable support. From the following herbaria or institutes material was received on loan and/or information obtained (alphabetically arranged according to standard abbreviation):

- B - Berlin, Botanisches Museum, Germany.
- BM - London, British Museum (Nat. Hist.), Great Britain.
- BOL - Cape Town, Bolus Herbarium, Univ. of Cape Town, South Africa.
- BR - Bruxelles, Jardin Botanique de l'Etat, Belgium.
- C - Copenhagen, Botanical Museum and Herbarium, Denmark.
- COI - Coimbra, Botanical Institute of the University, Portugal.
- E - Edinburgh, Royal Botanic Garden, Scotland, Great Britain.
- ENT - Entebbe, Forest Department, Uganda.
- FHO - Oxford, Forest Herbarium, Commonwealth For. Inst., Great Britain.
- FI - Firenze, Herbarium Universitatis Florentinae, Italy.
- G - Genève, Conservatoire et Jardin botaniques, Switzerland.
- GC - Legon, Ghana Herbarium, Univ. of Ghana, Ghana.
- GOET - Göttingen, Systematisch-Geobotanisches Institut, Germany.
- H - Helsinki, Botanical Museum, Finland.
- HBG - Hamburg, Staatsinstitut für allgemeine Botanik und Botanischer Garten, Germany.
- IEC - Brazzaville, Institut d'Etudes Centrafricaines, Central African Republic.
- IFAN - Dakar, Institut Français d'Afrique Noire, Senegal.
- J - Johannesburg, The Moss Herbarium, Univ. of the Witwatersrand, South Africa.
- K - Kew, The Herbarium and Library, Great Britain.
- L - Leiden, Rijksherbarium, Netherlands.
- LE - Leningrad, Herbarium of the Komarov Botanical Institute of the Academy of Sciences, U.S.S.R.
- LISC - Lisboa, Centro de Botânica da Junta de Investigações do Ultramar, Portugal.
- LISJC - Lisboa-Belem, Jardim e Museu Agrícola do Ultramar, Portugal.
- LISU - Lisboa, Institute of Botany, Faculty of Science, Portugal.

- M - München, Botanische Staatssammlung, Germany.
- MO - Saint Louis, Missouri Botanical Garden, U.S.A.
- NH - Durban, Natal Herbarium, South Africa.
- NY - New York, The New York Botanical Garden, U.S.A.
- OXF - Oxford, Fielding Herbarium, Department of Botany, Great Britain.
- P - Paris, Muséum National d'Histoire Naturelle, Lab. de Phanérogamie, France.
- PAT - Paris, Laboratoire d'Agronomie Tropicale, France.
- PRE - Pretoria, Botanical Research Inst., National Herbarium, South Africa.
- S - Stockholm, Botanical Department, Naturhistoriska Riksmuseet, Sweden.
- SRGH - Salisbury, Federal Herbarium, Rhodesia.
- TCD - Dublin, School of Botany, Trinity College, Ireland.
- U - Utrecht, Botanical Museum and Herbarium, Netherlands.
- UC - Berkeley, Herbarium of the University of California, U.S.A.
- UCI - Abidjan, Herbier de l'Université de Côte d'Ivoire, Ivory Coast.
- W - Wien, Naturhistorisches Museum, Austria.
- WAG - Wageningen, Laboratory for Plant Taxonomy and -Geography, Netherlands.
- WRSL - Wroclaw, Instytut Botaniczny Univ. Wroclawskiego, Poland.

I feel much indebted to Prof. Dr. H. C. D. DE WIT, in charge of the section Tropics and Subtropics in the Laboratory for Plant Taxonomy and -Geography at the University for Agriculture, Wageningen, for his continuous and most stimulating interest, and for a critical reading and polishing of the manuscript.

Miss Dr. G. J. H. AMSHOFF was so kind to correct the Latin diagnoses. The conversation with my colleagues of the Laboratory contained many valuable suggestions. I wish to tender warm thanks to all of them. The various members of the administrative and technical staff, who all assisted in their own way, I have to thank cordially.

Miss IKE ZEWARD prepared the drawings. A new described species, *Trichilia zewardae*, is dedicated to her.

## 2. GENERAL REMARKS

Among the *Trichilia* species which occur in Africa only one (*T. emetica* VAHL) extends beyond the continent, notably in the Yemen. Because, incidentally, this species is most important as regards utility, it was reported on long before any of the other representatives of the genus was discovered. According to FISCHER (Mittelalterliche Pflanzenkunde: 50. 1929) it was already known to IBN EL BEITHAR, who mentioned it in his Djami el Moufridat (ca. 1240).

When FORSKÅL collected the species in the Yemen and subsequently described it under the name *Elcaja 'roka'* (Fl. Aegypt.-Arab.: 127. 1775) the plant was familiar there, and in use. FORSKÅL in the protologue stated: 'In montibus Yemen frequens. Arab. Roka. Floris facies cum Citro convenit. Fructus venalis prostat Beit el fakih; miscetur cum odoriferis, quibus Arabum foeminae caput lavant. Liber Arabico idiomate scriptus titulo: Scharh elmoudjiz (a commentary on uses and philosophy of local names), hunc fructum, vomitorium esse perhiber, & appellari Djouz elkai; unde & nos literatum restauravimus nomen. Contra Pforam semina matura miscentur in unguentum cum oleo Sesami'.

The resemblance of the flowers with those of *Citrus*, mentioned above by FORSKÅL, afterwards led THONNING (in SCHUMACHER, Beskrivelse af Guineiske Planter: 217. 1827) to refer another species (*T. monadelpha*) to the genus *Limonia* L. (*Rutaceae*). In this, and also in other characters, *Meliaceae* and *Rutaceae* have much in common.

BENTHAM and HOOKER (Gen. Plant. 1: X and XI. 1862) placed *Meliaceae* together with *Geraniaceae*, *Malpighiaceae*, *Rutaceae*, *Burseraceae*, *Chailletiaceae*, and some other families in the 'cohort' *Geraniales*.

HUTCHINSON (Fam. Fl. Plants 2nd ed. 1: 353, 356. 1959) segregated *Meliaceae* as the only family of his order *Meliales*, stating that it is very similar to *Rutales*, but that in *Meliales* the stamens are often completely connate into a tube and the leaves usually not gland-dotted. This may be true in general, but it has no diagnostic value. Subfamily *Cedreloideae* in *Meliaceae* is characterized by free stamens, and glandular-punctate leaves occur throughout the family (HARMS in Nat. Pflanzenf. 2nd ed. 19BI: 6. 1940). Other authors refer *Rutaceae*, *Burseraceae*, and *Meliaceae* to one order, viz. *Rutales* (cf. PULLE, Compendium 3rd ed.: 260. 1952).

Apart from *T. quadrivalvis*, which is a suffrutex, the African representatives of the genus are shrubs or trees. Fourteen species are mainly confined to the Guineo-Congolian rain forest region, four (*T. capitata*, *dregeana*, *emetica*, and *quadrivalvis*) mainly occur outside that region. Only a few species reach large dimensions. Among the Moist Forest species *T. martineau* occasionally reaches the upper canopy, all others are confined to the lower stories. Of the species which occur outside the rain forest region, *T. dregeana*, under favourable conditions, may reach considerable dimensions. Many of the typical rain forest species favour secondary vegetations, and due to this habit are to some extent promoted by human interference in the original vegetation. In more or less

undisturbed forest, and even in old secondary forest in Africa, most *Trichilia* species are rare.

In this study each species is accompanied by a distributional map. The maps are from GOODE's Series of Base Maps, published by the University of Chicago Press, 1964. For each species the available collecting localities are plotted. Moreover, the supposed distributional area is often indicated by a continuous line. In many places this was done rather arbitrary. However, when the ecology of a species was more or less known, it often was possible to correlate it with the Vegetation Map of Africa (KEAY et al. 1959).

At the end of the description of each species the material examined is cited. This was done to supply detailed information about flowering time and sex of the specimens. The citations are arranged according to the countries where a species had been collected, in general from West to East and from North to South. Within each country (or in Congo within the Provinces) citations are alphabetically according to collector's names. 'Veget.' means that flowers nor fruits were available, and that the examined material was vegetative. I refrained from using the term 'sterile', as in *Trichilia* male flowers are often indicated as such.

The political geography of Africa recently being subject to many changes, it often was found difficult to be up to date on this point. The names of the countries and collecting localities are in accordance with the most recent map of Africa issued by the National Geographic Society, and completed with information from several other sources.

The species are treated alphabetically. The key is artificial. In the key besides generative characters as many vegetative characters were entered as possible. This is one reason why some species appear twice or three times. I was unable to compose a key based on vegetative characters only. It was thought to be useful to add distributional data to the morphological characters mentioned in the key. Strictly speaking this practice is not advisable but as the area of distribution of *T.*-species in Africa may be seen as sufficiently established, it was decided to employ the geography as additional guidance when identifying *Trichilia* specimens.

The detailed data on measurements given in the descriptions are based on analyses of dried herbarium material and/or spirit collections. No, or only slight, differences in measurements were found between dried and spirit collections. The terminology of simple symmetrical plane shapes is standardized according to the propositions issued by the Systematics Association in Taxon 11 (5) : 145-156. 1962. Other botanic terms are based on LAWRENCE (Taxonomy of Vascular Plants. 1951) and on JACKSON (A Glossary of Botanic Terms 4th ed. 1928).

Vernacular names are cited only when they belong to identified material.

### 3. NOTES ON SEXUALITY AND FREQUENCY OF FLOWERING

When A. DE JUSSIEU wrote his 'Mémoire sur le groupe des Méliacées' (in *Mém. Mus. d'Hist. Nat.* 19 : 153-304. 1830) only two African *Trichilia* species were known to him, viz.: *T. emetica* VAHL and *T. priureana* A. JUSS. DE JUSSIEU was first to recognize the possible presence of unisexual flowers in *Meliaceae*. He expressed the opinion that it was necessary (or at least favourable) for pollination that the two sexes occurred in the same inflorescence (DE JUSSIEU did not, explicitly, mention this for *Trichilia*).

C. DE CANDOLLE (in A. and C.DC., *Mon. Phan.* 1 : 399-779. 1878) already distinguished 10 *Trichilia* species on the African continent (and ca. 100 in America). In spite of his profound study of the *Meliaceae*, he did not mention anything in particular about sexuality of the flowers. In the description of the genus *Trichilia* it only was stated: 'Flores hermaphroditi'.

VERMOESEN in his remarkable study of the Congolese species of *Trichilia* (in *Rev. Zool. Afr.* 10(1) *Suppl. Bot.*: B14-B57. 1922) pointed out that the flowers showed differences in sexuality. He found that some trees produced fruits, but that from other all flowers were shed after anthesis. In the herbarium the flowers of the different trees showed differences in the development of the ovary. VERMOESEN assumed that the fertile flowers were hermaphrodite. Moreover, in a specimen of *T. retusa* he observed sterile (male) flowers together with young fruits.

VERMOESEN (l.c. : B17. 1922) derived two hypotheses from his observations:

1. Some *Trichilia* species should be polygamous, bearing hermaphrodite flowers on the one, and sterile (male) flowers on the other individual of the same species.
2. Some *Trichilia* species (if not all!) should produce fertile flowers at one season and sterile (male) flowers on the same individual at another season. (VERMOESEN made an exception for *T. rubescens* and *T. priureana*, from which species he thought the flowers were merely bisexual).

More recently, WHITE and STYLES (in *Fl. Zamb.* 2(1) : 297-304. 1963) studied 5 *Trichilia* species from the Flora Zambesiaca region. They concluded that of these species all the flowers were either male or female, and that the species appeared to be dioecious.

From my own experience (both the study of numerous herbarium specimens and of field observations) it became clear that all African *Trichilia* species (without exception) are distinctly dioecious, the flowers being either male or female (some American species at least appear to have bisexual flowers). In male flowers the anthers are opening and produce pollen, the ovary in these flowers is small and vestigial, but often contains vestigial ovules. Soon after anthesis the male flowers are falling. In female flowers the anthers most often do not open at all, and in the rare case they do, no mature pollen is produced. In female flowers the ovary is always distinct and starts developing during, or soon after, anthesis.

In case male flowers are attacked by some insect, the vestigial ovary, however, may develop more or less in the same way as in female flowers, and then the male flowers do not fall after anthesis. The 'gall-fruits' resulting from these flowers are usually more or less deformed, but when young it often is difficult to distinguish them from ovaries developing in a normal way. However, in transverse section they always distinctly show deformations inside. This sufficiently explains the case mentioned by VERMOESEN (see above), who observed male flowers together with young 'fruits' in *T. retusa*. Not only in *T. retusa*, but also in other species (*T. rubescens*, *T. gilletii*, *T. emetica*), I frequently observed this insect attack in male flowers and the resulting production of 'gall-fruits'.

Another peculiarity is that the male flowering specimens preserved in herbaria outnumber by far the specimens with female flowers. Assuming that male and female specimens flower with the same frequency, I calculated for *T. emetica* subsp. *emetica* a sex-ratio of ca. 3 : 1 (see also under that subspecies).

In Ivory Coast, near Abidjan, I was able to follow the development of 11 individuals, both males and females, of *T. monadelpha* from the beginning of October till half December. I found that trees bearing ripening fruits showed but less change in this period, while some of the male trees flowered, with a short interval, two times in those 3 months. From this it is possible to believe that female individuals only flower once (or two times?) in one year, developing their fruits in the remaining period. No trees were found bearing fruits in different stages of development. On the other hand male trees seem able to flower with only short intervals, and perhaps many times a year.

In the case of *T. emetica* subsp. *emetica*, mentioned above, this should imply that in the field there are not found three times as many male individuals as compared with females, but that male individuals flower three times more often as females. Careful field observations are needed to confirm this.



#### 4. ARIL CONTRA ARILLODIUM

The uncertain definition of the terms 'aril' (arillus) and 'arillodium' caused previous authors to use different names for the reddish fleshy tissue which, partly or completely, occupies (or envelopes) the surface of the seed of African *Trichilia*'s.

For instance DE JUSSIEU (in Mém. Mus. d'Hist. Nat. 19:236. 1830) stated that the seed of *T. emetica* VAHL was enveloped by a red aril ('semina collateralia, arillo rubenti involuta'). C. DE CANDOLLE (in A. and C.DC., Mon. Phan. 1:661. 1878), however, stated: 'Semina exarillosa, rubra'. More recently, WHITE and STYLES (in Fl. Zamb. 2(1):300. 1963) described the seed of *T. emetica* VAHL as: 'black, almost completely concealed by the scarlet aril'. The same authors consider the seed of *T. quadrivalvis* C.DC. (like *T. emetica* belonging to sect. *Trichilia*) as exarillate but with a fleshy orange testa.

First of all is needed a clear definition of an aril and an arillodium. According to JACKSON (A Glossary of Botanic Terms 4th ed.: 34. 1928) the aril is: 'an expansion of the funicle, arising from the placenta, and enveloping the seed.' The same author defines the arillodium as: 'a false aril, a coat of the seed, and not arising from the placenta'. Whatsoever the precise morphological interpretation of these (and other) definitions of 'aril' and 'arillodium' may be, they all agreed on the principle that the aril arises from the funicle (placenta), and that the arillodium forms part of the testa.

According to this concept the *Trichilia* species of continental Africa possess an arillodium, with the exception of *T. capitata*, which has a true aril. This conclusion is based on the following facts:

1. In *Trichilia* species where only a part of the testa consists of fleshy tissue the outer layer of the fleshy part is continuous as the outer layer of the (dark, not swollen) leathery part of the testa.
2. The fleshy tissue is completely merged with the underlying, more leathery, part of the testa.
3. The funicle remains distinctly and clearly visible throughout its course through the fleshy tissue. It seems only to be pressed to the surrounding fleshy tissue, not to be connate with it.
4. In seeds of *T. prieureana* subsp. *prieureana* (Fig. 12A, m) the outer layer of the fleshy tissue is interrupted near the apex of the seed, to form a small oval spot. Beneath this spot the radicle is found. I, therefore, concluded that this spot is identical with the micropyle, which, given the one-sided development of the fleshy tissue, excludes the possibility that this fleshy tissue is formed by the funicle.
5. In *T. capitata*, which also in other characters differs from all other African *Trichilia*'s (see under that species), the seed shows a distinct raphe from which arises an aril partly enveloping the seed. In this case the above mentioned points (1-4) do not hold.

Summarizing it is to be stressed that concerning the fleshy tissue covering the

seed of African *Trichilia* species two different, sharply delimited, groups occur. On one hand there is a rather homogeneous group of species (including all species of all three sections *Trichilia*, *Moschoxylum* and *Apotrichilia*) where this tissue forms part of the spermoderm. On the other hand there is one species (viz. *T. capitata*) where it arises from the funicle, and so is a true aril. On morphological grounds no essential difference exists between the seeds of *T. emetica* and *T. quadrivalvis*, as was supposed by WHITE and STYLES (l.c., 1963), the testa of the seed of *T. quadrivalvis* being completely developed into a fleshy orange-red sarcotesta, that of *T. emetica* only partly so.

## 5. DESCRIPTION OF THE GENUS

*Trichilia* P. BROWNE, Hist. Jamaica : 278. 1756; LINNAEUS, Syst. ed. 10, 2 : 1020. 1759; A. P. DE CANDOLLE, Prodrômus 1 : 622. 1824; A. DE JUSSIEU in Mém. Mus. d'Hist. Nat. 19 : 235. 1830; C.DC. in A. and C.DC., Mon. Phan. 1 : 646. 1878; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. 1896; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B30. 1922; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 104. 1940; WHITE and STYLES in Fl. Zamb. 2(1) : 297. 1963; Int. Code of Bot. Nom. (App. 3) : 250. 1956, *nom. conserv.*; RICKETT and STAFLEU in Taxon 8(9) : 303. 1959.

Type species: *T. hirta* L., l.c., 1759.

Synonyms (only generic names originally described from the African continent considered): *Elcaja* FORSK., Fl. Aegypt.-Arab. : 127. 1775. Type species: *Elcaja 'roka'* FORSK., l.c., 1775 (= *T. emetica* VAHL subsp. *emetica*).

*Elkaja* M. ROEM., Syn. Mon. 1 : 116. 1846. Type species: *Elkaja emetica* (VAHL) M. ROEM., l.c., 1846 (= *T. emetica* VAHL subsp. *emetica*).

*Mafureira* BERTOL. in Mem. Acc. Sci. Bol. 2 : 269. 1850. Type species: *Mafureira oleifera* BERTOL., l.c. : 270. 1850 (= *T. emetica* VAHL subsp. *emetica*).

Description of the genus *Trichilia* as represented on the African continent : Dioecious trees or shrubs, rarely a rhizomatous suffrutex (*T. quadrivalvis*), evergreen or deciduous. Leaves alternate, imparipinnate, 2–9-jugate, rarely 3-foliolate or 1-foliolate (*T. quadrivalvis*), leaflets entire, sometimes distinctly glandular dashed and/or dotted. Inflorescences paniculately arranged, axillary, supra-axillary or pseudo-terminal. Flowers unisexual, without distinct external difference between those that are functionally male and those that are functionally female. Receptacle well developed, jointed to the pedicel. Calyx cup-shaped, more or less deeply 5-lobed or -teethed, deciduous in fruit, rarely persistent (*T. capitata*). Petals 5, free, imbricate in bud, often reflexed during anthesis, much longer than the calyx. Filaments 10, usually united only in the lower half and the anthers inserted between a pair of narrowly triangular appendages ('lobes' or 'teeth') at the tops of the free parts of the filaments; rarely the filaments completely fused to form a staminal tube bearing the anthers on its more or less crenellated rim (*T. priureana*). Anthers erect, exerted from the staminal tube, glabrous or slightly hairy on dorsal side, opening laterally, lengthwise, containing well developed pollen; antherodes often smaller than the anthers, usually not dehiscent, not producing mature pollen. Disk apparently absent (and then completely fused to the base of the staminal tube) or more rarely free and distinct, cupuliform, around the ovary (*T. priureana*, *T. rubescens*, and *T. capitata*). Ovary 2–3(–4)-celled; ovules 2 in each cell, axile, collateral. Pistillode scarcely expanded at the base; vestigial ovary small, often indistinct,

but usually with vestigial ovules. Male flowers soon after anthesis as a whole falling. Fruit a 2-3(-4)-chambered capsule, loculicidally dehiscent, 2-3(-4)-valved, dry valves leathery or slightly woody. Seeds large, arillodiate (by way of exception arillate in *T. capitata*), more or less plano-convex, flat on the adjacent sides; testa for the largest part (or entirely) developed into a soft and fleshy, orange-red or scarlet, arillodium (sarcotesta), often leaving a dark brown or blackish dorsal spot of thin leathery testa; cotyledons firm, fleshy, plano-convex (thinner and more foliaceous in *T. capitata*); radicle obovoid or ellipsoid, longitudinally slightly flattened, in between the cotyledons just beneath the apex (partly protruding in *T. capitata*). Endosperm absent (distinctly present in *T. capitata*).

Note. Compared with the generic description supplied by HARMS (l.c. : 104, 1940), which deals with the genus as a whole, the following is of interest. 1. HARMS does not mention the marked dioecism which is characteristic for all the African representatives of the genus (without exception). 2. Both 4- and 5-merous (rarely 3-merous) flowers are accepted in the genus (all African species show 5-merous flowers). 3. HARMS does not consider the possibility of a persistent calyx, which is found in African *T. capitata*. 4. Either two collateral or two superposed ovules are permitted in the genus (all African species show 2 collateral ovules in each ovary-cell). 5. The fleshy tissue enveloping partly or entirely the seed is termed by HARMS as an 'arillus' (the African species show a fleshy arillodium (sarcotesta), with the exception of *T. capitata*, which species is characterized by an aril). 6. According to HARMS the radicle is usually protruding from the cotyledons (in all African species the radicle is apically included between the cotyledons, with the exception of *T. capitata*, where it is protruding). 7. Both presence or absence of endosperm is accepted in the genus (in African *Trichilia* species endosperm is absent, except for *T. capitata*, where it is present and distinct).

## 6. INFRAGENERIC SYSTEMATY, MORE IN PARTICULAR WITH RESPECT TO THE AFRICAN SPECIES

C. DE CANDOLLE in A. and C.DC., Mon. Phan. 1 : 647. 1878, dealing with the genus as a whole, distinguished three sections, viz.:

1. Sect. *Eutrichilia* C.DC. – Stamina basi vel ad medium usque connata. Discus nullus vel breviter lato-stipitififormis carnosus. Capsula globoso-ovata.
2. Sect. *Moschoxylum* (A.JUSS.) C.DC. – Stamina fere ad antheras usque in tubum margine denticulatum connata. Capsula plerumque ovato-oblonga.
3. Sect. *Apotrichilia* C.DC. – Stamina basi connata. Discus intrastaminalis liber, cupularis urceolatusve. Capsula globoso-ovata.

More recently, HARMS (l.c., 1940) recognized 10 sections in *Trichilia*. Among those not yet distinguished by C. DE CANDOLLE are 2 sections containing species described from the African continent, viz. sect. *Lepidotrichilia* HARMS (in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306. 1896), and sect. *Pterotrichilia* HARMS (l.c. : 307. 1896).

Sect. *Lepidotrichilia* was raised to generic level by LEROY (in Compt. Rend. Acad. Sci. 247(14) : 1025. 1958; id. in Journ. Agr. Trop. Bot. Appl. 5(10) : 673. 1958).

Sect. *Pterotrichilia* contained 2 species (*T. pterophylla* C.DC. and *T. alata* N.E.BROWN) which were both referred to the genus *Ekebergia* SPARRM. (see under excluded species).

The species treated in the present study are easily placed in the sections already known to C. DE CANDOLLE (except *T. capitata*) as follows:

1. *T.* sect. *Trichilia*: *T. djalonis*, *dregeana*, *emetica*, *gilgiana*, *gilletii*, *grandifolia*, *martineau*, *megalantha*, *monadelpha*, *ornithothera*, *quadri-valvis*, *retusa*, *tessmannii*, *welwitschii*, and *zewaldae* (15 species).
2. *T.* sect. *Moschoxylum* (A. Juss.) C.DC.: *T. prieureana*.
3. *T.* sect. *Apotrichilia* C.DC.: *T. rubescens*. (*T. rubescens* OLIV. is designated here as the lectotype for *T.* sect. *Apotrichilia* C.DC.).

In this classification only *T. capitata* cannot be accommodated. C.DC. (l.c., 1878) placed *T. capitata* together with *T. rubescens* in sect. *Apotrichilia*, but this cannot be maintained (for explanation see under *T. capitata* KLOTZSCH). The proper taxonomic position of *T. capitata* is left open, pending a world revision of the genus as a whole.

## 7. REMARKS ON TRICHILIA OCCURRING OUTSIDE AFRICA

About 250 species have been described from America, but a critical study will show that many of these are synonyms. Apart from the characters found in *Trichilia*'s belonging to the three sections which occur on the African continent, the characteristics of African *T. capitata* are found in America, singly or to some extent correlated. Little is to be said about segregating sections in the genus *Trichilia* as long as a monograph dealing with the numerous American species is absent.

Some fruit and seed fragments kindly sent to me by Mr. J. F. LEROY, Laboratoire d'Agronomie Tropicale (PAT), testify of the occurrence of the genus *Trichilia* in Madagascar. Mr. LEROY will deal with these species in a forthcoming fascicule of the Flore de Madagascar. It is to be noted that according to LEROY most (if not all) of the species hitherto described in *Trichilia* from Madagascar belong in other genera, viz. *Lepidotrichilia*, *Astrotrichilia* and *Malleastrum*.

BENTVELZEN (in Act. Bot. Neerl. 11 : 11. 1962) reduced the small tropical Indo-Malaysian genus *Heynea* ROXB. ex SIMS to *Trichilia*. BENTVELZEN stated: 'The two Asiatic species of *Heynea* can easily be accommodated within the large genus *Trichilia*, viz. in the sect. *Trichilia* (*Eutrichilia*) which occupies the entire (distributional) range of the genus *Trichilia*'.

There may be reason for his statement when the genus *Trichilia* as a whole is considered, but as regards a comparison of the Asiatic species with that from Africa, marked differences occur.

1. As far as I could verify the Asiatic species show bisexual flowers (all African species, without exception, are dioecious). 2. The calyx, however small, is distinctly persistent in the fruit of the Asiatic species (in Africa only the aberrant species *T. capitata* shows this character). 3. The seed of the Asiatic species is enveloped by a true aril (the African species possess a sarcotesta, except for *T. capitata*, where the seed is arillate). 4. The seed of the Asiatic species is characterized by a distinct raphe (raphe absent in African species, except in *T. capitata*).

Characters which the Asiatic species share with most of the African representatives of *Trichilia* are the absence of endosperm, the hard and fleshy cotyledons, and the small radicle (plumule) which is included between the cotyledons. The only African species (*T. capitata*) which clearly shows affinity with the Asiatic species in the above-mentioned characters (see 2, 3 and 4) is, however, different in the presence of endosperm, more foliaceous cotyledons, and exserted radicle.

Summarizing it may be stated that the Asiatic species, formerly included in the genus *Heynea*, and reduced to *Trichilia* by BENTVELZEN (l.c., 1962), show little affinity to the African representatives of the genus. Because of the presence of a free, annular disk (beside other aberrant characters) the Asiatic species do not fit in sect. *Trichilia* as represented on the African continent. The cleft staminal tube of the Asiatic species does not permit a position in sect. *Moschoxy-*

*lum.* A position of the Asiatic species in sect. *Apotrichilia* is not justified because of bisexual flowers, a persistent calyx and seed characters. Some affinity is found with the African species *T. capitata*, a taxon which deviates significantly from all other African *Trichilia* species, and which could not be placed properly in one of the sections hitherto distinguished in Africa (see also unter *T. capitata*).

## 8. KEY TO THE SPECIES<sup>1</sup>

1. Rhizomatous suffrutex, up to 40 cm high. Leaflets 1–2-jugate or the leaf unifoliolate. Southern Congo, Angola, eastern Zambia.  
**13. *T. quadrivalvis*** (p. 149)
1. Shrubs or trees. Leaflets in several pairs.
  2. Staminal tube entire (not laciniate); anthers sessile on the rim. Bole usually conspicuously fluted. West and Central Africa. **12. *T. priureana*** (p. 130)
  2. Staminal tube laciniate; anthers inserted at the tops of the free parts of the filaments. Bole usually not fluted.
    3. Disk around the ovary free and distinct. Flowers comparatively small, petals up to 5.5 mm long. Twigs markedly lenticellate or pustular.
      4. Twigs hollow. Petals 4.5–5.5 mm long. E. Nigeria to Lake Victoria, southwards to the mouth of the River Congo.  
**15. *T. rubescens*** (p. 161)
      4. Twigs not hollow. Petals 3.5–4 mm long. Basin of lower Zambezi River. . . . . **1. *T. capitata*** (p. 17)
    3. Disk apparently absent. Flowers larger.
      5. Leaflets widely emarginate at apex. Riparian vegetations from Nigeria to eastern Congo, southwards reaching 10°S.L.  
**14. *T. retusa*** (p. 154)
      5. Leaflets not widely emarginate at apex.
        6. Leaflets from the middle (or lower) gradually tapering into a long and narrow apex. Sierra Leone to Uganda and Congo.  
**8. *T. martineaui*** (p. 96)
        6. Leaflets not tapering from the middle into the apex.
          7. Branches with thick corky bark (except on very young shoots). Forest-Savanna Mosaic and Savanna Woodlands from Senegal to Uganda. . . . . **4b. *T. emetica* subsp. *suberosa*** (p. 67)
          7. Branches without corky bark.
            8. Branches of 2nd year thick, reddish-brown or greyish, outer bark peeling off in rectangular flakes. Leaflets with closely spaced main lateral nerves which are impressed on the upper surface. Trop. W. and Central Africa.  
**16. *T. tessmannii*** (p. 171)
            8. Branches without distinct peeling bark and without closely spaced lateral nerves impressed on the upper surface of the leaflets.

<sup>1</sup> To be noted before using the key:

1. As a rule, flowers are needed for identification.
2. In male flowers the vestigial ovary is usually small and indistinct. However, in most cases it is possible to judge from a transverse section (by microscope) whether it is 2- or 3-locular.
3. When judging the number of locules of the ovary, remember that this number is not always absolutely constant. Examine more flowers of one inflorescence, and take the number more common. In fruits, be aware of reduced locules.



- 9. Ovary 2-ocular.
  - 10. Leaflets glabrous (except for some hairs on midrib and nerves) on lower surface.
    - 11. Leaflets 3-4-jugate.
      - 12. Leaflets distinctly, and finely, glandular-punctate. Midrib flat or only shallowly impressed on upper surface. Petals 6.5-10 mm long. Fruit not beaked, 15-20 mm diam. Congolian rain forest region. . . . . **6. T. gillettii** (p. 83)
      - 12. Leaflets not or indistinctly glandular-punctate. Midrib impressed on upper surface. Petals 11-16.5 mm long. Fruit beaked, 80-90 mm diam. Endemic to São Tomé. **7. T. grandifolia** (p. 90)
    - 11. Leaflets 5-7-jugate. From E. Nigeria to E. Congo, southwards reaching 10°S.L. . . . . **17. T. welwitschii** (p. 181)
  - 10. Leaflets more or less hairy on lower surface.
    - 13. Indumentum exerted from the groove of the impressed midrib on upper surface of leaflets. Anthers at best rough (not hairy). Sierra Leone to Ghana. . . . . **11. T. ornithothera** (p. 122)
    - 13. Indumentum in the groove of the impressed midrib on upper surface of the leaflets short (not exerted). Anthers slightly hairy on dorsal side. Nigeria to Angola. . . . . **17. T. welwitschii** (p. 181)
- 9. Ovary 3-ocular.
  - 14. Mature fruit conspicuously beaked at apex. Cameroun. **18. T. zewaldae** (p. 190)
  - 14. Mature fruit not conspicuously beaked, or mature fruits absent.
    - 15. Petals 18 mm or more long.
      - 16. Leaves with 6 or 7 pairs of leaflets at least present. Ivory Coast to Nigeria. . . . . **9. T. megalantha** (p. 102)
      - 16. Leaves less than 6-jugate. Trop. Africa, and East Africa southwards to Durban. . . . . **3. T. dregeana** (p. 28)
    - 15. Petals shorter than 18 mm.
      - 17. Leaflets obtuse, slightly emarginate, or retuse at apex.
        - 18. Twigs yellowish-grey to dark grey. Dried leaflets olive-green. Inflorescences condensed and many-flowered. Fruit distinctly stipitate, 15-25 mm diam. In lower rainfall areas (700 mm or less). Riparian woodlands and similar vegetations from sea-level up to 1500 m. Sudan, Ethiopia and Yemen, southwards till Durban. **4a. T. emetica subsp. emetica** (p. 51)
        - 18. Twigs reddish-brown or dark brown. Dried leaflets brownish. Inflorescences not really condensed, often few-flowered. Fruit not or very shortly stipitate, 20-40 mm diam. Areas with higher rainfall; in evergreen forest patches at altitudes above 800 m. (Only in S. Africa and W. Congo also near sea-level). Trop. Africa and East Africa southwards to Durban. **3. T. dregeana** (p. 28)
  - 17. Leaflets acute or acuminate at apex.

19. Young twigs thin (3–5 mm diam.), very dark brown or blackish. Midrib on upper surface of leaflets flat (not impressed). Sierra Leone to Uganda and Congo. . . . . **8. T. martineai** (p. 96)
19. Twigs and midrib otherwise.
20. Bracts and bracteoles rather long persistent and conspicuous. Congolian rain forest region . . . . . **5. T. gilgiana** (p. 76)
20. Bracts and bracteoles early deciduous.
21. Appendages ('lobes' or 'teeth') on the apex of the free parts of the filaments almost lacking or very short and indistinct.
22. Connate part of the staminal tube slightly hairy inside. Guineo-Congolian rain forest region. **10. T. monadelpha** (p. 108)
22. Connate part of the staminal tube glabrous inside. Cameroun. **18. T. zewaldae** (p. 190)
21. Appendages on the apex of the free parts of the filaments distinct.
23. Shrub or treelet, up to ca. 6 m high (rarely up to 15 m tall). Guinea, Sierra Leone, Liberia and Ivory Coast, above 650 m altitude . . . . . **2. T. djalonis** (p. 23)
23. Medium-sized trees, 6 m or more high. Distribution otherwise.
24. Free parts of the filaments very densely hairy (really bearded) inside. Style glabrescent or thinly velutinous, indumentum especially in the upper part. Congolian rain forest region . . . . . **5. T. gilgiana** (p. 76)
24. Free parts of the filaments at best villous inside. Style hairy, sometimes glabrous or glabrescent in the upper part.
25. Appendages ('lobes' or 'teeth') 0.1–0.7 mm long. Moist Forest at low altitudes. Cameroun. **18. T. zewaldae** (p. 190)
25. Appendages 0.5–2.2 mm long. Other habitats.
26. Twigs yellowish-grey to dark grey. Dried leaflets olive-green. Inflorescences condensed and many-flowered. In lower rainfall areas (700 mm or less). Riparian woodlands and similar vegetations from sea-level up to 1500 m. Sudan, Ethiopia and Yemen, southwards till Durban. **4a. T. emetica subsp. emetica** (p. 51)
26. Twigs reddish-brown or dark brown. Dried leaflets brownish. Inflorescences not condensed, often few-flowered. Areas with higher rainfall; in evergreen forest patches at altitudes above 800 m. (Only in S. Africa and W. Congo also near sea-level). Trop. Africa and East Africa southwards to Durban. . . . . **3. T. dregeana** (p. 28)

## 9. DESCRIPTION OF THE SPECIES

### 1. *Trichilia capitata* KLOTZSCH

Fig. 1; Map 1

*Trichilia capitata* KLOTZSCH in PETERS, Naturw. Reise Mossamb. Bot. 1 : 120. 1861; OLIVER in Flora Trop. Afr. 1 : 335. 1868; C. DC in A. and C. DC., Mon. Phan. 1 : 707. 1878; GÜRKE in ENGL., Pflanzenw. Ost-Afr. C : 231. 1895; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306. 1896; SIM, For. Fl. Port. E. Afr. : 27. 1909; VERMOESEN in Rev. Zool. Afr. 10(1), Suppl. Bot. : B22. 1922; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 112. 1940; BRENNAN in Mem. N.Y. Bot. Gard. 8(3) : 235. 1953; GARCIA in Contr. Conhec. Fl. Moçamb. 2 : 143. 1954; WHITE and STYLES in Fl. Zamb. 2(1) : 302, tab. 59, fig. A. 1963.

Type: PETERS s.n. (Mozambique: Rios de Sena, holotype not seen, destroyed in B). Neotype: KIRK s.n. Febr. 1859 (Mozambique: Tette (presently Tete), K).

Note: No type material of *T. capitata* could be traced, probably it was destroyed in Berlin. KIRK s.n., a male flowering specimen, is designated as the neotype. According to an annotation made on the sheet, this specimen has been compared with the type at Berlin by OLIVER, in November 1895.

Diagnostic and differential characters. Shrub or small tree with pale, leafless, rather thick 2nd year's branches, marked by conspicuous leaf-scars. Leaves and inflorescences assembled near the top of the 1st year branches, which are often distinctly lenticellate. Leaflets 4-6(-7)-jugate, often markedly asymmetric at base. Flowers very small, crowded at the end of the inflorescences. Petals 3.5-4 mm long. Disk conspicuous. Fruit 3-chambered, globose, ca. 1-1.5 cm diam., subtended by a persistent calyx. Seed arillate; arillus orange-red, covering the seed for ca. 1/3; endosperm distinct; radicle exerted from the cotyledons. In riparian woodlands or thicket in basin of lower Zambesi River, at low altitudes.

Description. Shrub or small tree, up to 15 m tall. Young leaf-bearing parts of twigs somewhat angular or flattened, greyish-green or brownish, densely pubescent, scattered with conspicuous round or elliptic, pale brown or reddish-brown lenticels of ca. 0.5 mm diam.; older, mostly leafless parts of twigs terete, rather thick, ca. 0.6 cm diam., the indumentum gradually disintegrating and finally the twigs glabrous; scars of fallen leaves conspicuous, very broadly obovate or sometimes more obdeltate with rounded edges and with a separate round scar of a fallen inflorescence just above it; outer bark pale, sometimes reddish-brown, soft, longitudinally slightly wrinkled, inner bark more dark, rather thick, ca. 0.5-1 mm; wood pale creamy.

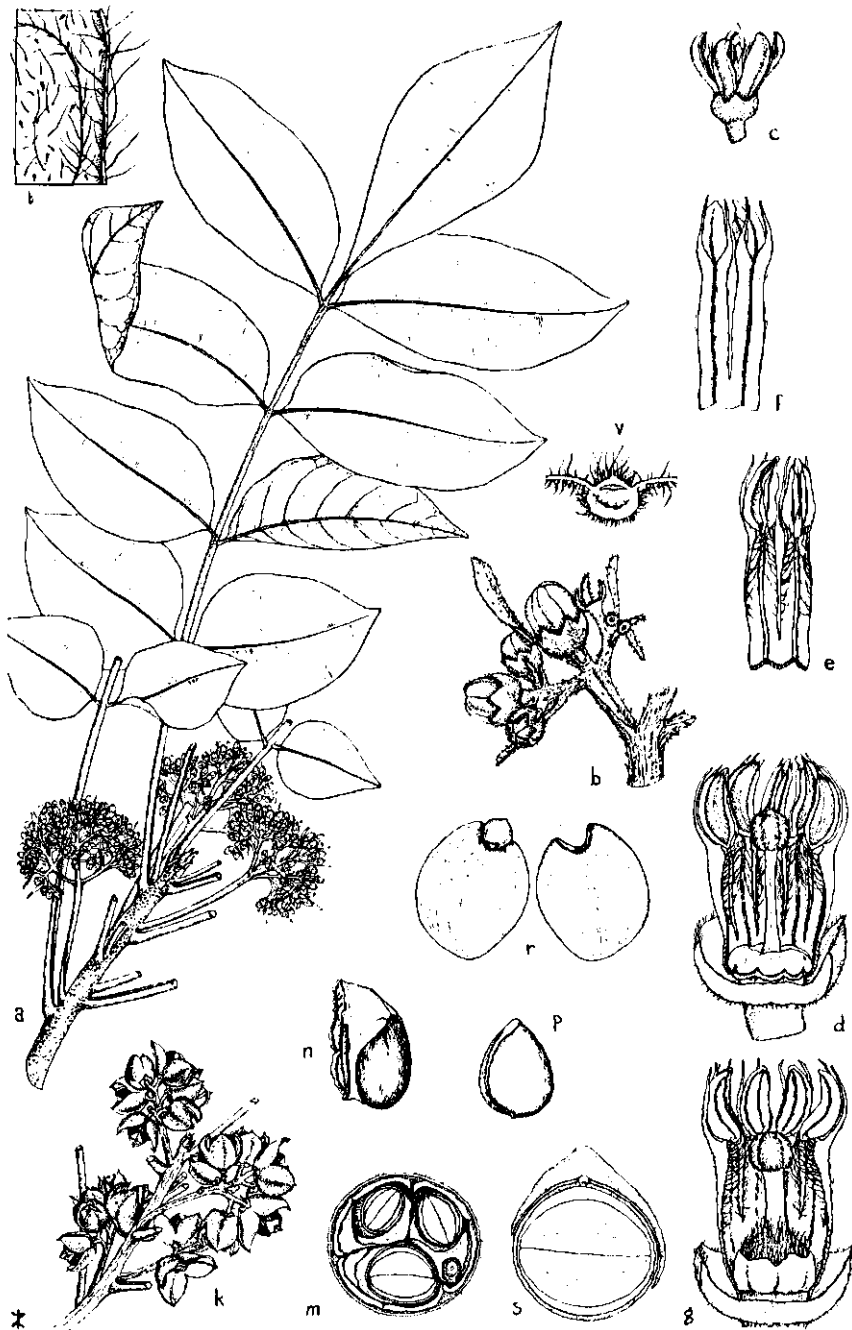
Leaves imparipinnate, 10-37 cm long; petiole terete, flattened on the upper surface, especially near the base, (1.5-)3.5-7(-8) cm long, densely pubescent, rachis (5-)9-15(-18) cm long, similar to the petiole; petiolules terete, flattened or slightly sulcate on the upper surface, densely pubescent, petiolule of terminal leaflet 6-13 mm, the others (0.5-)2-4(-5) mm long.

Leaflets 4–6(–7)-jugate, opposite or not, sometimes minutely and obscurely glandular punctate, variable in shape and size, (1.0–)3.5–6.5(–10.5) by (0.5–)1.5–3.5(–4.5) cm, distal leaflets largest, narrowly elliptic to elliptic, sometimes narrowly obovate to obovate, terminal leaflet often elliptic, proximal leaflets smaller, ovate to broadly ovate, sometimes nearly triangular, other leaflets intermediate, apex acute to acuminate, base obtuse or rarely nearly truncate, often markedly asymmetric, but the terminal leaflet symmetric and cuneate at the base. Upper surface somewhat rough in appearance, glabrescent to puberulous, midrib rather prominent, especially towards the base, sometimes slightly sulcate, puberulous, nerves (5–)7–10(–12) on either side, opposite or not, slender, curving and anastomosing before reaching the margin, veins indistinct; lower surface puberulous and often with some scattered, very minute, pale brown or reddish-brown glandular trichomes, midrib prominent, pubescent, especially in the axils of the nerves with whitish tomentose hairs, nerves prominent, veins rather distinct, reticulate.

Inflorescences paniculately arranged, axillary (solitary in the leaf-axils), assembled near the top of the branches and appearing with the leaves, (2.5–)3.5–6.5(–8.0) cm long, branched especially in the distal part, and there the flowers more or less crowded, main axes flattened or terete, wrinkled lengthwise, puberulous, often three times branching before the pedicel, branches up to 1.5 cm long; bracts rather early deciduous, the lower ones often leaflike; variable in shape and size, blade ca. 6–9 by 1.5–3.5 mm, unequalsided, narrowly elliptic, narrowly ovate or narrowly angular-ovate, with a flattened stalk of 4–10 mm long, higher bracts gradually diminishing in size, not leaflike, ca. 1.5–6.5 by 0.3–0.5 mm, linear, puberulous.

Male flowers: Pedicels very short, up to 1 mm long, bracteoles 2, opposite, sometimes absent, 0.7–1.2 by 0.2–0.4 mm, narrowly triangular, acute at apex, abaxial densely puberulous and with some minute gland-bearing trichomes especially at the ciliate margin, adaxial glabrous. Receptacle cylindrical, slightly tapering to the base, more or less grooved, ca. 0.5–1.0 mm long, puberulous, jointed to the pedicel. Calyx cup-shaped, rather fleshy, ca. 1 mm high by 2 mm wide, shortly 5-dentate at the margin, inside glabrous, outside puberulous. Petals 5, free, slightly imbricate in bud, more or less spreading during anthesis, 3.4–4.1 by 1.1–1.4 mm, narrowly obovate to obovate, more fleshy and slightly incurved at the acute apex, thin and transparent near the base, inside glabrous, outside minutely puberulous. Staminal tube ca. 3 mm long (including the

FIG. 1. *Trichilia capitata* KLOTZSCH – a: fl. branch, ♂ ( $\times \frac{1}{2}$ ); b: part of inflorescence, ♂ ( $\times 3$ ); c: ♂ fl. ( $\times 3$ ); d: section of ♂ fl., petals removed ( $\times 10$ ); e: part of staminal tube, inside, ♂ ( $\times 10$ ); f: id., outside ( $\times 10$ ); g: section of ♀ fl., petals removed ( $\times 10$ ); k: branchlet with fr. ( $\times \frac{1}{2}$ ); m: fr., transverse section ( $\times 2$ ); n: seed ( $\times 2$ ); p: seed, aril removed to show raphe ( $\times 2$ ); r: cotyledons, the left with partly protruding radicle ( $\times 4$ ); s: seed in transverse section ( $\times 4$ ); t: portion of leaflet, beneath ( $\times 12$ ); v: transv. sect. of the midrib of a leaflet ( $\times 10$ ). – a and t: PHELPS 22; b: SWYNNERTON 1033; c–f: SCOTT ELLIOT 8806; g: KIRK s.n., Febr. 1859; k–s, and v: CHASE 2608.



anthers), 10-fid, cleft over about two-thirds of its length or more, free parts of the filaments (excluding the appendages) ca. 1 mm long, glabrescent outside, densely tomentose inside, connate part of the staminal tube ca. 0.5–1.0 mm long, not thickened, glabrous both sides; anthers dorsifix but attached near the base and seemingly basifix; attached by a very short ca. 0.2 mm long stalk, inserted near the base of the sinus between two narrowly triangular, somewhat rough lobes (appendages) of ca. 1 mm long, at the top of the free part of the filament; 0.9–1.2 by 0.3–0.4 mm, narrowly ovate, mucronulate at apex, rough, opening laterally, lengthwise, pollen well developed. Disk conspicuous, cupuliform, ca. 0.5 mm high, fleshy, incurved at the margin, glabrous, for the greater part free from the staminal tube, only at the base adnate to it. Pistillode scarcely or not expanded at the base, ovary sterile, indistinct, apparently without vestigial ovules; style 1.5–2.0 mm long, 0.2–0.3 mm diam., slender, glabrous; stigma ovoid or subglobular, 0.3–0.6 mm high by 0.4–0.5 mm wide, stigmatic tissue spongy, in a ring around the lower part, glabrous near the apex and there with 3 minute erect lobes and with a depression in the centre.

Female flowers: Floral characters similar to male flower, but anthers not dehiscing, not producing pollen. Ovary well developed, ovoid or subglobular, ca. 1 mm diam., densely pubescent especially in the upper part (hairs whitish, more or less appressed), 3-celled; ovules 2 in each cell, axile, collateral, pendular, epitropous; style slightly shorter than in male flower.

Infructescences ca. 2–4.5 (–10) cm long. Fruit a (2–) 3-chambered, globose capsule, ca. 1–1.5 cm diam., subtended by the persistent, slightly or not enlarged, leathery calyx, often mucronulate at apex (style remnant), drying dark brownish, tomentulose or glabrescent, loculicidally dehiscent, (2–) 3-valved, valves thick leathery or slightly woody (ca. 0.5–1 mm thick), transversely wrinkled.

Seeds 2 in each chamber, often one (or both) not or only partially developed, collateral; funicle attached near the base of the seed, ascending along the ventral side of it, recurving at the apex of the seed and running downwards again along the axillary placenta, and inserted near the base of it. Mature seeds glossy, reddish-brown, ca. 7 by 4–6 mm, more or less ovoid, pointed at the apex, arillate, arillus orange-red, fleshy, covering the seed for about one third, especially developed at the ventral side and forming a cushion at the apex; testa rather thick, firm, leathery, with conspicuous ventral raphe, reddish-brown or brown outside, pale brown inside; endosperm distinct, fleshy, white, covering the inner surface of the testa, locally up to 0.2–0.3 mm thick; cotyledons fleshy, white, plano-convex, tending to a more foliaceous type as compared with African representatives of section *Trichilia*, nearly circular or broadly obovate, ca. 5 mm diam.; radicle obovoid, ca. 1 × 1 mm, apical, partly included between the cotyledons, partly protruding.

Seedling not seen.

Taxonomic note. *T. capitata* is different by a number of characters from all other species of *Trichilia* as represented on the African continent. These characters are summarized in the following scheme.

<i>Trichilia capitata</i> KLOTZSCH	<i>Trichilia</i> species African continent
1. Calyx persistent in fruit.	Calyx never persistent in fruit.
2. Seed arillate.	Seed arillodiate (sarcotesta).
3. Seed with distinct raphe.	Seed without raphe.
4. Endosperm present.	Endosperm virtually absent.
5. Radicle exerted from cotyledons.	Radicle included between cotyledons.
6. Cotyledons more foliaceous.	Cotyledons thick and fleshy.

It may be questioned, whether *T. capitata* belongs in *Trichilia*. Several characters listed above for *T. capitata*, perhaps all, are also found, singly or to some extent correlated, in American *Trichilia* species. As long as a monograph dealing with the numerous American species of *Trichilia* is not available, it seems premature to decide on the proper taxonomic position of *T. capitata*. On one hand it may appear that *T. capitata* can be kept in *Trichilia sensu latiore*, and so would be a link with the American representatives of the genus. On the other hand, it certainly could be argued that *T. capitata* ought to be excluded from *Trichilia*, and must be referred to another genus (e.g. *Cipadessa* BL.), or represents an undescribed genus.

C. DE CANDOLLE (in A. and C.DC., Mon Phan. 1: 707. 1878) placed *T. capitata* together with *T. rubescens* OLIV. in the section *Apotrichilia* C.DC., a classification which was followed by subsequent authors (HARMS 1896, 1940 and VERMOESEN 1922). This classification cannot be maintained.

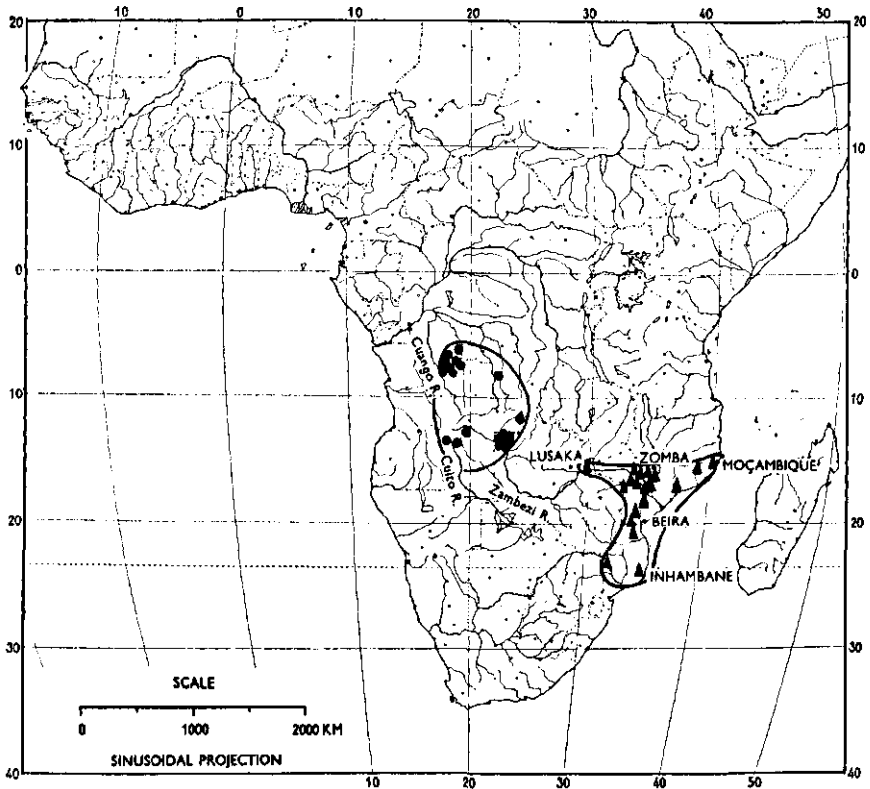
Sufficient detailed knowledge about the genus *Trichilia* as a whole being absent, the taxon *Trichilia capitata* KLOTZSCH is left in *Trichilia* in the present revision, but it is emphasized that it deviates significantly from all other African *Trichilia* species.

Distribution. Zambia, Malawi, Rhodesia, Mozambique.

Distributional, ecological and biological notes. *T. capitata* is mainly distributed in the basin of the lower Zambezi River. The northernmost limit is approximately 15° S.L., between Lusaka and the town of Moçambique. Southwards it just crosses the Tropic of Capricorn (near Inhambane; MENDONÇA no. 1983, LISC). As *T. capitata* is merely confined to lower altitudes (ca. 0–300 m), the distribution of the species is restricted to the lowlands of Mozambique, with a few outliers along the rivers in southern Malawi, eastern Rhodesia, and Zambia. In this area it seems to favour riparian woodlands. Sometimes it is found on termite mounds (PEDRO no. 4361, K).

In Malawi BRASS (no. 18006, K, MO, NY, PRE, SRGH) found it to be common on sandy riverbanks in the Lower Mwanza River, Chikwawa District (a tree, ca. 15 m tall, at an altitude of ca. 180 m).

PHELPS (no. 22, MO, SRGH) collected it in Rhodesia, in Mtoko District, near the Mozambique border, in a thicket on the banks of the Kafefe River. Stems brown-grey; flowers white.



MAP 1. Distribution of 1. *Trichilia capitata* KLOTZSCH (triangles) and 13. *Trichilia quadri-valvis* C.DC. (dots).

In Mozambique it was frequently collected. For example DE CARVALHO (no. 444, K) secured it near Murrupula: a treelet, 4–6 m tall, with greenish or cream-coloured flowers, honey-scented. WILD (no. 2575, BR, K, SRGH) found it near Tete, on the Mazoe River, in riverine fringe, at ca. 300 m altitude. He stated that it was a tree, ca. 9 m tall; the fruits showed a milky issue on section. Many collectors reported that the seeds are brown, partly concealed by a red aril (CHASE no. 2608, WILD no. 2575).

Vernacular names. Zambia: *mtarara-bu* (Boruma, W. of Feira). Mozambique: *namucuilicui* (near Murrupula), *tondua* (Sena), *garamagiua* (Beira region).

Uses. No particular uses came to my attention.

Specimens examined: Zambia: Boruma, ca. 80 km W. of Feira (♂ fl. Febr.) MENYHART 800 (E, K); *ibid.* (mature fr. Febr.) MENYHART s.n. (C).

Malawi: Chikwawa Distr., Lower Mwanza R. (mature fr. Oct.) BRASS 18006 (K, MO, NY, PRE, SRGH); *sin. loc.* (mature fr.) BUCHANAN 1107 (K); Lower Shire R. (mature fr. May) MELLER s.n. (K); Chiromo, Shire R. (♂ fl.) SCOTT ELLIOT 8806 (BM, K).



Rhodesia: Mtoko Distr., Kafefe R., near border with Mozambique (♂ fl. Jan.) PHELPS 22 (MO, SRGH); *ibid.*, Mkota Reserve (mature fr. Sept.) PHELPS 36 (K, SRGH).

Mozambique: Manica e Sofala Distr., ca. 80 km N. of Maringüé, Sabi R. (mature fr. June) CHASE 2608 (BM, NY, SRGH); near Murrupula (♂ fl. Jan.) DE CARVALHO 444 (K); Chemba, Nhangoma R. (immature fr. April) DE LEMOS and MACUÁCUA 110 (BM, K, SRGH); Vila Machado, near Mucúzi R. (fr. April) GARCIA 941 (BR); near Tette (♂ fl. Febr.) KIRK s.n. (K, neotype of *T. capitata*); between Lupata and Tette (♀ fl. Febr.) KIRK s.n. (K); between Tette and the sea coast (immature fr. April) KIRK s.n. (K); near Lumbo (mature fr. May) LEACH and RUTHERFORD-SMITH 10939 (FHO, SRGH); Inhambane, Govuro (fr. Sept.) MENDONÇA 1983 (LISC); between Matarara de Lucite and Dombe, Lucite R. (fl. buds Aug.) PEDRO 4361 (K); Chibabava, Lower Buzi R. (♂ fl. buds Dec.) SWYNNERTON 1033 (BM, K, SRGH); *ibid.* (♂ fl. buds Dec.) SWYNNERTON 1230 (BM); between Mopeia and Massingir (fr. July) TORRE 4464 (LISC); Zambézia Distr., Nhamacurra (♂ fl. Jan.) TORRE and CORREIA 14202 (LISC, WAG); Tete, Mazoe R. (mature fr. Sept.) WILD 2575 (BR, K, SRGH).

## 2. *Trichilia djalonis* A. CHEV.

Fig. 2; Map 2

*Trichilia djalonis* A. CHEV. in *Mém. Soc. Bot. France* 2 (8-d) : 146, 1912; A. CHEV., *Expl. Bot. Afr. Occ. Fr.* 1 : 113, 1920; by AUBRÉVILLE, *Fl. For. Côt.* Iv. 1st ed. 2 : 152, 1936 in the synonymy of *Trichilia prieureana* A. JUSS.; *id.* in 2nd ed. 2 : 184, 1959; by HUTCH. and DALZ., *Fl. W. Trop. Afr.* 1st ed. 1(2) : 493, 1928 in the synn. of *Trichilia prieureana*; by PELLEGRIN in *Not. Syst.* 9(1) : 23, 1940 in the synn. of *T. heudelotii* PLANCH. ex OLIV. (= *T. monadelpha* (THONN.) J. J. DE WILDE), erroneously cited as *T. djalonensis* A. CHEV.; HARMS in *Nat. Pflanzenf.* 2nd ed. 19B1 : 110, 1940; by KEAY in HUTCH. and DALZ., *Fl. W. Trop. Afr.* 2nd ed. 1(2) : 704, 1958 in the synn. of *T. heudelotii* (= *T. monadelpha*).

Typification: CHEVALIER no. 20356 (Guinea: Diaguissa, between Dalaba and Mamou, holotype, P); CHEVALIER no. 20349 (*ibid.*, paratype, P); CHEVALIER no. 20282 (*ibid.*, table-land near Dalaba, paratype, P).

Differential characters. Shrub or treelet, up to 6 m high (very rarely up to 15 m tall). Leaflets (1-)2-4(-5)-jugate, glabrous or glabrescent, shortly acuminate at apex. Connate part of staminal tube glabrous inside. Appendages ('lobes' or 'teeth') on the apex of the free part of the filament distinct, 0.4-1.0 mm long. Ovary 3-celled. Guinea to Ivory Coast, at altitudes above 650 m.

Description. Treelet or shrub, up to ca. 6 m high (rarely up to 15 m) and 15 cm diam. breast-high. Young twigs terete or flattened, reddish-brown to very dark brown, densely but shortly tomentose, indumentum greyish, older twigs terete, tomentose, indumentum gradually becoming looser with age and finally the twigs glabrescent, longitudinally wrinkled, outer bark thin, not peeling off, reddish-brown or grey-brown, inner bark thin, pale brown.

Leaves imparipinnate, sometimes paripinnate in the absence of the terminal leaflet, 9-30 cm long; petiole 2-8 cm long, shortly tomentose; rachis 1.5-7.0 (-9.5) cm long (in the rare case of a 3-foliolate leaf the rachis absent); petiolules

2-6(-8) mm, petiolules of terminal leaflets 4-8(-10) mm. Indumentum of rachis and petiolules similar to that of the petiole.

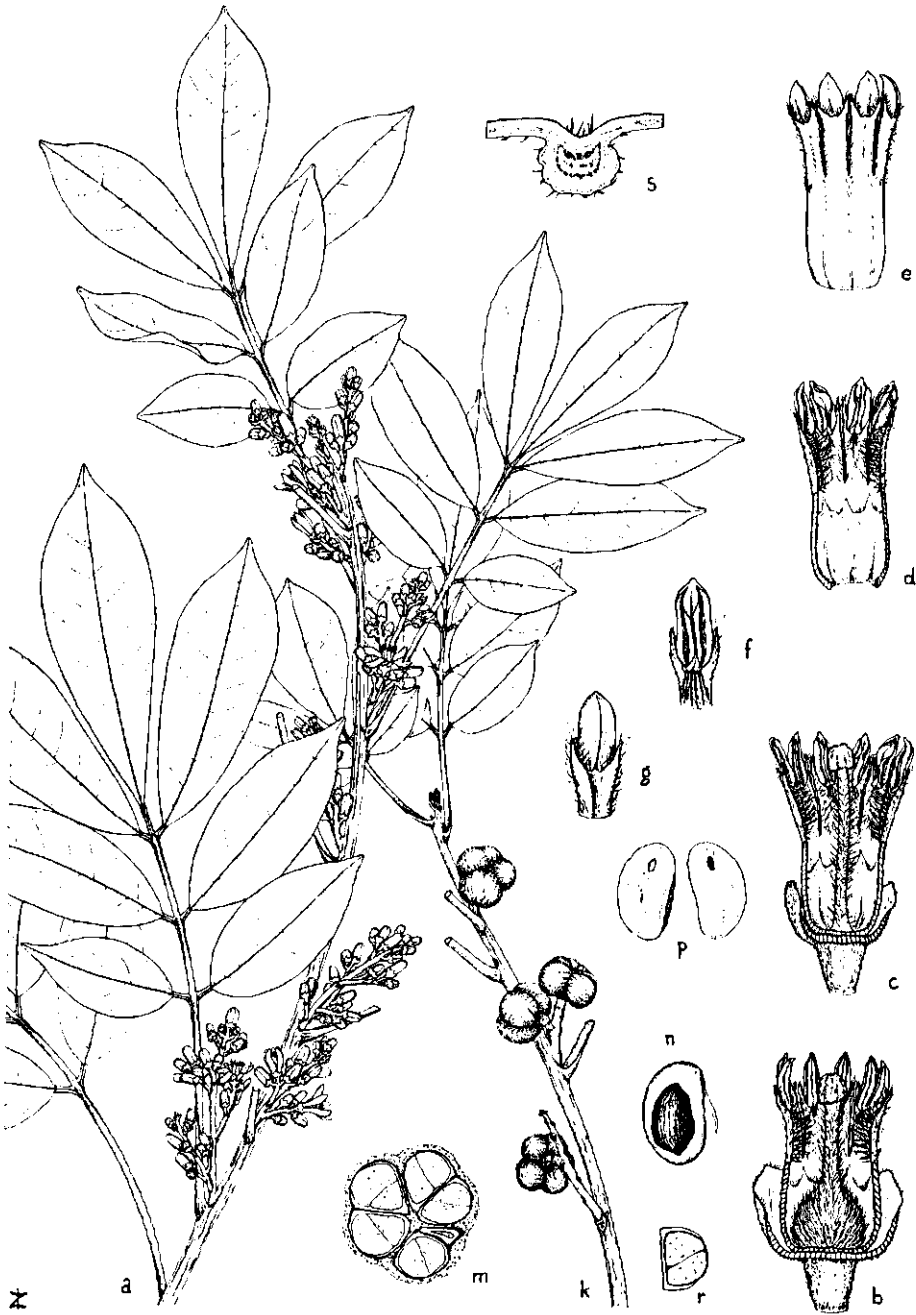
Leaflets (1-)2-4(-5)-jugate, opposite, not or very minutely and indistinctly glandular punctate, (1.5-)3.0-13.0(-17.0) by (0.7-)1.4-6.4(-7.6) cm, distal leaflets largest, narrowly obovate to obovate, proximal leaflets smaller, ovate; apex shortly acuminate, rarely acute, often mucronulate, base cuneate, sometimes obtuse, margin very narrowly revolute. Adult leaflets rather firm and coriaceous, circa glabrous both surfaces, except for some scarce indumentum on the midrib, and sometimes also on the lower surface of the leaflets, midrib and nerves impressed above, prominent beneath, nerves 6-12 on either side, opposite or not.

Inflorescences short, axillary or supra-axillary, near the top of the branches, 1.5-5.2 cm long, especially in female individuals often few-flowered. Bracts early deciduous, narrowly ovate or ovate, often boat-shaped, ca. 5.0-5.5 by 1.5-2.5 mm, acute, shortly tomentose.

Male flowers: Pedicels short, up to 1 mm long, often absent; bracteoles 1 or 2, sometimes absent, early deciduous, up to 3.0 by 1.0 mm, narrowly oblong or narrowly ovate, acute, abaxially pubescent, adaxially glabrescent, margin ciliate. Receptacle 1.3-1.8 mm long. Calyx cup-shaped, 2.0-2.7 mm high by 3.0-5.5 mm wide, 5-lobed, lobes 0.9-1.8 by (0.8-)1.2-2.6 mm, depressed ovate, obtuse at apex, outside appressed pubescent, irregularly wrinkled, inside glabrous, margin ciliate. Petals 7.4-11.0 by 2.0-2.9 mm, narrowly oblong, often slightly incurved at the rather fleshy obtuse apex, outside shortly pubescent, inside glabrous or somewhat rough. Staminal tube 5.5-8.0 mm long (including the anthers), 10-fid, incisions to about 2/5 or 1/2 of its length, free parts of the filaments 2.0-3.5 mm long, slightly tomentose outside, densely tomentose with long whitish hairs inside and on the margins, connate part of the staminal tube 3.0-4.0 mm long, glabrous both sides. Anthers inserted in the apical sinus between two rather long, narrowly triangular, tomentose lobes of 0.4-1.0 mm long (the lobes always distinct), at the top of the free part of the filament, 1.5-2.5 by 0.5-0.7 mm, narrowly oblong, mucronulate, hairy on the dorsal side near the base, otherwise rough. Pistillode not expanded at the base, ovary sterile, pubescent; style 5.0-5.8 mm long, 0.4-0.7 mm wide, pubescent; stigma globular, 0.8-1.2 mm diam.

Female flowers: Floral characters similar to male flower, anthers not dehiscent, not producing pollen. Ovary globular, ca. 2 mm diam., densely appressed pubescent, (2-)3-celled; style shorter than in male flowers, ca. 2 mm long.

FIG. 2. *Trichilia djalensis* A. CHEV. - a: fl. branch, ♂ ( $\times \frac{1}{2}$ ); b: section of ♀ fl., petals removed ( $\times 4$ ); c: id., ♂ fl. ( $\times 4$ ); d: part of staminal tube, inside, ♂ ( $\times 4$ ); e: id., outside ( $\times 4$ ); f: anther, ♂, ventral side ( $\times 6$ ); g: id., dorsal side ( $\times 6$ ); k: branch with fr. ( $\times \frac{1}{2}$ ); m: transverse section of immature fr. ( $\times 1$ ); n: seed ( $\times 1$ ); p: cotyledons ( $\times 1$ ); r: transv. sect. of seed ( $\times 1$ ); s: transv. sect. of the midrib of a leaflet ( $\times 20$ ). - a, e-g, and s: CHEVALIER 20349; b: LEEUWENBERG 2975; k-r: AKÉ ASSI 7360.



Fruit a 3-chambered, not stipitate, more or less 3-lobed, obovoid-subglobose capsule, 10–15 mm high by 16–20 mm wide, densely covered with a mealy indumentum of very short trichomes and of scattered, pale, tomentose hairs, often mucronulate (style remnant), loculicidally dehiscent, 3-valved; dry valves leathery, transversely wrinkled.

Seeds 2 in each chamber, collateral. Mature seed ca. 11–13 by 8 mm, arillodiate, plano-convex, flat on the adjacent sides; arillodium soft and fleshy, orange-red without, whitish within, ca. 0.2 mm thick, near apex and base of the seed up to 0.5 mm thick, occupying the surface of the seed for about 3/4, leaving a rather big, ovate, dorsal spot (ca. 10 by 5–7 mm) of glossy, leathery, very dark brown or blackish testa; cotyledons firm, fleshy, pale brown to olive-green, plano-convex, ca. 10–12 by 5–6 mm, radicle narrowly ellipsoid, longitudinally slightly flattened, 1.5–2.0 by 0.8–1.0 mm, between the cotyledons at about 1.5–2.0 mm beneath the apex. (Description of seeds only based on one specimen, viz. AKÉ ASSI no. 7360 in UC1).

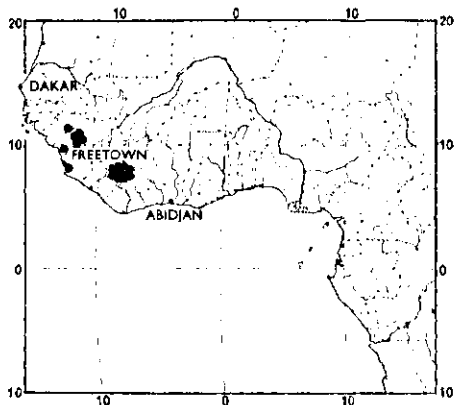
Seedling unknown.

Note. Though *T. djalonis* A. CHEV. was often reduced to the synonymy of *T. monadelpha*, to which it has indeed much affinity, I am convinced that it represents a taxon, which ought to be maintained as a species. Few or none really diagnostic, constant, characters can be used to segregate *T. djalonis* from *T. monadelpha*, but the combination of characteristics of both species is sufficient to distinguish between them. These differential characters are summarized in the following scheme.

Differential characters	<i>T. monadelpha</i>	<i>T. djalonis</i>
1. Leaflets	(3-)4-6(-7)-jugate	(1-)2-4(-5)-jugate
2. Hairiness inside connate part stam. tube	hairs always present, but indumentum rather variable	as a rule glabrous (very rarely some hairs)
3. Lobes on top free parts of filaments	very short or ca. absent, 0.1-0.2(-0.4) mm long	always distinct, 0.4-1.0 mm long
4. Fruit	ca. 15-25 mm diam.	ca. 10-20 mm diam.
5. Seed	15-17 by 8-11 mm	11-13 by 8 mm
6. Altitude of growing locality	0-650 m	above 650 m

When considering the table one must bear in mind that the data for *T. djalonis* are based on much less material than those for *T. monadelpha*. It is not impossible that when more material of *T. djalonis* becomes available, slight changes in the circumscription of that taxon are needed. On the other hand there also exists the possibility that more clear-cut, diagnostic characters are found, especially in fruits and seeds.

MAP 2.  
Distribution of 2. *Trichilia djalonis* A. CHEV.



Distribution. Guinea, Sierra Leone, Liberia and Ivory Coast.

Ecology. *T. djalonis* seems, according to available collectors notes, confined to altitudes above ca. 700 m. The type material was collected in Guinea, in the mountainous region of Fouta Djallon, at altitudes of ca. 1200 m (CHEVALIER nos. 20282, 20349 and 20356, all in P). POBÉGUIN, who collected it on the road from Pita to Touba, also on Fouta Djallon, stated that the flowers are greenish-white (POBÉGUIN no. 2027, P). SCHNELL collected it in Guinea on Mt. Nimba, at the border of the montane forest, which is found there at an altitude of ca. 1600 m (SCHNELL no. 3837, IFAN). ROBERTY found it near Conakry at ca. 700 m altitude (ROBERTY no. 17667, G).

In Sierra Leone it was collected by SCOTT ELLIOT on Mt. Gonkwi on the Talla Hills plateau, a locality in Northern Province which I could not trace with accuracy. No altitude is given, and the flowers are aberrant, being slightly hairy inside the connate part of the staminal tube (SCOTT ELLIOT no. 4986, K). Near Freetown it was collected by ROBERTY (no. 17305, G).

LEEUWENBERG and VOORHOEVE observed it in montane rain-forest on Mt. Nimba in Liberia, at an altitude of 900 m. They described it as a treelet, ca. 6 m high, growing on the border of a creek (LEEUWENBERG c.s. no. 4789, WAG).

In Ivory Coast several collections were made on Mt. Tonkoui, at altitudes of ca. 1150 m.

Summarizing it might be stated that *T. djalonis* probably occurs scattered throughout its distributional area everywhere where anthropogenous, climatic and/or edaphic factors provide above 700 m altitude a suitable habitat. This habitat is characterized by a rather low humidity during the dry season, often due to a thin soil-layer and the low and rather open forest that goes with this. The environmental conditions make this forest susceptible to human influences (fire), resulting in progressing impoverishment in humidity. *T. djalonis* forms part of this rather xerophilous vegetation-type. (See also SCHNELL, Vég. et Fl. Région Montagneuse du Nimba (as Mém. de l'IFAN No. 22) : 119, 346 and 493. 1952, where it is mentioned under the name *Trichilia heudelotii*, with the

restriction that it probably concerned a mountainous variety of that taxon).

Vernacular names. SCHNELL (no. 3837, IFAN) mentions in his field-notes the name *ouana* (dial. Konnoh) for the Guinean part of the Nimba Mountains.

Uses. No particular uses came to my attention.

Specimens examined: Guinea: Fouta Djallon, high-plateaux near Dalaba (♂ fl. Dec.) CHEVALIER 20282 (P, paratype); Fouta Djallon, Diaguissa, between Dalaba and Mamou (♂ fl. Jan.) CHEVALIER 20349 (P, paratype); *ibid.* (♂ fl. Jan.) CHEVALIER 20356 (P, holotype); Fouta Djallon, near Pita (♂ fl. Dec.) JACQUES-FÉLIX 677 (P); *ibid.*, road Pita-Touba (♂ fl. Dec.) POBÉGUIN 2027 (P); Kakoulima, near Conakry (young fr. April) ROBERTY 17667 (G); Nimba Mountains (immature fr. March) SCHNELL 624 (IFAN); *ibid.* (very young fl. buds Oct.) SCHNELL 3837 (IFAN).

Sierra Leone: Sugar loaf, near Freetown (immature fr. April) ROBERTY 17305 (G); Northern Prov., Talla Hills plateau, Mt. Gonkwi (♂ fl. Febr.) SCOTT ELLIOT 4986 (BM, K).

Liberia: Western Prov., Boporo Distr., Bangee (♂ fl. Nov.) BALDWIN 10364 (K); Nimba Mts. (♀ fl. Dec.) BOS 2404 (WAG); Loffa County, between Zorzor and Voinjama (♀ fl. Dec.) BOS 2580 (WAG); Nimba Mts., near iron-mines of L.A.M.C.O. (young fr. July) LEEUWENBERG and VOORHOEVE 4789 (WAG).

Ivory Coast: Mt. Tonkouï, N.W. of Man (nearly mature fr. Febr.) AKÉ ASSI 7360 (UCI); *ibid.* (immature fr. March) LEEUWENBERG 2975 (FHO, LISU, S, WAG); *ibid.* (♂ fl. Dec.) ROBERTY 15821 (G); *ibid.* (♀ fl. Jan.) SCHNELL 4138 (IFAN); *ibid.* (very young fr. Jan.) SCHNELL s.n. (IFAN).

### 3. *Trichilia dregeana* SOND.

Fig. 3, 3A, 19b; Map 3

*Trichilia dregeana* SOND. in HARVEY and SONDER, Fl. Cap. 1 : 246. 1860 (after the 10th of May); C.DC. in A. and C.DC., Mon. Phan. 1 : 658. 1878 (in the synonymy of *Trichilia dregei* E. MEY. ex DRÈGE, which name is a *nomen nudum*); MONRO in Proceed. Rhod. Sci. Ass. 8(2) : 67. 1908; WHITE and STYLES in Fl. Zamb. 2(1) : 298. 1963.

Syntypes: GUEINZIUS s.n. (South Africa: Port Natal (Durban), lectotype in TCD; iso-lectotypes, G, K, S); DRÈGE s.n. (South Africa: Port Natal (Durban), paratype, BM, G, L, OXF, S, W).

Note: The material of GUEINZIUS cited above is not numbered in TCD and K. The sheets in G and S bear the number '81'.

Synonyms: *Trichilia dregeana* var. *oblonga* HARV. ex SOND. in HARVEY and SONDER, Fl. Cap. 1 : 246. 1860 (published after the 10th of May); HARVEY, Thes. Cap. 1 : 49, tab. 76. 1859; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Type: SANDERSON s.n. (South Africa: Port Natal (Durban), holotype in TCD; isotype, K).

Note: HARVEY's 'Thesaurus Capensis' or: Illustrations of the South African Flora, is dated 1859 on the title-page, but seems to have been published in 1860 (cf. WHITE and STYLES in Fl. Zamb. 2(1) : 298. 1963). However, in the absence of

proof establishing effective publication at a date after 1859, it is necessary to accept the date on the title-page, viz. 1859 (Code, art. 30). It follows that the name *T. dregeana* var. *oblonga* HARVEY (1859), is not validly published because the species to which it was assigned (*T. dregeana* SOND.) was published only in 1860 (after the 10th of May 1860) (Code, art. 43). The name became valid at the moment *T. dregeana* SOND. was validly published (Code, art. 45), viz. after the 10th of May 1860.

*Trichilia dregei* E. MEY. ex C.DC. in A. and C.DC., Mon. Phan. 1 : 657. 1878; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Type: DRÈGE no. 39 (South Africa: Port Natal (Durban), holotype in P, not seen).

*Trichilia dregei* var. *oblonga* C.DC. in A. and C.DC., Mon. Phan. 1 : 658. 1878. Type: SANDERSON s.n. (South Africa: Port Natal (Durban), holotype in TCD; isotype, K).

*Trichilia strigulosa* WELW. ex C.DC. in A. and C.DC., Mon. Phan. 1 : 658. 1878; HIERN, Cat. Afr. Pl. collected by WELW. 1 : 133. 1896; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. 1896; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 820. 1915; EXELL c.s. in Journ. of Bot., Br. and Foreign 65 (Suppl. 1) : 63. 1927; GOSSWEILER and MENDONÇA, Carta Fitogeogr. Angol. : 88. 1939; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 314. 1951; DALE and GREENWAY, Kenya Trees and Shrubs : 271. 1961; WHITE and STYLES in Fl. Zamb. 2(1) : 298. 1963 (in synonymy to *T. dregeana* SOND.). Type: WELWITSCH no. 1311 (Angola: Cuanza Norte, Golungo Alto, near Ndele, holotype in BM; isotype, LISU (2 sheets)).

*Trichilia welwitschii* var. *grandiflora* C.DC. in A. and C.DC., Mon. Phan. 1 : 660. 1878; HIERN, Cat. Afr. Pl. collected by WELW. 1 : 133. 1896; EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 314. 1951 (in synonymy to *T. strigulosa*); HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Type: WELWITSCH no. 1308 (Angola: Cuanza Norte, Golungo Alto Distr., Alta Queta Mts., holotype in K (not seen); isotype, LISU).

*Trichilia vestita* C.DC. in Bull. Herb. Boiss. 4 : 428. 1896; HIERN, Cat. Afr. Pl. collected by WELW. 1 : 133. 1896; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 822. 1915; EXELL c.s. in Journ. of Bot., Br. and Foreign 65 (Suppl. 1) : 63. 1927; GOSSWEILER and MENDONÇA, Carta Fitogeogr. Angol. : 80 and 86. 1939; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 314. 1951 (in synonymy to *T. strigulosa*); WHITE and STYLES in Fl. Zamb. 2(1) : 298. 1963 (in syn. to *T. dregeana*). Syntypes: WELWITSCH no. 1309/1310-A (Angola, lectotype in G, iso-lectotypes, C, COL, K, P); WELWITSCH no. 1309/1310-B (Angola, paratype, C, COL, G, K, P).

Note: WELWITSCH no. 1309/1310, the base of *T. vestita* C.DC., is composed of specimens from two trees, belonging in the same taxon, viz. *T. dregeana* SOND. Partly WELWITSCH no. 1309/1310 consists of specimens secured from a male flowering individual (leaflets densely tomentose on the lower surface) and partly of a fruiting specimen (leaflets glabrescent on the lower surface). The specimens of WELWITSCH no. 1309/1310, present in various herbaria, can easily be segregated in this way.

For this reason, and directed by the Code, I divided WELWITSCH no. 1309/1310 into two parts. I labeled the flowering specimens 1309/1310-A, and the fruiting 1309/1310-B. WELWITSCH no. 1309/1310-A was designated as the lectotype as it agrees best with the original diagnosis of *T. vestita* C.DC.

*Trichilia stuhlmannii* HARMS in ENGL. Bot., Jahrb. 23 : 162. Sept. 1896; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. Febr. 1896 (*nomen*); ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 820. 1915; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; BREMAN, Check-Lists of the Br. Emp. No. 5, Tanganyika Terr. 2 : 319. 1949. Type: STUHLMANN no. 1136 (Tanzania: Bukoba, holotype destroyed in B, no isotypes seen). Neotype: GILLMAN no. 311 (Tanzania: Bukoba Distr., K).

Note: STUHLMANN no. 1136 was destroyed in Berlin. No isotypes could be traced. GILLMAN no. 311 (K), collected in the type locality, is here designated as the neotype; it matches the protologue of *T. stuhlmannii* HARMS closely.

*Trichilia dregeana* E. MEY. ex HARMS in Engl., Nat. Pflanzenf. 1st ed. 3(4) : 305. Febr. 1896; HARMS in ENGL., Bot. Jahrb. 23 : 163. Sept. 1896. Typification: somewhat doubtful, possibly GUEINZIUS s.n. from South Africa: Port Natal (Durban).

Note: The type material, as far as it was present in Berlin, is probably lost. To avoid further confusion I designate GUEINZIUS s.n. in TCD as the neotype (duplicates in G, K and S).

*Trichilia ledermannii* HARMS in ENGL., Bot. Jahrb. 46 : 161. 1911; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; PELLEGRIN in Not. Syst. 9(1) : 26. 1940. Type: LEDERMANN no. 2660 (Cameroun: Pasz Tchape, holotype destroyed in B, no isotypes seen). Neotype: JACQUES-FÉLIX no. 2945 (Cameroun: Banganté, P).

*Trichilia chirindensis* SWYNNERTON and E.G. BAK. in Journ. Linn. Soc., Bot. 40 : 39. 1911; EYLES in Trans. Roy. Soc. S. Afr. 5 : 389. 1916; STEEDMAN, Trees, shrubs and lianes of S. Rhod. : 33, pl. 31. 1933; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; BREMAN, Check-Lists of the Br. Emp. No. 5, Tanganyika Terr. 2 : 318. 1949. Type: SWYNNERTON no. 1 (Rhodesia: Gazaland, Chirinda Forest, holotype in BM; isotype, K).

*Trichilia splendida* A. CHEV. in Bull. Soc. Bot. Fr. 58 (Mém. 8) : 147. 1912; CHEVALIER, Expl. Bot. Afr. Occ. Fr. 1 : 115. 1920; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928. AUBRÉV., Fl. For. Côt. Iv. 1st ed. 2 : 156, pl.



184 (1,2,3). 1936; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 26. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 159, fig. 9 and pl. 4. 1941; EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed. : 198. 1952; STANER and GILBERT in Fl. Cong. Belg. 7 : 165. 1958; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958; AUBRÉV., Fl. For. Côt. Iv. 2nd ed. 2 : 187, pl. 194 (1,2,3). 1959; WHITE and STYLES in Fl. Zamb. 2(1) : 298. 1963 (in synonymy to *T. dregeana*). Type: CHEVALIER no. 20708 (Guinea: Kissidougou, holotype in P; isotypes, BR, COI, K).

*Trichilia umbrosa* VERMOES. in Rev. Zool. Afr. 10(1), Suppl. Bot. : B53. 1922; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 159, fig. 9 and pl. 4. 1941 (in syn. to *T. splendida*); EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed. : 198. 1952 (in syn. to *T. splendida*); STANER and GILBERT in Fl. Cong. Belg. 7 : 165. 1958 (in syn. to *T. splendida*); WHITE and STYLES in Fl. Zamb. 2(1) : 298. 1963 (in syn. to *T. dregeana*). Syntypes: VERMOESEN no. 1999 (Congo: Mayombe, Temvo, lectotype, BR); VERMOESEN no. 1926 (Congo: Mayombe, Temvo, paratype, BR, K); VERMOESEN no. 1948 (Congo: Mayombe, Temvo, paratype, BR, K).

Note: VERMOESEN in the protologue to *T. umbrosa* (l.c.: B57. 1922), cited 'VERMOESEN no. 1919' as one of the syntypes. No doubt, this is due to a printer's(?) error; it was intended to refer to 'VERMOESEN no. 1999'.

*Trichilia schliebenii* HARMS in Notizbl. Bot. Gart. Berl. 11 : 1070. 1934; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; BRENAN, Check-Lists of the Br. Emp. No. 5, Tanganyika Terr. 2 : 319. 1949; WHITE and STYLES in Fl. Zamb. 2(1) : 299. 1963 (in syn. to *T. dregeana*). Type: SCHLIEBEN no. 3636 (Tanzania: N.W. side of Uluguru Mts, Morogoro Distr., holotype destroyed in B; lectotype, G; iso-lectotype, BM).

Nomina nuda. *Trichilia dregei* E. MEY. ex DRÈGE, Zwei Pflanzengeogr. Docum., in Besondere Beigabe zur Flora 2 : 227. 1843, *nom. nud.* Based on: DRÈGE s.n. (South Africa: Port Natal (Durban), 'in Wäldern und Holzungen', BM, G, L, OXF, S, W).

*Trichilia tomentosa* A. CHEV., Expl. Bot. Afr. Occ. Fr. 1 : 115. 1920, *nom. nud.*, non v. HUMBOLDT, BONPLAND and KUNTH 1822; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928 (*nomen*); PELLEGRIN in Not. Syst. 9(1) : 26. 1940 (cited as a *nomen* by *T. splendida*); HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940 (*nomen*); HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958 (cited as a *nomen* by *T. splendida*). Cited specimen: CHEVALIER no. 12916 (Guinea: Diaguissa; P, not seen).

Note: *T. tomentosa* A. CHEV. (l.c., 1920) was published as a *nomen nudum*. Moreover, *T. tomentosa* is a homonym of *Trichilia tomentosa* H., B. et K. (in Nov. Gen. 5 : 215. 1822). *Trichilia tomentosa* A. CHEV. must be rejected.

*Trichilia redacta* BULLOCK ex BURTT DAVY and BOLTON, Check-Lists Forest Trees and Shrubs Brit. Emp. 1: 64. 1935, *nom. nud.* Cited specimen: SNOWDEN no. 1971 (Uganda: Mengo region, near Kampala, K).

Nomen anglice tantum descriptum: *Trichilia redacta* BULLOCK ex EGGELING, Indig. Trees Uganda Prot. 1st ed.: 104. 1940.

Note: EGGELING (l.c.) only supplied a description in English. This is contrary to the Code (art. 36). SNOWDEN no. 1971 (the base of *T. redacta* BULLOCK ex BURTT DAVY and BOLTON, *nomen nudum*) was not cited by EGGELING. Instead he cited EGGELING nos. 159, 1502 and 1924, and FYFFE 97/13. It cannot be decided, therefore, whether or not *T. redacta* BULLOCK ex EGGELING is identical with *T. redacta* BULLOCK ex BURTT DAVY and BOLTON. Anyhow, the name *T. redacta* BULLOCK ex EGGELING was not validly published, and must be rejected.

In EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed.: 198. 1952, the name *T. redacta* BULLOCK was merely cited in the synonymy of *T. splendida* A. CHEV. For this reason, *T. redacta* is not validated (art. 34 of the Code). In addition, SNOWDEN no. 1971 is cited (l.c., 1952) together with several other specimens. EGGELING no. 1502, in the 1st ed. of 1940 referred to *T. redacta*, is now (in 1952) referred to *Trichilia megalantha* HARMS. From this, and from the slightly altered description in this 2nd edition, it appears that the name *T. redacta* BULLOCK was not validated by a reference to the effectively published first edition, because there the species was circumscribed differently (cf. Code art. 32, note 1), apart from the fact that the diagnosis of 1940 was not in Latin.

Diagnostic and differential characters. Evergreen tree up to 30 m tall. Twigs dark reddish-brown or greenish-brown, without corky bark, nor with the bark peeling off. Leaflets (1-)2-5-jugate, brown or dark brown when dried. Inflorescences not condensed, often few flowered. Petals (9-)13-22(-24) mm long. Connate part of the staminal tube glabrous inside. Ovary 3-celled. Fruit broadly obovoid to subglobose, ca. 20-40 mm diam., not or very shortly stipitate. Especially distributed in E. Africa from Ethiopia to Durban, in evergreen forest patches at altitudes above 800 m. In W. Africa confined to altitudes above 800 m. In W. Congo and near Durban also found at lower altitudes.

Description. Medium-sized or even large evergreen tree, (6-)12-25(-30) m tall and (20-)30-100(-200) cm d.b.h., bole usually cylindrical, rarely fluted, 4-12(-16) m long before branching, often slightly buttressed at base, buttresses sometimes up to 3.5 m high, crown large, spreading, mostly much branched, dense and often rounded, umbrageous. Bark up to 3-4 cm thick, not corky, outside smooth or only slightly rough, with a few longitudinal fissures or finely cracked, pale grey, grey or grey-brown, sometimes orange tinged; slash rather soft, cream-coloured, quickly turning salmon-pink and reddish-brown, in many cases vertically brownish and white streaked, sometimes with cedar

smell, often slowly exuding drops of rather thick, off-white coloured latex from near the cambium; sapwood pale creamy-yellow.

Young leaf-bearing twigs often flattened or angular, otherwise terete, dark reddish-brown or greenish-brown, puberulous to densely tomentose, indumentum pale grey or pale brown; lenticels not distinct or absent; older (often still leaf-bearing) twigs more or less terete, usually rather stout, (4-)7-13(-16) mm diam., with hard, dark brown or reddish, longitudinally wrinkled outer bark (dilation lines), not peeling off, the indumentum gradually disappearing; scars of fallen leaves (if present) conspicuous, very broadly obovate, often more or less flattened or slightly depressed at the top (horseshoe-shaped), and with a separate scar of a fallen inflorescence or with a bud just above it; wood whitish or pale yellowish-brown, rather soft.

Leaves imparipinnate, (7-)15-55(-65) cm long, loosely spread on the younger branches; petiole terete, flattened on the upper surface, especially in the upper part and near the base, glabrescent or densely greyish or yellowish-grey pilose (indumentum strongly varying, all intermediates occur; sometimes the flattened side of the petiole is densely hairy, the remaining part nearly glabrous), longitudinally finely wrinkled, (2.5-)3.5-12.5(-16.5) cm long, pulvinus slightly swollen, contracted at the insertion; rachis 2-15(-23) cm long, flattened or sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), otherwise, especially for the indumentum, similar to the petiole; petiolules narrowly sulcate on the upper surface, the raised edges of the petiolular furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see above), glabrescent, densely tomentose or pilose, petiolule of terminal leaflet (3-)5-15(-40) mm, the others 2-7(-8) mm long.

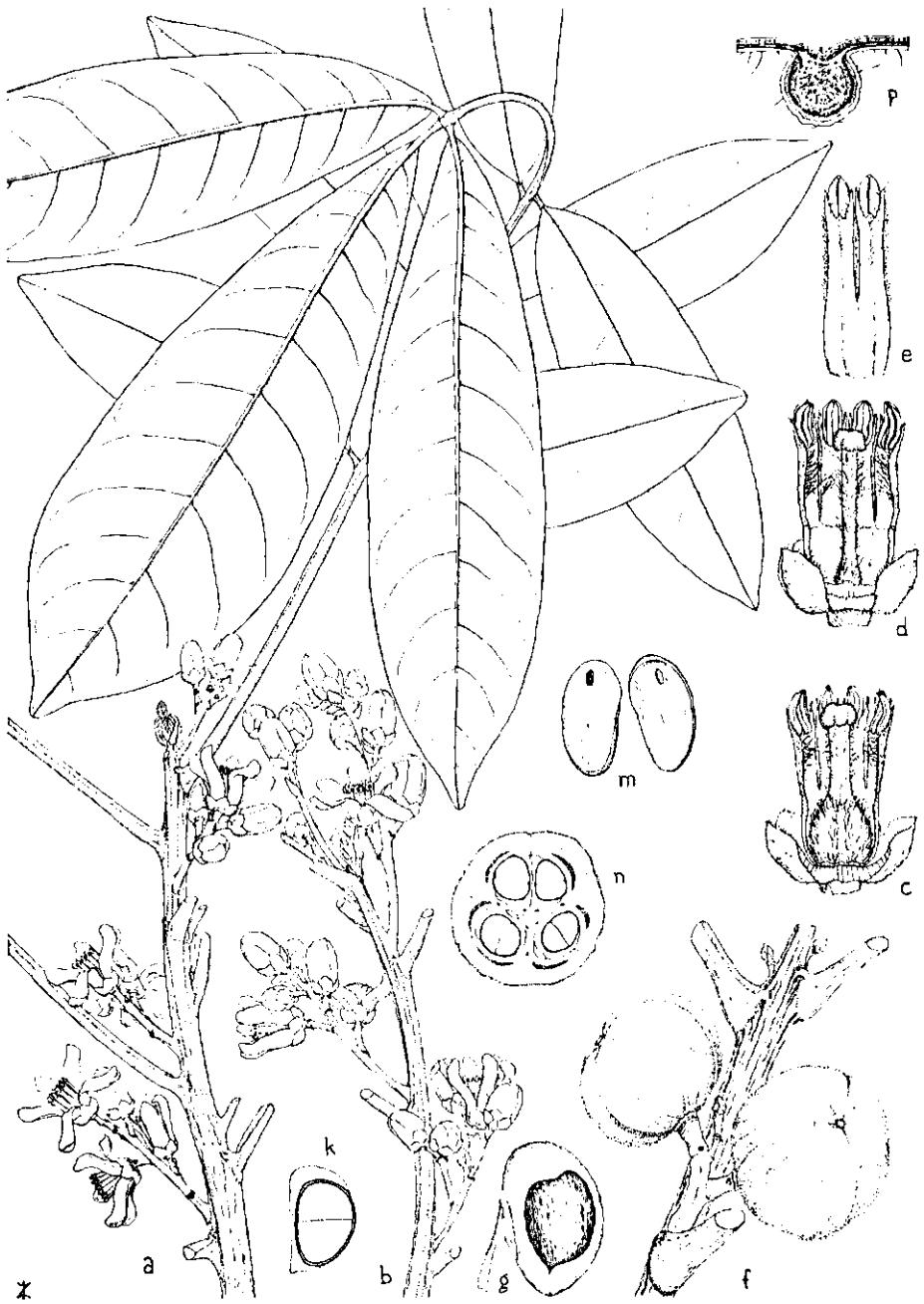
Leaflets (1-)2-5-jugate (extremely rare 6-jugate!), opposite or subopposite, sometimes distinctly glandular dashed and dotted (especially in young leaves), often not or only indistinctly so, variable in shape and especially in size, (3.0-)3.5-25(-30.5) by 1.5-9(-12) cm, distal leaflets largest, narrowly obovate to obovate, narrowly oblong to oblong or narrowly elliptic to elliptic, proximal leaflets smaller, ovate (narrowly ovate) or elliptic; apex acute or acuminate, more rarely obtuse, sometimes slightly retuse and mucronulate (midrib), base cuneate or obtuse, rarely truncate or even subcordate, usually drying dark brown or brown, sometimes pale brown or greenish-brown. Upper surface glossy or not, glabrous but rather often with some indumentum in the furrow of the impressed midrib, and this indumentum varying in length and in density, nerves (7-)8-14(-17) on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin; veins indistinct. Lower surface with varying indumentum, often glabrous or glabrescent but also rather often with a more or less dense indumentum of pilose hairs (irrespective of age), the hairs often with a brownish resinous central canal, midrib and nerves very prominent, veins slender, often distinct, sometimes glandular-translucent, rather closely reticulate.

Inflorescences usually rather short, and especially in female specimens always

only few-flowered, in male specimens sometimes many-flowered and more elongated, paniculately arranged, axillary, supra-axillary, or pseudo-terminal, 2.5–11(–24) cm long; main axes flattened, often angular, puberulous or tomentose, once or two times branching before the pedicel, branches short, rarely up to 5 cm long. Bracts very early deciduous, ovate to triangular, elliptic or narrowly elliptic, 5–9(–11) by 3–4.5 mm, acute or obtuse at apex, abaxially appressed pubescent, adaxially puberulous or glabrous, margin ciliate.

Male flowers: On up to 4 mm long, more or less densely pubescent pedicels (pedicels mostly shorter and sometimes almost lacking); bracteoles usually 2, sometimes only 1 or absent, early deciduous, 2–4 by 1.5–2.5 mm, elliptic, broadly elliptic or ovate, acute or obtuse, abaxially pubescent, adaxially glabrous, margin ciliate, hairs often with a brownish or reddish, resinous content in a central canal. Receptacle cylindrical, slightly tapering to the base, 0.5–2.0 (–3.0) mm long, longitudinally ridged, appressed pubescent or tomentose, jointed to the pedicel. Calyx cup-shaped, 3.5–5.5(–7.5) mm high, by 5.5–9.0 (–11.0) mm wide, usually 5-lobed to 1/3 till 2/3 of its length, rarely more, lobes imbricate, 1–3(–4) by (1–)2–4(–5) mm, broadly ovate, very broadly ovate or depressed ovate, obtuse at apex, especially in the centre rather fleshy, outside appressed pubescent or tomentose, irregularly wrinkled, inside smooth and glabrous, margin ciliate. Petals (4–)5, free (imbricate in bud, spreading and often reflexed during anthesis), fleshy especially in the upper part, (9–)13–22 (–24) by 3–5(–6.5) mm, narrowly oblong, often slightly incurved at the obtuse apex, inside rough, glabrescent or puberulous, outside appressed puberulous or shortly tomentose. Staminal tube (8.5–)10–16(–17) mm long (including the anthers), 10-fid, incisions to about 1/2 of its length, free parts of the filaments (3.5–)4.5–7.5(–9.5) mm long, glabrous or sparsely puberulous outside, densely villous inside and on the margins, connate part of the staminal tube (3.0–)4.0–7.5(–8.0) mm long, glabrous (rarely slightly hairy) and fleshy inside, the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into raised wedge-shaped issues, the tops of the wedges usually alternating with the bases of the free parts of the filaments, the connate part glabrous or slightly rough outside; anthers dorsifix, inserted in the apical sinus of the free part of the filament, between two narrowly triangular hairy lobes of 0.5–1.8 mm long, (1.6–)2.0–3.3 by 0.8–1.2 mm, narrowly elliptic or elliptic or narrowly oblong, often mucronulate, glabrous, rough, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, ca. 1 mm diam., more or less densely appressed pubescent, rarely glabrescent, vestigial ovules present; style 6–8.5

FIG. 3. *Trichilia dregeana* SOND. – a: fl. branch, ♀ (× 1/2); b: fl. branch, ♂ (× 1/2); c: section of ♀ fl., petals removed (× 2); d: id., ♂ fl. (× 2); e: part of staminal tube, outside, ♂ (× 2); f: branch with fr. (× 1/2); g: seed (× 1); k: seed in transverse section (× 1); m: cotyledons (× 1); n: transv. sect. of fr. (× 1/2); p: transv. sect. of the midrib of a leaflet (× 10). – a: SNOWDEN 1971; b, d and e: SCHEEPERS 1042; c: MEYER 7932; f–p: W. J. DE WILDE and DE WILDE-DUYFJES 6913 (from spirit mat.).



(-12) mm long, 0.5-1 mm wide, variously hairy, often glabrescent in the upper part; stigma discoid to capitate, 1.0-1.8 mm high by 1.7-2.8 mm wide, densely velutinous by very minute trichomes, flattened and crateriform at the glabrous, slightly 3-lobed apex.

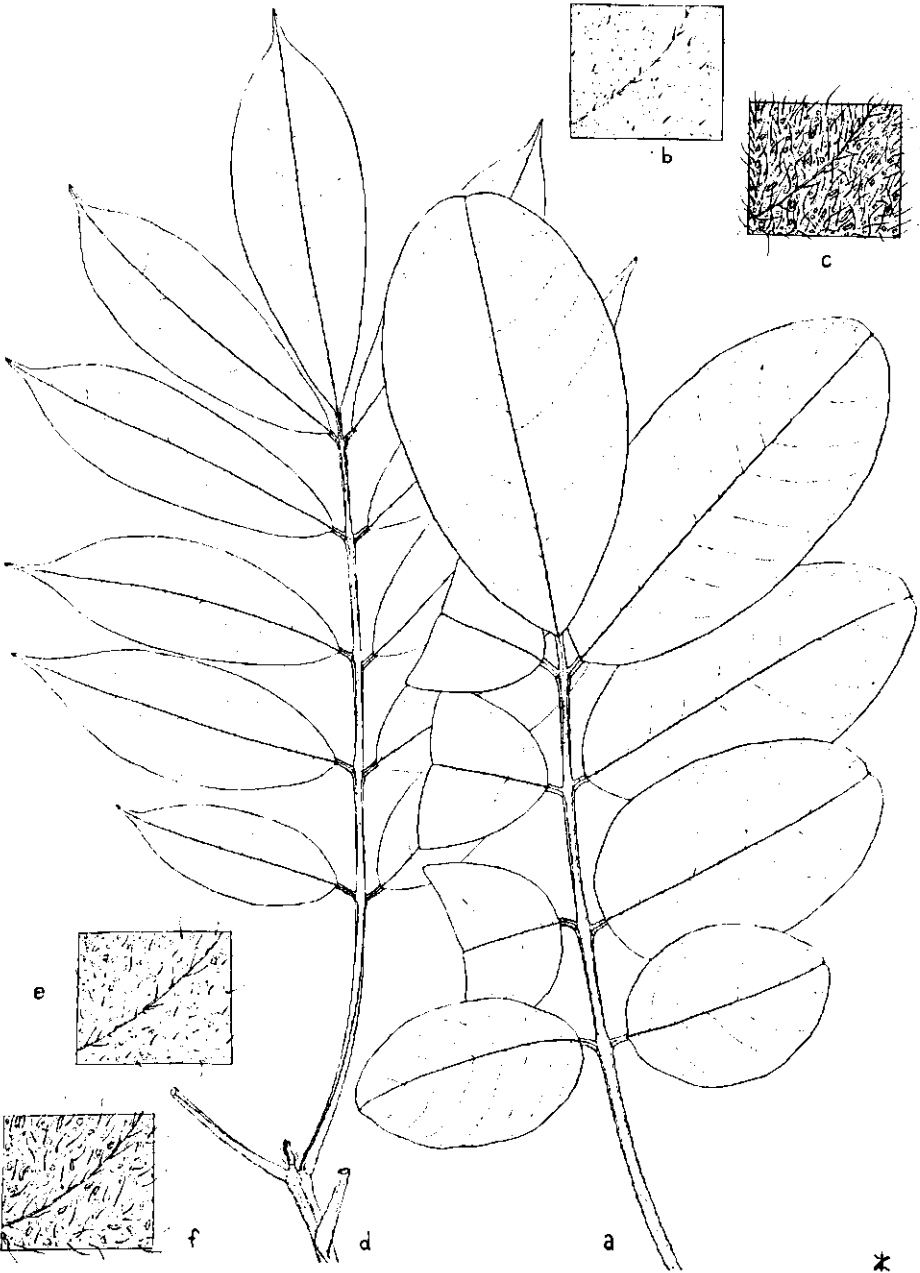
Female flowers: Similar to male flower but anthers not dehiscent, not producing pollen. Connate part of the staminal tube often more or less hairy inside, especially towards the base, however, sometimes glabrous as in male flowers. Ovary well developed, ovoid, ca. 3-6 mm diam., densely, more or less appressed, pubescent, 3(-4)-celled; ovules 2 in each cell, axile, collateral; style and stigma as in male flower.

Infructescences up to 10 cm long, mostly considerably shorter, only one or two fruit(s) (rarely 3 or even 4) of each infructescence developing into maturity; fruit a 3(-4)-chambered, not (or only shortly) stipitate capsule, broadly obovoid to subglobose, during immaturity greyish-green, often bright purplish or pinkish tinged, slightly 3(-4)-lobed, in transverse section exuding a whitish or cream-coloured latex from the ovary-wall; mature fruits nearly round in transverse section, ca. 20-35 mm high by 25-40 mm wide (stipe excluded), (stipe up to 3 mm long, most often completely absent), very densely covered with a pale brown velvety indumentum of very short and rather stiff hairs, mixed with fewer, but rather long and distinct, tomentose hairs, mucronulate or even mucronate (style remnant), loculicidally dehiscent, 3(-4)-valved; dry valves thick leathery, very broadly obovate, acute at apex, transversely wrinkled.

Seeds 2 in each chamber, very often one or both not or only partially developed, collateral, beneath the apex or towards the middle attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Mature seeds 18-25 by 9-15 mm, arillodiate, plano-convex, flat on the adjacent sides; testa for the largest part developed into a fleshy arillodium (sarcotesta), arillodium scarlet or orange-red without, whitish within, locally up to 2.5 mm thick, occupying the surface of the seed for about 3/4-4/5, leaving a large, variously shaped but often more or less obovate to rectangular, glossy, very dark brown or blackish spot of thin leathery testa, which measures ca. 9-13 mm in diam.; cotyledons firm, fleshy, pale brown, plano-convex, 14-19 by 6-9 mm; radicle obovoid, longitudinally slightly flattened, sometimes a few hairs on edge, in between the cotyledons at 1-2.5 mm beneath the apex.

Seedling: Germination epigeal. Taproot. Hypocotyl up to 4 cm long (probably always much longer than in *Trichilia emetica* subsp. *emetica*), glabrous or pubescent. Cotyledons opposite or slightly sub-opposite, sessile, fleshy, not

FIG. 3A. *Trichilia dregeana* SOND. - Different shapes of leaflets and types of indumentum - a: leaf with leaflets more or less obtuse at apex ( $\times \frac{1}{2}$ ); b: portion of leaflet, beneath ( $\times 2$ ); c: id. ( $\times 2$ ); d: leaf with leaflets more or less acuminate at apex ( $\times \frac{1}{2}$ ); e: portion of leaflet, beneath ( $\times 2$ ); f: id. ( $\times 2$ ). - a-b: SCHEEPERS 1042; c: WELWITSCH 1308; d-e: W. J. DE WILDE and DE WILDE-DUYFJES 6913; f: WELWITSCH 1311.



developing. Epicotyl 4–8 cm long, pubescent. First two leaves usually opposite, simple, petiolate, ca. 7–9 by 2.5–4.5 cm, more or less elliptic, cuneate or obtuse at base, acute or slightly acuminate at apex, glabrous above except for a rather long indumentum in the furrow of the impressed midrib, thinly puberulous beneath, hairs rather long and especially on the prominent midrib and nerves. Petiole 4–6 mm long, pubescent. Following leaves alternate, simple, similar to the above-described or slightly larger and with petioles up to 1 cm long. The seventh or eighth leaf after the cotyledons may be compound and is found to be three-foliolate on a ca. 6 months old seedling.

Notes to the synonyms. *Trichilia dregeana* var. *oblonga* HARV. ex SOND. (l.c., 1860) is based on a specimen collected by SANDERSON near Durban in South Africa. The holotype in TCD is not numbered, an isotype in K has on the label, written in pencil, the number '231'. It concerns a male, flowering specimen which in every respect comes within the variation of *T. dregeana*.

The apex of the leaflets is very variable, and changes from obtuse to more or less acute. Noteworthy in the SANDERSON specimen is the occurrence of very small proximal leaflets (2 by 1.5 cm) together with a much larger terminal leaflet (7.8 by 3.2 cm) on the same leaf. The leaflets are nearly glabrous on both sides. SANDERSON s.n. is interesting as it shows, even in one specimen, the variability in shape and dimensions of the leaflets in *T. dregeana*. It is not warranted to maintain *T. dregeana* var. *oblonga* HARV. ex SOND. as a distinct variety in *T. dregeana* SOND.

*Trichilia dregei* E. MEY. ex C.DC. (l.c., 1878) is based on DRÈGE no. 39, collected near Durban in South Africa also. C. DE CANDOLLE examined DRÈGE no. 39 conserved in the Paris herbarium; he stated that it had been named *T. dregei* E. MEY. already. C. DE CANDOLLE reduced *T. dregeana* to the synonymy of *T. dregei*. Although I did not see DRÈGE no. 39 in P, DE CANDOLLE's description demonstrates that it belongs in *T. dregeana* SOND. I even suspect strongly that DRÈGE no. 39 at Paris, is a duplicate of the specimens preserved at G, L, OXF, S, and W as 'DRÈGE s.n.'; a paratype of *T. dregeana* SOND. It is clear that DE CANDOLLE considered the *nomen nudum* *Trichilia dregei* (1843) as the oldest available name, and used it accordingly. *T. dregei* E. MEY. ex C.DC. must be placed in the synonymy of *T. dregeana* SOND.

On describing *Trichilia dregei* var. *oblonga*, C. DE CANDOLLE (l.c., 1878) referred to *T. dregeana* var. *oblonga* HARV. ex SOND., based on SANDERSON s.n. Here he evidently followed the same line of thought as given above for *T. dregei* E. MEY. ex C.DC. More details concerning SANDERSON s.n. are already given above.

*Trichilia strigulosa* WELW. ex C.DC. (l.c., 1878) rests on WELWITSCH no. 1311 (from Angola). The holotype (BM) I did not see, but an isotype I had on loan from LISU. It is a male, flowering specimen. The leaflets are narrowly obovate, and rather distinctly acuminate (a terminal leaflet with obtuse apex also occurs), the base is cuneate. The apparently young leaflets are very minutely glandular punctate. Except for the indumentum in the furrow of the impressed midrib,



the leaflets are glabrous above. The lower surface bears a lax indumentum of rather long pilose hairs. Rachis and petiole are densely pilose. The large dimensions of the flowers (petals 18–19 mm long), the rather shallowly lobed calyx, the short and only few-flowered inflorescences together with the appearance of the twigs (reddish-brown, not flaking), indicate that this is only one of the numerous forms of the highly variable species *T. dregeana*. Similar hairy specimens are found in Cameroun (W.J. DE WILDE c.s. no. 2370-B, WAG), in Ethiopia (W.J. De WILDE c.s. no. 10779, WAG). Similar specimens were collected almost throughout the distributional area of the species. I did not manage to find any correlation between variation in indumentum and other, also varying, characters; all characters seem to vary independently. Moreover, the amount of indumentum is varying in the same locality from nearly glabrous to densely pilose (compare e.g. WELWITSCH no. 1309/1310-A and WELWITSCH no. 1309/1310-B, syntypes of *T. vestita* C.DC.). At an infraspecific level it appears impossible to distinguish taxa in a satisfying manner. *T. strigulosa* WELW. ex C.DC. must be considered a later synonym of *T. dregeana* SOND.

*Trichilia welwitschii* var. *grandiflora* C.DC. (l.c., 1878) is based on WELWITSCH no. 1308, a male flowering specimen collected on the Alta Queta Mountains in Angola. I examined an isotype from LISU, the holotype (at K) I did not see. This specimen has very much in common with WELWITSCH no. 1311, the base of *T. strigulosa*. The leaflets, however, are elliptic to obovate, obtuse or acute at the top, more rounded at the base. In all other respects the resemblance is complete. EXELL and MENDONÇA (l.c., 1951) rightly reduced this to the synonymy of *T. strigulosa*. DE CANDOLLE (l.c., 1878) described the ovary as 2-locular (which possibly induced him to consider it a variety in *T. welwitschii*). In a few flowers which I was able to examine, however, I found a 3-locular ovary. Beyond doubt, *T. welwitschii* var. *grandiflora* belongs in the synonymy of *T. dregeana* SOND.

*Trichilia vestita* C.DC. (l.c., 1896) was based on WELWITSCH no. 1309/1310, collected in Angola. Above I pointed out that WELWITSCH no. 1309/1310 is a mixture of two individuals. A segregation was made, leading to WELWITSCH no. 1309/1310-A (lectotype), and WELWITSCH no. 1309/1310-B (paratype). WELWITSCH no. 1309/1310-A, a male, flowering individual, fully matches WELWITSCH no. 1308, the type of *T. welwitschii* var. *grandiflora* C.DC. It even seems possible that WELWITSCH no. 1309/1310-A and WELWITSCH no. 1308 were originally collected from the same tree. WELWITSCH no. 1309/1310-B concerns a fruiting specimen (fruits 3-locular) with glabrescent leaflets. When describing *T. vestita*, C. DE CANDOLLE must have seen only the material sent to Geneva, which consists of the hairy male individual (WELWITSCH no. 1309/1310-A) together with loose fruits (without leaves) of WELWITSCH no. 1309/1310-B. This explains the fact that in the protologue to *T. vestita* it is only stated: 'foliolis... subtus dense villosis', and also: 'capsulae valvae 3 ellipticae circiter 22 mm longae'. The glabrescent leaflets which belong to these fruits are not mentioned, being unknown to the describing author. Although by coincidence C. DE CANDOLLE used the, by their indumentum so widely different specimens

WELWITSCH no. 1309/1310-A and -B as the base for *T. vestita*, this illustrates strikingly the variability of this character. *T. vestita* C.DC. must be reduced to the synonymy of *T. dregeana* SOND.

*Trichilia stuhlmannii* was described by HARMS in 1896. The holotype, STUHLMANN no. 1136 was lost in Berlin. GILLMAN no. 311 (K) from the type locality, viz. Bukoba in Tanzania, was designated as the neotype. *T. stuhlmannii* HARMS is a later synonym of *T. dregeana* SOND.

*Trichilia dregeana* E. MEY. ex HARMS (l.c., Febr. 1896) must be accepted as validly published by the statement that it has glabrous leaves, and grows in Natal. No type material was indicated. Later on HARMS (l.c., Sept. 1896), discussing *T. stuhlmannii*, writes: 'Die kahlen Blätter teilt die STUHLMANN'sche Pflanze mit *T. dregeana* E. MEY. (vergl. HARVEY-SONDER, Fl. Cap. I. 246), die mir leider nur in Fruchtexemplaren (GUEINZIUS) bekannt ist, sodass ich über ihre Unterschiede gegenüber *T. stuhlmannii* nichts angeben kann, die ihr auch in der Form der Blätter sehr ähnlich ist'.

From this it appears that HARMS must have seen a duplicate of GUEINZIUS s.n. when he prepared the manuscript for his treatise of the *Meliaceae* (Nat. Pflanzenf. 1st ed. 3(4) : 258. 1896). GUEINZIUS s.n. in Berlin was probably lost, and so I designated GUEINZIUS s.n. in TCD as the neotype. Doing so, the name *T. dregeana* E. MEY. ex HARMS becomes a homotypic synonym of *T. dregeana* SOND.

*Trichilia ledermannii* was described by HARMS in 1911. The holotype, LEDERMANN no. 2660 was lost in Berlin. It was collected in Cameroun, in Tchape pass, where it was found in a small gallery-forest on rocky soil, at 1420 m altitude. JACQUES-FÉLIX no. 2945 (P) collected near Banganté, was designated as the neotype. *T. ledermannii* HARMS is a later heterotypic synonym of *T. dregeana* SOND.

*Trichilia chirindensis* SWYNNERTON and E. G. BAKER (l.c., 1911) is based on SWYNNERTON no. 1, collected in Rhodesia. It concerns a male, flowering specimen. The inflorescences are rather long (up to 11 cm), and bear more numerous flowers than is usual in *T. dregeana*. However, all other characters equal *T. dregeana*. *T. chirindensis* SWYNNERTON and E. G. BAK. must be considered a later, heterotypic synonym of *T. dregeana* SOND.

*Trichilia splendida* was named and described by CHEVALIER (l.c., 1912), based on CHEVALIER no. 20708 (from Guinea). The protologue is accompanied by a note stating: 'Arbre très ornemental, remarquable par ses grandes feuilles, par ses fleurs à parfum rappelant celui du Muguet (*Convallaria majalis* L.)'. The specific epithet '*splendida*' certainly alludes to this statement. It concerns a male, flowering specimen. The inflorescences are aberrant, being up to 24 cm long. The calyx is rather deeply 5-lobed, petals 15-16 mm long. Shape and dimensions of the leaflets remain well within the variation of *T. dregeana*. In particular the duplicate at K, with its rather short inflorescences and a reddish-brown, not flaking bark proves its being identical with *T. dregeana*. Already WHITE and STYLES (l.c., 1963) found *T. splendida* A. CHEV. conspecific with *T. dregeana* SOND. I fully agree with their conclusion.

*Trichilia umbrosa* VERMOESEN (l.c., 1922) is based on three syntypes, all three collected by VERMOESEN near Temvo, Mayombe (Congo). VERMOESEN no. 1999, designated here as lectotype, concerns a male, flowering specimen. The calyx is rather deeply lobed, but this character varies on the same plant. The petals are 15.5–17.5 mm long. The leaflets are finely but rather distinctly glandular-punctate; apex acute. Inflorescences up to 9 cm long, and many-flowered. VERMOESEN no. 1999 has very much in common with SWYNNERTON no. 1, the holotype of *T. chirindensis*, and discussed above. The protologue on page B-53 states: 'Grand et bel arbre à belle et large couronne hémisphérique, à feuillage touffu'. On page B-57 it is stated: 'fleurs très odorantes' (cf. notes to *T. splendida* A. CHEV.). The paratypes, VERMOESEN no. 1926 and no. 1948, are in bad condition, but conform to the lectotype. DUBOIS no. 332 (BR), collected near Thysville, near the type locality of *T. umbrosa*, has a fruit without stipe, characteristic for *T. dregeana*. STANER (l.c., 1941) already placed *T. umbrosa* in the synonymy of *T. splendida* A. CHEV. I was unable to segregate the Congolese specimens from the East African, which means that *T. umbrosa* VERMOES. is reduced here to a synonym of *T. dregeana* SOND.

*Trichilia schliebenii* HARMS (l.c., 1934) is based on SCHLIEBEN no. 3636 (Uluguru Mts, Tanzania). The holotype was destroyed in Berlin, but isotypes are in G and BM. The specimen present at G was designated as the lectotype. The leaflets of this specimen are obviously resembling *T. dregeana*. The apex is acute or slightly acuminate, both sides are nearly glabrous. The reddish-brown lower surface in the dried leaflets is conspicuous. Isotypes have this in common with a (vegetative) specimen collected in the type locality by BRUCE (no. 961, BR). However, also a male Natal specimen collected by RUDATIS (no. 496, WRSL, E, G, W), shows leaflets with a reddish-bronze lower surface. The calyx is very deeply 5-lobed (sometimes some lobes are nearly free). Petals 9–10 mm long; inflorescences short and few-flowered. In general SCHLIEBEN no. 3636 very much resembles RUDATIS no. 496, but the latter has petals 13–14 mm long, and a calyx mostly only lobed to about half-way. In SCHLIEBEN no. 3636 the connate part of the staminal tube is distinctly hairy inside below, a character I did not often observe in male flowers of *T. dregeana*. In RUDATIS no. 496, the connate part of the staminal tube is glabrous inside, as is usual in *T. dregeana*. It appears that especially some floral characters of *T. schliebenii* are unusual within *T. dregeana*. However, the material of the Uluguru Mountains is scanty (no fruits are available) and *T. dregeana* is found to be widely variable, certainly as regards the characters mentioned. For these reasons it seems unwarranted to adopt *T. schliebenii* as a taxon in *T. dregeana*. *T. schliebenii* HARMS is judged to be a later, heterotypic synonym of *T. dregeana* SOND.

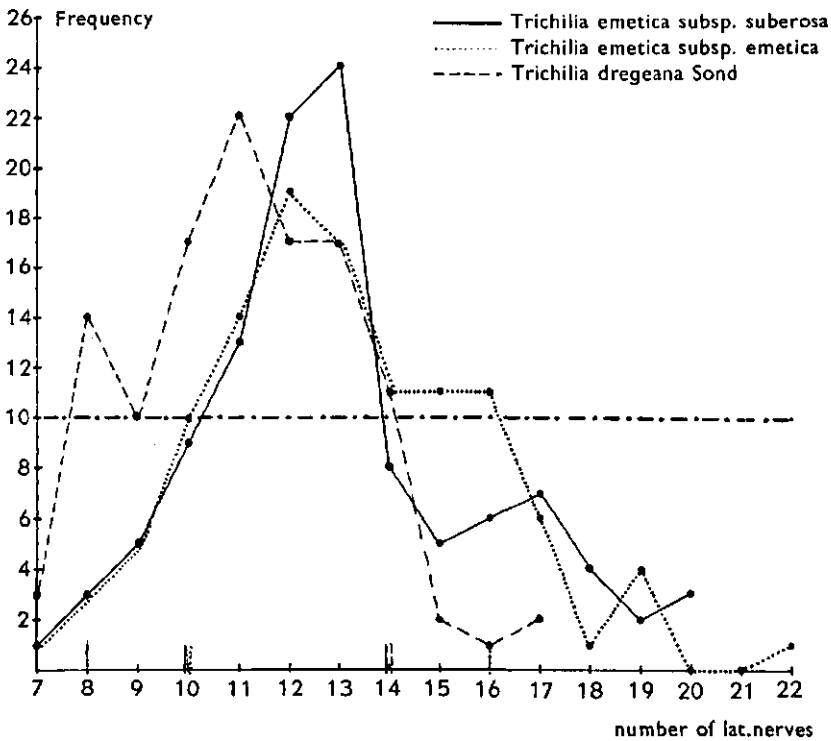
General notes: The delimitation of *T. dregeana* against *T. emetica* subsp. *emetica*. The present description and notes to the synonyms prove that the variation pattern of *T. dregeana* is rather complicated. Its variability is not correlated with geographical distribution and I found it impossible to subdivide the species satisfactorily. The same holds for *T. emetica* subsp. *emetica*, a very

closely related taxon, although its variation is perhaps less wide. In East-, as well as in South Africa, the areas of distribution of these taxa largely overlap. In the absence of complete material (especially fruits) it often is difficult to arrive at a certain identification. Apart from the fruit, no strictly diagnostic characters are present. Both diagnostic and differential character(s) are summarized below.

DIAGNOSTIC CHARACTER	<i>T. emetica</i> subsp. <i>emetica</i>	<i>T. dregeana</i>
Fruit	distinctly stipitate, stipe 3-9(-11) mm	not or very shortly stipitate, stipe up to 3 mm
DIFFERENTIAL CHARACTERS		
Latex from near the cambium	never recorded	usually present
Twigs	yellowish-grey, grey or dark grey	reddish-brown or dark brown
Apex of leaflets	obtuse, emarginate or retuse (rarely acute or subacuminate)	acute or acuminate (more rarely obtuse or slightly retuse)
Colour dried leaflets	olive-green (pale brown)	dark brown or brown (pale brown)
Inflorescences	usually condensed and many-flowered	especially in female individuals always few-flowered, in male specimens sometimes many-flowered
Calyx	5-lobed, often almost to the base	5-lobed to 1/3 till 2/3 of its length, rarely deeper
Length of petals	(8-)9-14(-15) mm	(9-)13-22(-24) mm
Length staminal tube (including anthers)	7.5-11.5 mm	(8.5-)10-16(-17) mm
Length of style	4.5-7 mm	6-8.5(-12) mm
Fruit	15-25 mm diam.	20-40 mm diam.
Hypocotyl	short, ca. 1 cm	much longer, up to 4 cm
Ecology (E. Africa)	lower rainfall areas (700 mm or less), riparian woodland and similar vegetations, from sea-level up to 1500 m	areas with higher rainfall, evergreen forest patches at altitudes above 800 m

The characters listed are to be used in combination to obtain a correct identification. Though very closely allied, intermediates (or hybrids) between these taxa came not to hand. In West Africa confusion between *T. dregeana* and *T. megalantha* HARMS may occur. *T. megalantha*, however, is characterized by the rather constant occurrence of 6-jugate leaves (a condition which is only rarely found in leaves of *T. dregeana*).

WHITE and STYLES (in Fl. Zamb. 2(1) : 298. 1963) were first to recognize the complications in delimiting *T. dregeana* and *T. emetica*. In their key to the species of the genus *Trichilia* they used i.a. the number of lateral nerves of the



GRAPH 1. Counts of lateral nerves in 114 leaflets.

leaflets as a distinguishing character between *T. dregeana* and *T. emetica*; *T. dregeana* is declared to have 8-9(-12) lateral nerves in widely spaced pairs, whereas *T. emetica* has (10-12-) 13-16(-19) closely spaced pairs. An analysis of this alleged difference is given in graph 1.

From 114 leaflets, both of *T. dregeana* and *T. emetica* subsp. *emetica*, taken at random from specimens representing the whole distributional area, the number of lateral nerves (pairs) was counted, and frequency-curves were drawn. The curves overlap widely, and it is evident that a difference in number (and spacing) of nerves cannot be used to distinguish among specimens belonging in *T. dregeana* or *T. emetica*. If one accepts (rather arbitrarily) a frequency of 10 (and more) as 'normal' (ca. 90% of specimens), then *T. dregeana* has (7-)8-14(-17), and *T. emetica* subsp. *emetica* (7-)10-16(-22) pairs of lateral nerves. Although there is some trend in *T. dregeana* to have fewer lateral nerves as compared with *T. emetica* subsp. *emetica*, as a key-character this trend is unsuitable.

Shape of the leaflets (distinctly broadest near apex in *T. dregeana*, against not or scarcely broadest near apex in *T. emetica*), and indumentum are also used as key-characters by WHITE and STYLES (l.c., 1963). These characters, however, I consider after careful consideration of no value at all.

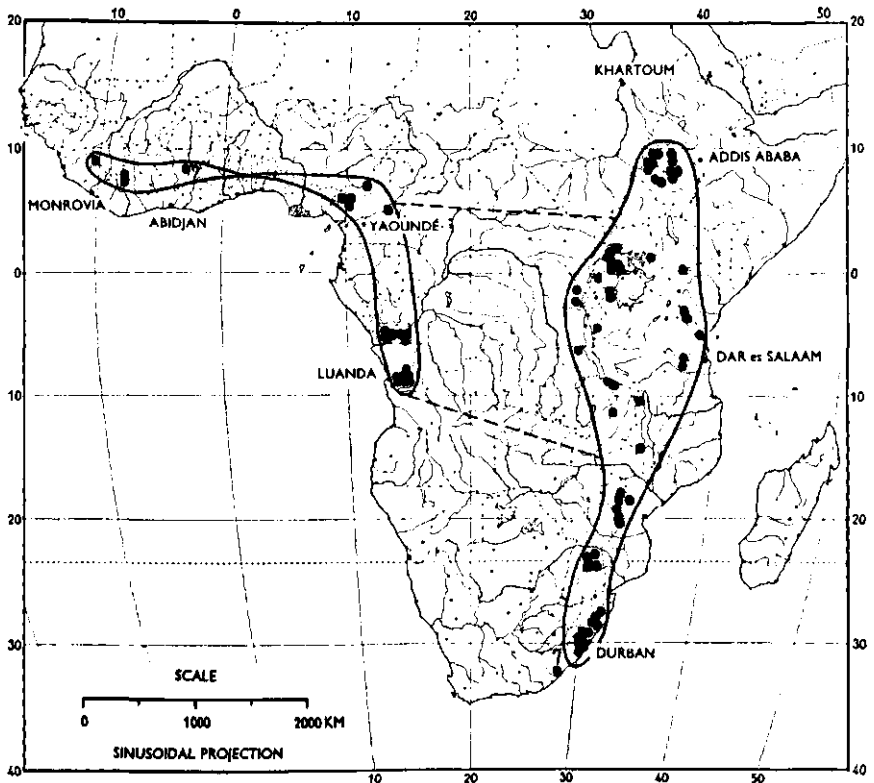
In conclusion it may be stated that the delimitation of *T. dregeana* against *T. emetica* subsp. *emetica* is difficult. These taxa are natural groups and ought

to be segregated, but the study of the characters and variability suggests that they may well be the result of recent speciation.

Distribution. Guinea, Ivory Coast, Cameroun, Ethiopia, Congo, Uganda, Kenya, Tanzania, Angola, Zambia, Rhodesia, Malawi, Mozambique, South Africa.

Notes. The distribution of *T. dregeana* as presented here offers a problem. In East Africa the species occurs at altitudes above 800 m. More to the south, in the neighbourhood of Durban, it comes down to sea-level. This is a feature shared with many other taxa. The distributional area in West and Central Africa, however, is not connected with that in East Africa. In Congo there is a gap of ca. 1500 km between both areas. Moreover, the western distributional area is disrupt, the few localities where it is found being remote from one another. Nevertheless, the morphological variation pattern within the West African distributional area is similar to that of the eastern part.

The altitudes where it was found in the western part vary from ca. 1400-



MAP 3. Distribution of 3. *Trichilia dregeana* SOND. Continuous lines demarcate both hitherto known disjunct areas in resp. W. and Central Africa and in E. Africa. Between the broken lines the species seems to be absent and, most likely, is.

1600 m near Banganté in the Bamiliké-region in Cameroun, to only 200–500 m near Luki and Temvo in Bas Congo. The westernmost locality where it was found, viz. Kissidougou in Guinea, is situated at an altitude of ca. 800 m. In Angola it is found near Golungo Alto in Alta Queta Mts, at an altitude of 800–1000 m, which represents the southernmost known locality of the western distribution.

There is, of course, a possibility that future research will reveal its presence in the part of Congo, where it was never found so far. If it really is absent, a disjunct distribution of *T. dregeana* is to be accepted.

Ecological and biological notes. In West Africa and Cameroun *T. dregeana* was infrequently collected. Here it seems confined to altitudes between 800 and 1600 m, and to form part of (sub)montane communities in the transitional zone between Forest-Savanna Mosaic and Moist Forest. This habitat only occurs locally and in remote areas. A vegetative specimen, collected by AUBRÉVILLE (no. 731, IFAN, P) near Bondoukou, in Ivory Coast, in a different ecological habitat, at an altitude of ca. 500 m, I refer with doubt to *T. dregeana*.

The occurrence at altitudes below 500 m in Léopoldville Prov. in Congo is hard to explain. In this region the vegetation consists of a mixture of Moist Forest and Forest-Savanna Mosaic at low and medium altitudes. The species has been collected there several times. It is puzzling why *T. dregeana* appears to be confined to West Congo. In eastern Congo its habitats are closely linked with the East African in general. GUTZWILLER (no. 3768, BR) collected it at an altitude of 1000 m near Bunyakiri in Kivu Prov. Again in Kivu it was found by PIERLOT (no. 3380, BR) who collected it at an altitude of 1925 m on the road Kavumu–Walikale. More to the South, in Katanga Prov., DELEVOY (no. 185, BR) found it near Albertville.

In Angola it was collected several times, especially by WELWITSCH and by GOSSWEILER. It seems, however, confined there to a rather small area in the southern part of Cuanza Norte Prov., north of the Cuanza River. According to KEAY et al., Vegetation Map of Africa 1959, this concerns a patch of Moist Forest, for the greater part enclosed by a relative moist type of Savanna Woodland. The material collected in this area is very variable in indumentum. It grows here at altitudes between 500 and 1000 m.

In East Africa the northernmost limit of the distributional area is found near ca. 10° N. Lat. in Ethiopia, where it is confined to the higher rainfall areas in the S.W. (esp. Wollega, Illubabor and Kaffa Provinces). W. J. DE WILDE, DE WILDE-DUYFJES and DE WIT collected it in several places near Jimma and Lekenti in Montane Evergreen Forest at altitudes between 1700 and 1900 m. It often concerns big trees, 20–30 m tall, up to 1.50 m d.b.h. The flowers are pale yellowish (W. J. DE WILDE c.s. nos. 6913, 10143, 10772, and 10779, WAG). The lowest altitude recorded is MOONEY's, who found it near Mezan Tefari in Kaffa Prov., at 1350 m. According to MOONEY the annual rainfall amounts here to 2500 mm (teste MOONEY no. 9234, FI, K, S). MOONEY found it also near Marrato at 9°40'N.–35°00'E., in N.W. Wollega Prov., at an altitude of 1680 m,

and with an annual rainfall of ca. 1500 mm (MOONEY no. 7768, K). The flowers are reported to be white, with a perfume resembling orange blossoms (teste MEYER no. 7932, K). Summarizing available collectors' notes, it may be stated that *T. dregeana* occurs in Ethiopia between 1350 and 1900 m altitude, corresponding to an annual rainfall of approximately 1500–2500 mm.

Many collectors observed the occurrence of *T. dregeana* in Uganda. Especially STYLES supplied detailed fieldnotes. He collected it in the Bugoma Forest Reserve, Bunyoro District, between 1050 and 1200 m altitude in moist semi-deciduous rainforest dominated by *Cynometra alexandri* C.H. WRIGHT. According to STYLES the annual rainfall amounts there to 1250–1500 mm (STYLES no. 150, FHO). In the Kalinzu Forest Reserve, Ankole District, STYLES collected it in 'mixed rainforest with distinct montane appearance', at an altitude of 1500–1800 m (teste STYLES no. 162, FHO). The highest altitude on record in Uganda is the Elgon Forest Reserve, ca. 16 km E. of Mbale, where STYLES collected it at 2100 m altitude (annual rainfall of 1250 mm; teste STYLES no. 321, FHO). In general it may be stated that in Uganda *T. dregeana* is found between 1000 and 2100 m altitude, in areas with an annual rainfall of approximately 1000–1750 mm.

Only few records are available from Kenya. POLE EVANS and ERENS (no. 1222, E) found it at Meru, stating in their notes: 'Tree, 12–15 m tall, growing under moist conditions'. The altitude of this locality is probably between 1500 and 2000 m. Presumably *T. dregeana* is also found in the region N.W. of Nairobi, indicated by KEAY et al. (l.c., 1959) as 'Montane Communities'.

In Tanzania the distribution of *T. dregeana* is also confined to 'montane communities' (KEAY et al., l.c., 1959). GREENWAY found it in the eastern Usambara Mountains near Amani, at an altitude of 840 m. This locality is the easternmost in the known distributional area. Locally it seems to be common there. The flowers are reported to be cream coloured (GREENWAY no. 6171, K). SCHLIEBEN collected it near Morogoro in the N.W. Uluguru Mountains, in mist-forest at 1500 m altitude. He stated: 'Blüte graurot', a colour never mentioned by other collectors (teste SCHLIEBEN no. 3636, BM, G; see also: 'Notes to the synonyms' under: *Trichilia schliebenii* HARMS). According to available collectors' notes *T. dregeana* is confined in Tanzania to altitudes between 800 and 1800 m.

In Zambia it is found in Abercorn District, Northern Province. HOYLE reports it from there as a very large tree with wide-spreading crown, 30 m tall, and 2.10 m d.b.h., growing in a small patch of evergreen forest (HOYLE no. 1102, FHO). TRAPNELL (no. 1939, BR, K) collected it near Shiwa Ngandu in Mpika District. Both localities are at ca. 1600–1700 m altitude.

In Rhodesia several collectors found it in Chirinda Forest, where it is reported to be one of the commonest of the larger trees (WHITE and STYLES, l.c., 1963). In Rhodesia *T. dregeana* seems mainly confined to the extreme east, where on the border with Mozambique it occurs in 'montane communities' (KEAY et al., l.c., 1959). The altitudes vary here between 900 and 1500 m.

From Mozambique I only saw CHASE no. 4150 (K, MO), collected in: 'Border



Forest, 1100 m altitude'. Although I could not locate this, most probably Manica e Sofala Province, on the border with Rhodesia (see also the distribution in Rhodesia) is meant.

In Malawi, for example, CHAPMAN found it near Dedza (CHAPMAN nos. 1142 and 1349, both in SRGH). It is 'a tree, ca 12 m high, with slightly buttressed trunk'.

In South Africa it was frequently collected. At the latitude of Durban (ca. 30° S.L.) it is found near sea-level. MOLL collected it near Isipingo, due south of Durban, on flat, sandy soil, fairly close to mangroves. It was 'a tree, ca. 6 m high' (MOLL no. 885, S). The Durban area I consider the southernmost limit of the natural distributional area. A specimen collected by PEGLER, near Kentani in Cape of Good Hope Province, may or may not represent the southernmost limit of the distribution (on the distribution map it is indicated with a question-mark; PEGLER no. 1128, BOL). BOTHA, in Herb. Johannesburg no. J-30628, collected near De Hoek in Cape of Good Hope Prov. must be considered, if this locality is correct, a cultivated tree. In Transvaal Prov., where among others, SCHEEPERS found it in Duivelskloof District, a well-known area with a high rainfall and rich vegetation, it is reported to grow at an altitude of 1200 m (SCHEEPERS no. 1042, MO, PRE, SRGH). Summarizing it may be stated that in South Africa *T. dregeana* occurs north of Durban at altitudes between sea-level and ca. 1200 m.

As regards the altitudinal tolerance of *T. dregeana* as a whole, it is emphasized that only in the extreme South of its East African distribution (south of the Tropic of Capricorn), it may be found near sea-level. North of the Tropic of Capricorn it is in East Africa confined to 'montane communities' between 800 and 2100 m altitude. In the West African counterpart of the distribution a similar trend is found, but here the area of distribution as a whole appears to be more to the North-West, showing an occurrence of *T. dregeana* near sea-level at ca. 6° S.L., a feature which is insufficiently explained.

Vernacular names. Ethiopia: *shigo* or *sigo* (Galla), *signon* (Maho).  
Congo: *kaya* (Léopoldville Prov.), *iyundi* (dial. Kirega), *libuyu* (dial. Kingwana), *soko* (Luki).  
Uganda: *sekoba* or *senkoba* (Luganda), *nkoba* (Luganda).  
Tanzania: *mbamba* (dial. Kishambaa), *muyongayonga* (dial. Kika).  
South Africa: *umkuhmanyenye* (Zululand), *rooinessenhout*, *white mahogany*, *thunder tree*.

Uses. Until recent times *T. dregeana* and *T. emetica* have been much confused in literature. For this reason it often is very difficult to decide which particular species was meant. In general I came to the conclusion that the fat from seeds and arilodiums is used in the same way as in *T. emetica* (see there). In Ethiopia the oil from the seeds is used in hairdressing and in cooking (MOONEY no. 8821, K). GREENWAY stated that in Tanzania the roots are cooked, and the liquid drunk as a tonic (GREENWAY no. 6171, K). The wood makes a good furniture timber, and in Uganda *T. dregeana* is classed as a desirable timber tree (STYLES nos. 206 and 333, FHO). The wood is said to be pink or

reddish, it is easily worked, and after seasoning it seems to be free from attack by *Bostrichidae* (SWYNNERTON no. 1, BM, K). Near Durban it is planted as a shade tree. On places in South Africa outside the natural distributional area, where it is planted for the same purpose, it seems to do fairly well too.

Specimens examined: Guinea: Kissidougou (♂ fl. Febr.) CHEVALIER 20708 (P, holotype of *T. splendida* A. CHEV., BR, COL, K, isotypes).

Ivory Coast: near Bondoukou (veget. Jan.) AUBRÉVILLE 731 (IFAN, P, identification doubtful!); near Man (veget.) AUBRÉVILLE 946 (P); Mt. Tonkoui, N.W. of Man (♂ fl.) AUBRÉVILLE 993 (P).

Cameroon: Sanaga R., near Ebaka, 58 km N.W. of Bertoua (♀ fl. May) BRETELER 1447 (WAG); ca. 10 km N.E. of Bangwa (immature fr. April) W. J. DE WILDE c.s. 2370 (WAG); Bangwa, ca. 15 km N.W. of Banganté (fr. May) W. J. DE WILDE c.s. 2370-B (WAG); Banganté (♂ fl. Jan.) JACQUES-FÉLIX 2945 (P, neotype of *T. ledermannii* HARMS).

Ethiopia: ca. 30 km N.W. of Jimma, on road to Agaro (mature fr. June) W. J. DE WILDE c.s. 6913 (WAG, with fruits in spirit); *ibid.*, ca. 25 km N.W. of Jimma (♀ fl. Febr.) W. J. DE WILDE c.s. 10143 (WAG); ca. 35 km W. of Lekemti (veget. April) W. J. DE WILDE c.s. 10772 (WAG); ca. 20 km N. of Lekemti, on road to Angar R. (immature fr. April) W. J. DE WILDE c.s. 10779 (WAG); Galla-Sidama region (very young fl. buds Jan.) GIORDANO 2449 (FI); *ibid.* (veget. Jan.) GIORDANO s.n. (FI); Wollega Prov., near Dembidolla (veget. March) GIULIARELLI 565 (FI); *ibid.* (veget. March) GIULIARELLI 582 (FI); *ibid.* (mature fr. April) GIULIARELLI 584 (FI); *ibid.* (veget. April) GIULIARELLI 777 (FI); Kaffa Prov., near Agaro (♀ fl. Jan.) MEYER 7932 (K); Wollega Prov., Bosco di Toti (veget. Dec.) MILCHERSICH 129 (FI); Wollega Prov., Marrato (young fr. Febr.) MOONEY 7768 (K); Illubabor Prov., near Meti (veget. Dec.) MOONEY 8821 (K); Kaffa Prov., Mezan Tefari (veget. Aug.) MOONEY 9234 (FI, K, S).

Congo: Léopoldville: Mayombe, Temvo (young ♂ fl. buds April) DE MEULEMEESTER 1 (BR); Mvuazi, Malanga Forest (♂ fl. Sept.) DEVRED 737 (BR); Thysville Terr., Tadi dia Nkosi Forest (very young fl. buds March) DUBOIS 231 (BR); Thysville Terr., M'Keve Forest, Malanga (immature fr. Aug.) DUBOIS 332 (BR); Luki (♂ fl. April) TOUSSAINT 2265 (BR, FHO, K); Mayombe, Temvo (♀ fl. and young fr. April) VERMOESEN 1926 (BR, K, paratype of *T. umbrosa* VERMOES.); *ibid.* (♀ fl. buds April) VERMOESEN 1948 (BR, K, paratype of *T. umbrosa* VERMOES.); *ibid.* (♂ fl. April) VERMOESEN 1999 (BR, lectotype of *T. umbrosa* VERMOES.).

Kivu: Kalehe Terr., Bunyakiri (♂ fl. buds June) GUTZWILLER 3768 (BR); 42 km's on road Kavumu-Walikale, Tshinganda Forest (veget. April) PIERLOT 3380 (BR).

Katanga: near Albertville (♂ fl. Aug.) DELEVOY 185 (BR).

Uganda: Kasala Forest (♀ fl. May) DÜMMER 2449 (BM, MO); near Entebbe (♂ fl. Jan.) EGGELING 159 (ENT); *ibid.* (♂ fl. Jan.) EGGELING 371 (BR); Kalinzu Forest (veget. Dec.) GIBSON 386 (BR); Buganda Prov., Masaka Distr., near Kalungu (♂ fl. Sept.) PHILIP 369 (ENT); Entebbe (♀ fl. Nov.) SNOWDEN 1813 (K, S); Entebbe, Botanic Gardens (mature fr. Jan.) SNOWDEN 1901 (K); Mengo Region, near Kampala (♀ fl. and mature fr. Febr.) SNOWDEN 1971 (K, with fruits in carp. coll.); Western Prov., Bunyoro Distr., Bugatiya Country, Bugoma For. Res. (veget. Oct.) STYLES 150 (FHO); Western Prov., Ankole Distr., Kalinzu For. Res. (young fr. Oct.) STYLES 162 (FHO); Buganda Prov., W. Mengo Distr., Lwamunda For. Res., near Buta (young fr. Nov.) STYLES 206 (FHO); Eastern Prov., S. Bugisu Distr., ca. 16 km E. of Mbale, Elgon For. Res. (fl. buds Jan.) STYLES 321 (FHO); Western Prov., Bunyoro Distr., on road Nyabyeye-Hoima (♂ fl. Jan.) STYLES 332 (FHO); *ibid.*, Budongo For. Res. (fl. and young fr. Jan.) STYLES 333 (FHO).

Kenya: Kakamega Forest (♂ fl. May) BOARD no. H-290/56-7 (FI, K, S); Meru (very young fr. July) POLE EVANS and ERENS 1222 (E).

Tanzania: Morogoro Distr. (veget.) BRUCE 961 (BR); Bukoba Distr., Bushasha (♂ fl.) GILLMAN 311 (K, neotype of *T. stuhlmannii* HARMS); Mt. Kilimanjaro, S. slope, Lyamungo (mature fr. Aug.) GREENWAY 3017 (K); E. Usambara Mts, near Amani (♂ fl. May) GREENWAY

6171 (K); Lake Prov., Bukoba Distr., Minziro Forest (young fr. Jan.) PROCTER 1124 (S); Western Prov., Kasulu Distr., Manyovu (♂ fl. buds Sept.) ROSE 1 (BR); Mt. Kilimanjaro, S.E. slope (♂ fl. Jan.) SCHLIEBEN 4626 (BM, G, M, P, S); Uluguru Mts, N.W. slope, Morogoro Distr., (♂ fl. buds March) SCHLIEBEN 3636 (BM, iso-lectotype, G, lectotype of *T. schliebenii* HARMS).

Angola: Cuanza Norte Prov., Cazengo, Granja de S. Luiz (♂ fl. Sept.) GOSSWEILER 4508 (BM, COI, K, M, MO); *ibid.* (♂ fl.) GOSSWEILER 5134 (BM, LISJC, LISU); *ibid.* (♂ fl. Sept.) GOSSWEILER s.n. (COI); Cuanza Norte Prov., Golungo Alto, Alta Queta Mts (♂ fl. March) WELWITSCH 1308 (LISU, isotype of *T. welwitschii* var. *grandiflora* C.DC.); *ibid.* (veget.) WELWITSCH 1308-b (BM, LISU); Golungo Alto Distr., Sobado de Bumba, near Quibixe e Cangunhe (♂ fl. buds and fruits Oct.) WELWITSCH 1309 (mixed gathering of two individuals: C, 1 sheet with fruits, the other with ♂ fl. buds; LISU, fruits); *sin. loc.* (♂ fl.) WELWITSCH 1309/1310-A (G, lectotype of *T. vestita* C.DC.; C, COI, K, P, iso-lectotypes); *sin. loc.* (mature fr.) WELWITSCH 1309/1310-B (C, COI, G, K, P, paratype of *T. vestita* C.DC.); Cuanza Norte Prov., Golungo Alto Distr., Alta Queta Mis (♂ fl.) WELWITSCH 1310 (BM, LISU, M); *ibid.*, near Ndele (♂ fl. April) WELWITSCH 1311 (BM, holotype of *T. strigulosa* WELW. ex C.DC.; LISU, isotype).

Zambia: Northern Prov., Abercorn Distr., on road Abercorn-Kalambo Falls (fl. buds July) HOYLE 1102 (FHO); Abercorn Distr., Kawimbi (fl. Oct.) RICHARDS 6415 (K); Mpika Distr., near Shiwa Ngandu (♂ fl. Sept.) TRAPNELL 1939 (BR, K).

Rhodesia: Chirinda Forest (♂ fl. Oct.) CHASE 419 (BM, COI); Umtali Distr., Vumba Mts (veget. Sept.) CHASE 5306 (BM, MO); Chipinga Distr. (veget. Febr.) CHASE 7869 (SRGH); Gazaland, Chirinda Forest (♂ fl. Sept.) SWYNNERTON 1 (BM, holotype of *T. chirindensis* SWYNNERTON and E. G. BAK., K, isotype); *ibid.* (veget. Sept.) WHELLAN 199 (K); Chirinda Distr. (♂ fl.) WILD 2057 (BR, COI, S); *ibid.* (veget.) WILD 2139 (BR).

Malawi: *sin. loc.* (♀ fl.) BUCHANAN 432 (K); Northern Prov., Mugesse For. Res., near confluence of Timbwa and Witumba streams (very young fr. Nov.) CHAPMAN 50 (K); Dedza Distr. (veget. Jan.) CHAPMAN 1142 (SRGH); *ibid.*, Kirk Range, Dzonze Mt. (veget. June) CHAPMAN 1349 (SRGH); Central Prov., Luwawa (veget. Dec.) CHAPMAN 1534 (SRGH).

Mozambique: 'Border Forest' (♂ fl. Oct.) CHASE 4150 (BM, K, MO).

South Africa: Natal Prov., Fairfield, Dumisa (♂ fl. buds Dec.) BAYER 1400 (NH); Transvaal, Duivelskloof Distr., Westfalia Estate, cultivated in Arboretum (young fr. Jan.) Bos 1100 (WAG); Cape of Good Hope Prov., De Hoek, cultivated? (♀ fl. Nov.) BOTHA in Herb. Johannesburg no. 30628 (J); Northern Transvaal, Zoutpansberg Distr. (veget. June) CURSON and IRVINE 122 (PRE); Durban (formerly Port Natal) (fr. April) DRÈGE s.n. (BM, G, L, OXF, S, W, paratype of *T. dregeana* SOND., base of *T. dregei* E. MEY. ex DRÈGE, *nomen nudum*); Natal, Nkandla Distr. (veget. June) EDWARDS 1445 (PRE); Transvaal, New Agatha (fr. April) EDWARDS in Herb. Johannesburg no. 23018 (J); near Durban (♀ fl. Oct.) GERRARD 597 (TCD); *ibid.* (♂ fl. Oct.) GERRARD 598 (TCD); Natal, Tugela (♂ fl. Jan.) GERRARD and M'KEN 1598 (BM, TCD); Durban (formerly Port Natal) (♀ fl. buds Jan.) GERRARD and M'KEN 1600 (BM, K, TCD); Natal Prov., Zululand, near Ubombo (♂ fl. March) GERSTNER 3902 (NH); *ibid.*, Ngome Forest (veget. Dec.) GERSTNER 5183 (PRE); Durban (Port Natal) (♂ fl.) GUEINZIUS s.n. (81) (TCD, lectotype of *T. dregeana* SOND.; G, K, S, iso-lectotypes; neotype of *T. dregeana* E. MEY. ex HARMS); Pietermaritzburg Distr., Table Mt. (fr. June) KILICK 545 (PRE); Natal Prov., Zululand, Eshowe Distr. (♂ fl. Dec.) LAWN 65 (NH); near Durban (♂ fl. Oct.) MEDLEY WOOD 3883 (NH); *sin. loc.* (♂ fl. Dec.) MEDLEY WOOD 5612 (K); Berea, W. of Durban (♂ and ♀ fl. Dec.) MEDLEY WOOD 5615 (mixed gathering of at least two individuals, BOL (♂ fl.), E (♀ fl.), K, MO (♀ fl.)); *ibid.* (♀ fl. Nov.) MEDLEY WOOD 7405 (BM, M); Isipingo, Durban Distr. (immature fr. June) MOLL 885 (S); Transvaal, Zoutpansberg Distr., Ishakoma (fl. Nov.) OBERMEYER 985 (K); Cape of Good Hope Prov., Kentani Distr. (cultivated tree?) (veget., and 1 mature fr. Oct.) PEGLER 1128 (BOL); Northern Transvaal Prov., Zoutpansberg Distr., Sibasa (veget. Sept.) POLE EVANS 3751 (NY); Natal Prov., Umzinto (formerly Alexandra) Distr., Dumisa Station, Ifafa R. (♂ fl. Nov.) RUDATIS 496 (BM, E, G, W, WRSL); Durban (formerly Port Natal) (♂ fl.) SANDERSON s.n. (TCD, holotype of *T. dregeana* var. *oblonga* HARV. ex SOND., holotype of *T. dregei* var. *oblonga* C.DC.; K, isotype); Transvaal Prov., Duivels-

kloof Distr., Letaba R. (nearly mature fr. June) SCHEEPERS 358 (K, M); *ibid.* (♂ fl. Nov.) SCHEEPERS 1042 (BM, MO, PRE, SRGH); Natal Prov., near Botha House (♂ fl. buds Sept.) SMUTS 2347 (PRE); near Durban, Stella Bush (fr. Sept.) SMUTS in Natal Herb. 17829 (NH); Natal, Inanda (♀ fl.) WOOD s.n. (E); Natal, near Durban, Stella Bush (♂ fl. Dec.) unknown collector, in Natal Herb. 17099 (NH).

**4. *Trichilia emetica* VAHL**

**Fig. 4A, 4B; Map 4**

*Trichilia emetica* VAHL, Symb. Bot. 1 : 31. 1790; OLIVER, Fl. Trop. Afr. 1 : 335. 1868; C.D.C. in A. and C.D.C., Mon. Phan. 1 : 660. 1878; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305, fig. 164 (L-S). 1896; HOLLAND, The Useful Pl. of Nigeria, Kew Bull., add. series 9(1) : 146. 1908; TH. and H. DURAND, Syll. Fl. Cong. : 92. 1909; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 821. 1915; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109 and 111, fig. 28 (L-S). 1940; STANER in Bull. Jard. Bot. Brux. 16 (2-3) : 175. 1941; AUBRÉVILLE, Fl. For. Soud.-Guin. : 381, pl. 80 (1-3). 1950; ANDREWS, Fl. Pl. Anglo-Egypt. Sudan 2 : 331, pl. 123. 1952; EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed. : 195. 1952; DALZIEL, Useful Pl. W. Trop. Afr. : 328. 1955.

Typification: See under subsp. *emetica*.

Differential characters. Shrubs to medium-sized trees, confined to Savanna Woodlands and Forest-Savanna Mosaic from Senegal eastwards to Ethiopia and the Yemen, in East Africa southwards to Durban. Leaflets obtuse, slightly emarginate or retuse at the apex (rarely acute). Petals (8-)9-18(-20) by 2.5-5(-7) mm. Disk apparently absent. Fruit a 3-chambered, stipitate capsule.

Description: See under the subspecies.

**Key to the subspecies**

1. Medium-sized evergreen tree, (5-)8-20(-30) m tall and 30-75(-90) cm d.b.h. Older, often leafless twigs thin, 0.3-0.8 cm diam., never with corky bark. Inflorescences often condensed, rarely more lax. Savanna Woodlands, often in the vicinity of rivers, from Sudan and Ethiopia southwards to South Africa, also in Yemen . . . . . **a. subsp. emetica**

1. Shrub or small tree, more or less deciduous, 2-10 m tall and (3.5-)5-15 (-20) cm d.b.h. Older, often leafless twigs rather thick, 0.8-2 cm diam., with soft corky bark. Inflorescences lax, rarely more condensed. Forest-Savanna Mosaic and Savanna Woodlands, from Senegal eastwards to Sudan and Uganda

**b. subsp. suberosa**

Literature referring to *T. emetica* subsp. *emetica*: VAHL l.c., 1790; PERSOON, Syn. Pl. 1 : 468. 1805; A.P.DC., Prod. 1 : 622. 1824; SPRENGEL, ed. 16 of LINNAEUS, Syst. Veg. 3 : 68. 1826; OLIVER l.c., 1868 (pro parte); OLIVER in Trans. Linn. Soc. of London 29(1) : 44, tab. 20. 1872; C.DC. in A. and C.DC. l.c., 1878 (pro parte); GÜRKE in ENGL., Pflanzenw. Ost-Afr. C : 231. 1895; DEFLERS, Voyage au Yemen: 98 and 121. 1889; SCHWEINFURTH in Bull. Herb. Boiss. 7 (App. 2) : 295. Jan. 1899; SCHINZ and JUNOD in Mém. Herb. Boiss. 10 : 44. 1900; GIBBS in Journ. Linn. Soc., Bot. 37 : 435. 1906; MONRO in Proceed. Rhod. Sci. Ass. 8(2) : 67. 1908; SIM, For. Fl. and For. Res. Port. E. Afr. : 26, pl. 15. 1909; LEGAT in Kew Bull. : 53, cum photogr. 1910; R. E. FRIES, Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1 : 111. 1914; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 821, cum photogr. 1915 (partly); EYLES in Trans. Roy. Soc. S. Afr. 5 : 389. 1916; DE WILDEMAN, Contr. Fl. Kat. : 105. 1921; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B34. 1922; HARMS l.c., 1940 (partly); STANER l.c., 1941 (partly); GLOVER, Prov. Check-List Brit. and Ital. Somaliland : 186. 1947; BRENNAN, Check-Lists Br. Emp. No. 5, Tanganyika Terr. 2 : 318. 1949; AUBRÉVILLE l.c., 1950 (partly); GOSSWEILER, Fl. Exot. Angol. in Agronomia Angolana 1-4 : 121. 1950; EXELL and MENDONÇA in Consp. Fl. Angol. 1(2) : 314. 1951; O. B. MILLER in Journ. S. Afr. Bot. 18 : 40. 1952; PARDY in Rhod. Agr. Journ. 51(6) : 492, cum photogr. 1954; DALZIEL l.c., 1955 (partly); DALE and GREENWAY, Kenya Trees and Shrubs : 272. 1961 (as *Trichilia* sp. nov.); WHITE and STYLES in Fl. Zamb. 2(1) : 299. 1963 (excl. remarks about W. Afr. distribution); COMPTON, Annot. Check-List Fl. Swaziland, in J.S. Afr. Bot. Suppl. no. 6 : 12, 51 and 124. 1966.

Type: FORSKÅL no. 478 (Yemen: Hadie Mountains, holotype in C; isotype in BM; the sheet in BM is not numbered).

Synonyms: *Elcaja 'roka'* FORSK., Fl. Aegypt.-Arab.: XCV (*nom. sine descr.*) and 127 (*cum descr. gen.-specif. sed sine nom. specif.*). 1775; CHRISTENSEN in Dansk Bot. Arkiv 4(3) : 24. 1922. Type: Same type as *T. emetica* subsp. *emetica*. (See also the note on page 52).

*Mafureira oleifera* BERTOL. in Mem. Acc. Sci. Bol. 2 : 270, tab. 12. 1850. Type: FORNASINI s.n. (Mozambique: sin loc., type in P, not seen).

*Trichilia umbrifera* SWYNNERTON et BAK.F. in Journ. Linn. Soc., Bot. 40 : 39. 1911; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Type: SWYNNERTON no. 148 (Mozambique: Gazaland, Lower Umswirizwi R., lectotype, K; isotype, BM).

*Trichilia somalensis* CHIOV. in Result. Sc. Miss. Stefanini-Paoli Somal. Ital. 1 : 50. 1916; PAOLI, STEFANINI and PAOLI, Miss. Somal. Ital. Merid., Relaz. : 231. 1916 (*nomen*); CHIOVENDA in Reale Acc. d'Ital., Centro Studi Afr. Orient. Ital. 17 : 96. 1939; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; CUFO-

DONTIS in Bull. Jard. Bot. Brux. 26 (Suppl. Sept.) : 402. 1956. Type: PAOLI no. 515 (Somalia: Hacacca, holotype in FI, 3 sheets).

*Trichilia grotei* HARMS in Notizbl. Bot. Gart. Berl. 7 (no. 65) : 230. 1917; HARMS in Nat. Pflanzenf. 2nd ed. 19BI : 110. 1940; BREAN, Check-Lists of the Br. Emp. No. 5, Tanganyika Terr. 2 : 319. 1949. Type: GROTE no. 3774 (Tanzania: Usambara Mts foothills, Amani, near Kiuhui, holotype destroyed in B; lectotype, K).

*Trichilia roka* CHIOV. in Bull. della Soc. Bot. Ital. : 115. 1923 (*nom. illegit.*); CHIOVENDA, Fl. Somala 2 : 131. 1932; BREAN in Mem. N.Y. Bot. Gard. 8(3) : 235. 1953; GARCIA in Contr. Conhec. Fl. Moçamb. 2 : 142. 1954; CUFODONTIS l.c. : 401. 1956; WILLIAMSON, Useful Pl. Nyasaland : 119. 1956; STANER and GILBERT in Fl. Cong. Belg. 7 : 163. 1958; WHITE, For. Fl. N. Rhod. : 181, fig. 35 (I and J). 1962. Type: Same type as *T. emetica* subsp. *emetica*.

*Trichilia jubensis* CHIOV., Fl. Somala 2 : 129, tab. 88. 1932; HARMS l.c. : 109. 1940; CUFODONTIS l.c. : 401. 1956. Type: TOZZI no. 326 (Somalia: Touata Island, Giuba R., near Alessandra, holotype in FI; isotype, K).

*Trichilia chirindensis* sensu GARCIA in Contr. Conhec. Fl. Moçamb. 2 : 142. 1954.

Note. CHIOVENDA l.c., 1923 made the new combination *Trichilia roka*. He did so in the opinion that the binomial *Elcaja roka* FORSKÅL was validly published, the new combination being *Trichilia roka* (FORSKÅL) CHIOV. FORSKÅL, however, in his Flora Aegyptiaco-Arabica (1775) on page 127 published a combined generic and specific description. The genus he named *Elcaja*, but he added no specific epithet and only stated that in Arabian the plant was called 'Roka'. In another part of FORSKÅL's book, viz. page XCV, the combination *Elcaja roka* was printed, however among a lot of other binomials formed by an often valid genus name and an Arabian epithet. In this part of his Flora, with pages numbered in Roman numerals, it was certainly not intended to publish new binomials, this in contradistinction to the rest of his work where this was practiced with much accuracy.

Concluding, it is my opinion that the name on page XCV in FORSKÅL's book must not be associated with the description on page 127. Also on page CXVI FORSKÅL only cited: *Elcaja*, and unattached to it the Arabian vernacular 'Roka', obviously not intending the nomenclatural combination. HARMS l.c. : 108. 1940 shares this point of view. (See for a contrary opinion: BREAN l.c., 1953).

From this it must be decided that CHIOVENDA l.c., 1923 was not justified when accepting the specific epithet 'roka', for the combination *Trichilia roka* (FORSKÅL) CHIOV. In fact he published a new name '*Trichilia roka* CHIOV.', which was nomenclaturally superfluous, and therefore illegitimate in consequence of the available legitimate name *Trichilia emetica* VAHL (l.c., 1790). The name *Trichilia roka* CHIOV. must be rejected (Art.'s 63 and 72 of the Code).

Diagnostic and differential characters. Medium-sized evergreen tree up to 30 m tall (usually 8–20 m high), d.b.h. 30–75(–90) cm. Second year's twigs not corky nor peeling. Leaflets (2–)3–5-jugate, with (7–)10–16(–22) nerves on either side of midrib. Inflorescences usually condensed, rather short, up to 8.5 cm long. Calyx very deeply 5-lobed. Petals (8–)9–14(–15) mm long. Fruits distinctly stipitate, ca. 15–25 mm in diam. Savanna Woodlands, often in the vicinity of rivers, from Sudan and Ethiopia southwards to South Africa (Durban), also in the Yemen.

Description. Medium-sized evergreen tree, (5–)8–20(–30) m tall and 30–75(–90) cm d.b.h., bole cylindrical, 3–6 m long before branching, crown spreading, much branched, rather dense and often rounded, umbrageous. Bark up to 2 cm thick, rather hard, not corky, outside smooth or slightly rough, irregularly furrowed and sometimes minutely scaling, dark grey or brownish; slash deep reddish-pink below rhytidoma, becoming paler inwards, and with a narrow white layer next to the cambium; sapwood whitish.

Young leaf-bearing twigs terete or slightly angular, yellowish-brown or grey-brown, densely tomentose, indumentum pale grey; lenticels not distinct or absent; older, often leafless parts of twigs terete, narrow, 0.3–0.8 cm diam., never corky, but with a hard, dark grey, longitudinally wrinkled outer bark (dilatation lines), not peeling off, the indumentum gradually disappearing; scars of fallen leaves conspicuous, very broadly obovate or obdeltate with rounded edges, often more or less flattened or depressed at the top (horseshoe-shaped) and with a separate scar of a fallen inflorescence just above it; wood cream or pale brown, rather soft.

Leaves imparipinnate, rarely paripinnate, (10–)17–42 cm long, often tufted at the end of the branchlets; petiole terete, more or less flattened on the upper surface, especially in the upper part and near the base, short yellowish-grey tomentose or densely puberulous (very rarely thinly puberulous to glabrescent), longitudinally finely wrinkled, (1.5–)3.5–11 cm long, pulvinus slightly swollen, contracted at the insertion; rachis (2–)4–14(–18) cm long, flattened or sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), otherwise similar to the petiole; petiolules always distinct, however often short, narrowly sulcate on the upper surface, the raised edges of the petiolular furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see above), tomentose or rarely glabrescent, petiolule of terminal leaflet 2–10(–19) mm, the others 1–4(–6) mm long.

Leaflets (2–)3–5-jugate, opposite or subopposite, not or very indistinctly glandular punctate (in young leaflets the punctuation is often rather distinct but very minute), variable in shape and size, (1.5–)3–14(–15) by 1–5.5(–6.5) cm, distal leaflets largest, narrowly obovate to obovate, narrowly oblong to oblong or narrowly elliptic to elliptic, proximal leaflets smaller, ovate, oblong or elliptic (rarely narrowly elliptic); apex obtuse, often slightly emarginate or retuse, more rarely acute or subacuminate, base obtuse or cuneate, rarely

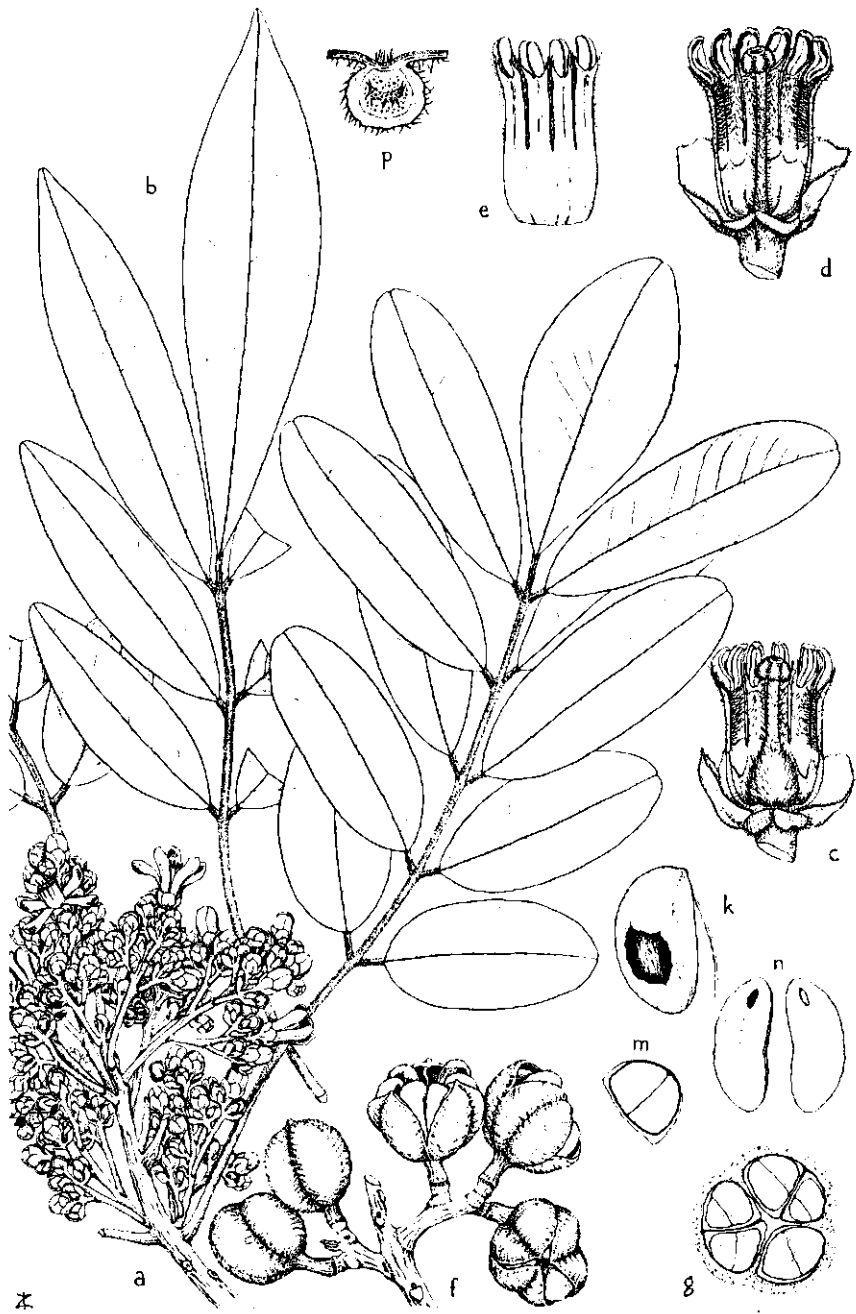
truncate or even subcordate; drying olive-green or pale brown. Upper surface glabrous, more rarely, especially in young leaflets, glabrescent, sometimes some indumentum in the furrow of the impressed midrib and nerves, nerves (7-)10-16 (-22) on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin; veins indistinct. Lower surface with varying indumentum, often tomentose or densely puberulous, rarely glabrous or nearly so, the hairs often with a brownish resinous central canal, midrib and nerves very prominent, veins slender, often distinct, sometimes glandular-translucent, rather closely reticulate. (Very young leaflets on the upper surface drying very dark green or nearly blackish and with white indumentum mostly confined to midrib and nerves).

Inflorescences condensed, rarely more lax, often rather short, paniculately arranged, in leaf-axils of young branches or crowded near the top of second-year branches, (1.5-)2.5-7.0(-8.5) cm long; main axes terete or flattened or slightly angular, wrinkled lengthwise, dense, shortly grey-tomentose, mostly once or two times branching before the pedicel, branches short, rarely up to 4.5 cm long. Bracts rather early deciduous, ovate or obovate, rarely narrowly oblong, 3.0-6.5 by 1.5-3.5 mm, acute or obtuse at apex, abaxially pubescent, adaxially puberulous or glabrous, margin ciliate.

Male flowers: On up to 6 mm long, tomentose pedicels (pedicels mostly shorter and sometimes almost lacking); bracteoles 1 or 2, sometimes absent, rather early deciduous, (2-)3-5 by 1.8-3.0 mm, elliptic, ovate or triangular, acute or obtuse, abaxially tomentose, adaxially glabrous, margin ciliate, hairs often with a brownish, resinous content in a central canal. Receptacle cylindrical, slightly tapering to the base, 0.8-2.0(-3.0) mm long, smooth or longitudinally slightly ridged, appressed pubescent, jointed to the pedicel. Calyx cup-shaped, 4-6 mm high by 5-8 mm wide, very deeply (almost to the base) 5-lobed, lobes imbricate in bud, 2.0-5.5 by 2.5-4.5 mm, broadly ovate to very broadly ovate, obtuse at apex, especially in the centre rather fleshy, outside appressed pubescent or tomentose, smooth or irregularly wrinkled, inside smooth and almost glabrous, margin ciliate. Petals (4-)5, free (imbricate in bud, spreading and often reflexed during anthesis), slightly fleshy especially in the upper part, (8-)9-14(-15) by 2.5-4.8 mm, narrowly obovate or narrowly oblong, often slightly incurved at the obtuse apex, inside rough, glabrescent, puberulous or shortly tomentose, outside puberulous or shortly tomentose. Staminal tube 7.5-11.5 mm long (including the anthers), 10-fid, incisions to about 1/2 of its length, free parts of the filaments 3.1-5.3 mm long, glabrous or puberulous outside, densely villous inside and on the margins, connate part

FIG. 4A. *Trichilia emetica* VAHL subsp. *emetica* - a: fl. branch, ♂ ( $\times \frac{1}{2}$ ); b: leaf with leaflets more or less acute at apex ( $\times \frac{1}{2}$ ); c: section of ♀ fl., petals removed ( $\times 3$ ); d: id., ♂ fl. ( $\times 3$ ); e: part of staminal tube, outside, ♂ ( $\times 3$ ); f: branch with fr. ( $\times \frac{1}{2}$ ); g: transverse section of immature fr. ( $\times 1$ ); k: seed ( $\times 1$ ); m: transv. sect. of seed ( $\times 1$ ); n: cotyledons ( $\times 1$ ); p: transv. sect. of the midrib of a leaflet ( $\times 10$ ). - a, d, e, p: BRASS 17503; b: ANGUS 131; c: LAM and MEEUSE 5056; f, k-n: BALDRATI 2067; g: SCHIMPER 866.





of the staminal tube 3–5(–6.5) mm long, glabrous and fleshy inside, the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into raised wedge-shaped issues, the tops of the wedges usually alternating with the bases of the free parts of the filaments, the connate part glabrous or glabrescent outside; anthers dorsifix, inserted in the apical sinus of the free part of the filament, between two narrowly triangular hairy lobes of 0.5–1.5(–2.2) mm long, 1.9–2.9 by 0.7–1.0 mm, narrowly elliptic to elliptic or narrowly oblong, often mucronulate, glabrous, rough, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, ca. 1 mm diam., pubescent, vestigial ovules present; style 4.5–7 mm long, 0.4–1 mm wide, variously hairy, indumentum more or less dense, hairs often rather long and spreading, glabrous or glabrescent in the upper part; stigma subglobular to discoid, 0.9–1.3 mm high by 1–2(–3) mm wide, densely velutinous by very minute trichomes, flattened and crateriform at the glabrous, slightly 3-lobed apex.

Female flowers: Similar to male flower, but anthers not dehiscing, not producing pollen. Connate part of the staminal tube often more or less hairy inside, especially towards the base, sometimes however glabrous as in male flowers. Ovary well developed, ovoid, subglobular or obovoid, ca. 2–5 mm diam., densely pubescent or tomentose, 3-celled; ovules 2 in each cell, axile, collateral; style in average somewhat shorter than in male flowers, (3–)4–5 mm long, variously hairy nearly all over; stigma as in male flower. Calyx often rather long persistent in the ripening fruit.

Infructescences up to 10 cm long, mostly shorter, only a few fruits (up to 3) of each infructescence developing into maturity; fruit a 3-chambered, stipitate capsule, broadly obovoid to subglobose; mature fruits slightly 3-lobed in transverse section, ca. 15–25 mm diam. (stipe excluded), (stipe 3–9(–11) mm long, always distinct, 3–4(–5) mm thick, not or only slightly tapering to the base, wrinkled lengthwise), very densely covered with a pale brown indumentum of very short and rather stiff hairs, mixed with fewer, but rather long and distinct tomentose hairs, mucronulate (style remnant), loculicidally dehiscent, 3-valved; dry valves thick leathery, very broadly obovate, acute at apex, transversely wrinkled.

Seeds 2 in each chamber, often one or both not or only partially developed, collateral, beneath the apex or towards the middle attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Mature seeds 15–22 by 9–12 mm, arillodiate, plano-convex, flat on the adjacent sides; testa for the largest part developed into a fleshy arillodium (sarcotesta), arillodium scarlet or orange-red without, whitish within, ca. 1 mm thick, occupying the surface of the seed for about  $\frac{4}{5}$ – $\frac{5}{6}$ , leaving a large, variously shaped but often more or less square or circular, glossy, very dark brown dorsal spot of thin leathery testa, which measures ca. 6–11 mm in diam.; cotyledons firm, fleshy, pale brown, plano-convex, 12–19 by 6–8 mm; radicle obovoid, longitudinally slightly flattened, not ciliate on edge, in between the cotyledons at 0.8–1.2 mm beneath the apex.

Seedling: Germination epigeal. Tap root. Hypocotyl short, up to 8 mm long, glabrescent. Cotyledons opposite or sub-opposite, sessile, fleshy, not developing. Epicotyl 2–4 cm long, puberulous. First two leaves opposite, simple, petiolate, ca. 2–4 by 0.6–1.6 cm, narrowly elliptic to narrowly ovate, broadly cuneate at base, acute or obtuse at apex, glabrous above except for some indumentum in the furrow of the impressed midrib, thinly puberulous beneath, hairs especially on the prominent midrib and nerves. Petiole 1–4 mm, pubescent. Following leaves alternate, simple, similar to the above-described or slightly larger and with petioles up to 7 mm long. The seventh or eighth leaf after the cotyledons may be compound and is found to be three-foliolate on a ca. 6 months old seedling.

Notes to the synonyms. *Elcaja 'roka'* FORSK. (l.c., 1775) is based on a specimen collected by FORSKÅL in the Yemen. This specimen is the same as on which VAHL based *Trichilia emetica* (l.c., 1790). The holotype is in Copenhagen. It is stamped: 'Herb. FORSKÅLII No. 478', and on the cover is a later annotation: 'Legit FORSKÅL in Arabia felix, montibus Hadie, silvis, mense Martii 1763'. On the back of the sheet is a small label, probably the original, having: '*Citrus* vel nov. gen., *Roka*, Hadie'.

In BM there is a sheet, annotated on the back: 'Ex Oriente FORSKOHL', without further indication about the locality. This probably is an isotype.

The material, which belongs to a male specimen, is rather scanty and the flowers are damaged by insect attack. It, however, doubtless falls within the variation of *Trichilia emetica* subsp. *emetica* as delimited here. Both FORSKÅL's and VAHL's descriptions confirm the present interpretation of *T. emetica* subsp. *emetica*. (See also the note on page 52 ).

*Mafureira oleifera* BERTOL. (l.c., 1850) is based on FORNASINI s.n. from Mozambique. Although I did not examine the type, both the description and especially the plate going with it, are without any doubt *T. emetica* subsp. *emetica*. *Mafureira oleifera* BERTOL. is a later heterotypic synonym.

*Trichilia umbrifera* SWYNNERTON et BAK.F. (l.c., 1911) was described after a specimen collected by SWYNNERTON (no. 148) in Mozambique. Type material is in BM and K. It represents a male, flowering specimen. The leaflets are rather narrow, but this character seems to be of no taxonomic value as it occurs occasionally throughout the distributional area. (See also WHITE and STYLES in Fl. Zamb. 2(1): 302. 1963, who came to the same conclusion for that area). All other characters match perfectly with *T. emetica* subsp. *emetica*. *T. umbrifera* must be adopted as a later synonym.

*Trichilia somalensis* CHIOV. (l.c., 1916) is based on PAOLI no. 515, collected in Somalia near Hacacca. From this type number there are 3 sheets in Firenze (FI). A first sheet consists of two leafless branchlets bearing mature fruits. The second sheet contains full-grown leaves. Both are obviously *T. emetica* subsp. *emetica*. A third sheet of the same number was identified by F. WHITE as *Blighia unijugata* BAKER (*Sapindaceae*), with a question-mark, however. This sheet is vegetative. The material is aberrant by the acuminate apex of the leaflets. The hairs, especially those on the developing terminal sprout, show the characteristic

brown central canal of *Trichilia*. I therefore do not hesitate to refer also this sheet to *T. emetica* subsp. *emetica*. Most probably it concerns juvenile leaves of a shade-sprout. *T. somalensis* CHIOV. belongs in the synonymy of *T. emetica* subsp. *emetica*.

*Trichilia grotei* HARMS (l.c., 1917) is based on a specimen collected by GROTE (no. 3774) in Tanzania. The holotype was lost in Berlin, but there is an isotype at K. The Kew material consists of two small branchlets, each bearing a leaf and some very young, small flower buds. The leaflets are obtuse or very bluntly acute at apex, and slightly puberulous on the lower surface. There are 8–12 lateral nerves on either side of the midrib. All this gives but little hold when deciding between *T. dregeana* SOND. and *T. emetica* subsp. *emetica*. The original description by HARMS also gives no clear indication as to which species was before him. Although the petals are described to measure 13–14 mm, and the inflorescences said to be short and many-flowered, even this is not sufficient for a decision. However, the altitude of the locality where GROTE collected this plant is given as 500 m. This strongly points to *T. emetica* subsp. *emetica*, for none of the specimens of *T. dregeana* I examined from this part of Africa ever occurred beneath 800 m altitude.

The general appearance of the material, together with the low altitude of the locality where it was found, and the fact that nothing in the protologue is against it, makes me believe that GROTE no. 3774 belongs to *T. emetica* subsp. *emetica*. As a result, the name *T. grotei* HARMS is placed here in the synonymy of *T. emetica* subsp. *emetica*.

WHITE and STYLES, in Fl. Zamb. 2(1) : 298. 1963, who placed *T. grotei* in the synonymy of *T. dregeana*, must have been guided to this conclusion mainly by the number of lateral nerves, a character which in my opinion, as I pointed out on page 43, does not hold.

*Trichilia jubensis* CHIOV. (l.c., 1932) is based on TOZZI no. 326. The holotype is at FI and there is an isotype at K. The material originates from Somalia. It consists of vigorous, corkless, shoots with leaves and immature fruits. These fruits are distinctly stipitate, with stipes 4–6 mm long. The leaflets have 12–17 pairs of lateral nerves. The lower surface of the leaflets is puberulous. All these characters agree with *T. emetica* subsp. *emetica*, of which *T. jubensis* CHIOV. must be placed in the synonymy.

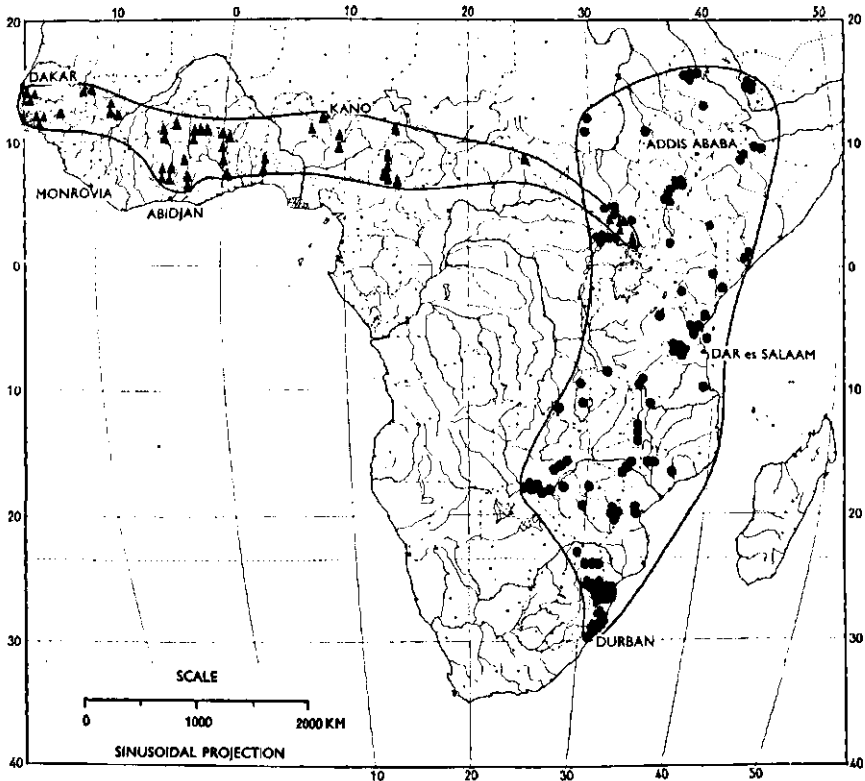
The combination *Trichilia roka* CHIOV. (l.c., 1932) is already discussed above.

*Trichilia chirindensis* sensu GARCIA (l.c., 1954). At least part of the material cited under this name by GARCIA, viz. MENDONÇA no. 3979, from Mozambique, belongs to *T. emetica* subsp. *emetica*.

Distribution. Sudan, Ethiopia, Yemen, Somali Rep., Congo, Uganda, Kenya, Tanzania, Angola(?), Zambia, Rhodesia, Malawi, Mozambique, South-West Africa, Botswana (formerly: Bechuanaland), South Africa, Swaziland, Réunion?, Madagascar?

Note. Although I did not see material of *T. emetica* subsp. *emetica* from Réunion and Madagascar, according to CUFODONTIS in Bull. Jard. Bot. Brux. 26

(Suppl. Sept.): 402. 1956, this taxon occurs also on these islands. Whether these localities fall within the natural distributional area of *T. emetica* subsp. *emetica* is to be verified.



MAP 4. Distribution of 4. *Trichilia emetica* VAHL subsp. *emetica* (dots) and subsp. *suberosa* J. J. DE WILDE (triangles).

Ecological and biological notes. The occurrence of *T. emetica* subsp. *emetica* is largely confined to the Zambezan and Oriental Domain of the Sudano-Zambian Region. Within this enormous area of savanna woodlands the subspecies *emetica* seems to prefer the more fertile soil-types. For this reason it is, according to WHITE (in Webbia 19 : 680. 1965), especially found in the so-called 'Munga' vegetation type which is characteristic for these soils. Also river-banks and river-beds, which are dry for the greater part of the year, are very suitable.

The north-westernmost limit of the distributional area is reached in Kordofan Province in Sudan (see BROUN no. 1302 and DANDY no. 321, both in BM). DOUGLAS SIMPSON found it growing on termite mounds near Juba, also in Sudan (DOUGLAS SIMPSON no. 7176, K). The northernmost limit is probably found along the line Kassala-Massawa in Ethiopia, where it was frequently collected (SCHWEINFURTH no. 756, G, M; SCHWEINFURTH and RIVA no. 2178, G,

K; BALDRATI nos. 2067, 2243 and 2380, FI). Slightly more to the South, in Tigre Province, SCHIMPER reports it from an altitude of 1500 m (SCHIMPER no. 866, BM, K, NH). He stated that at this altitude the tree is only small and not frequent. Also in Ethiopia it was found in the Errer River valley, 22 km S.E. of Harar, at an altitude of ca. 1350 m (BURGER no. 1437, FI). Approximately at the same locality it was collected by W. J. DE WILDE, De WILDE-DUYFJES and DE WIT (nos. 9948, 9949, 9963, and 9964, WAG). DE WIT observed here a specimen with some inflorescences sprouting from the roots. These roots were laying more or less bare and had been damaged by people or cattle (Colour-Slide no. 28396, WAG).

From the Yemen I saw material collected by DEFLERS (no. 168, B) and by SCHWEINFURTH (nos. 365, C, G, and 921, G). These collections were made at the end of the 19th century. More recent material from that area I have not seen. The present-day occurrence should be verified.

In Sudan and Uganda both the subspecies *suberosa* and subspecies *emetica* are found. In these countries the distribution areas overlap. In how far both subspecies are ecologically sharply separated here is unknown. It is possible that the subsp. *emetica*, as stated above, is merely confined to the riparian vegetations, and in general to the more fertile sites, while subsp. *suberosa* occurs on the drier soil types. This had to be verified in the field. However, EGGELING and DALE (l.c., 1952), describing *T. emetica* VAHL, already stated: 'Two distinct forms occur, one a small erect tree in savanna-lands subject to grass fires away from the water, the other a much larger spreading tree on river banks or lines of seepage'. From this very valuable remark it is clear that the first form concerns *T. emetica* subsp. *suberosa*, and the second *T. emetica* subsp. *emetica*. Hybrids I was unable to trace, but their occurrence may be possible.

DAWKINS collected subsp. *emetica* in Uganda in the region of the Acholi tribe in Northern Province near Agoro, close to the border with Sudan. According to his notes it was growing there in heavily grazed country on the edge of a gully with permanent stream, in deep sandy pale brown soil at the foot of a gneissic hill. It concerned 'an aggregate tree consisting of dozens of stems up to 9 m high, springing from a system of root suckers of fallen, rooted stems, covering several yards of the gully bank' (teste DAWKINS no. 159, ENT). Although this habit is quite uncommon, similar cases are reported by BAINBRIDGE from Zambia (BAINBRIDGE no. 567, FHO) and by CLEGHORN from Rhodesia (CLEGHORN no. 607, SRGH). Under certain conditions subsp. *emetica* seems to possess the ability of vegetative propagation, perhaps a point to bear in mind for forestry purposes. Up till now this behaviour is unknown for subsp. *suberosa*.

Among many other collectors GILLETT found it in Kenya in Northern Province, near the Manzili River, ca. 6 km E. of Moyale, at an altitude of 900 m (GILLETT no. 13505, FI). GILLETT states that the rainfall in this area is ca. 635 mm per annum (as an average of 31 years), with maxima in April and October. It was growing there along a watercourse. The vegetation-type is described as montane scrub, with *Cussonia*, *Ficus*, *Acacia*, *Dichrostachys*, *Combretum*, *Commiphora* and others, largely degraded by cultivation, fuel cutting etc.

In Tanzania it is found frequently. Noteworthy is the specimen collected by STOLZ (no. 174, BM, G, M, W) at an altitude of 1300 m in Konde table-land near Kyimbila-station. In contrast with this gathering is the occurrence on Zanzibar, where VAUGHAM collected it near Chwaka. There it is reported a large forest tree, growing on a rocky ridge above the shore (teste VAUGHAM no. 2004, BM). From these and from other field-notes it seems that subsp. *emetica* has an altitudinal tolerance from about sea-level up to ca. 1500 m.

In Zambia and Rhodesia it was collected many times also. ROBSON, who found it in the Eastern Province of Zambia, stated that the fruit-wall of immature fruits secretes a white latex (ROBSON no. 715, FHO, K, SRGH). This is often occurring in fruits of African *Trichilia*. Very frequently some whitish latex oozes from a slash near the cambium; *T. emetica* subsp. *suberosa* also shows incidentally this feature. Rather surprisingly latex from the stem was never observed in subsp. *emetica*, although many collectors gave details about the slash. Only TANNER (no. 2322, K) mentioned a colourless sap from the stem. As latex issuing from the cambial zone in other *Trichilia* spp. appears to occur or to be absent, depending probably on the season, and possibly on other factors (age?), it seems to be of little taxonomic value. Nevertheless, it seems worth-while to check this character in both subspecies more carefully in the field. A comparative study of the anatomy of sapwood and bark may also provide valuable information.

Numerous collectors found *T. emetica* subsp. *emetica* in Mozambique, where it is rather common in certain areas (e.g. surroundings of Bay de Lourenço Marques). From there, and from all other areas, it is always reported as an evergreen, often magnificent shade tree. For this reason it is often planted in villages and near houses (SWYNNERTON no. 6517, BM). HONEY, though stating in his field-notes that it is evergreen, added that in very dry stations it may lose its leaves towards the end of the dry season (HONEY no. 933, BOL). By this character it differs clearly from subsp. *suberosa*, which is, as a rule, a small crooked tree with open crown, probably standing bare at the beginning of the dry season. More field-observations are needed to show how far this character is reliable and can be used to distinguish both subspecies in the field. This, especially, should be valuable where their areas overlap.

The flowers are described as pale greenish-white or pale yellow, very fragrant. Main flowering-time on the whole in August–October; a small amount of records in January. None or very few flowering specimens were found from April till July, and in December. Mature fruits were mainly collected in July, and from December till February. From 93 controlled flowering specimens, originating from the whole distributional area, 69 proved to be male and 24 female. It seems reasonable to assume that the samples were taken at random because it is difficult to distinguish in the field between male and female specimens. Assuming in addition that male and female trees flower with the same frequency (which still is to be proved), this implies a sex-ratio of ca. 3 : 1.

In South-West Africa I found it only once collected in the extreme eastern part, the Caprivi Strip, where KILICK and LEISTNER found it locally common

on the bank of Linyanti (Chobe) River (teste KILLICK and LEISTNER no. 3388, K, M, PRE, SRGH). From Botswana (the former Bechuanaland Protectorate) I saw a specimen collected by MILLER (no. B-45, BM, MO) near the Zambesi River. The latter locality must be near to where KILLICK and LEISTNER collected it.

In South Africa it is common in the Northern and Eastern Transvaal, and especially in Natal. Durban seems to be the southernmost limit of the distributional area (see Map 4). In Swaziland it was collected several times by COMPTON.

The distribution in Congo is confined to Lake Albert in the extreme North-East, where it was collected by DEVILLÉ (no. 552, BR), GILBERT (no. 606, BM, C, MO) and by VAN DER BEN (no. 1330, WAG), who all found it in the neighbourhood of Mahagi-Port. This locality is a link with the distribution in Uganda. ROGERS found it in the South near Elisabethville at 11°37'S.-27°24'E., where it closely links with the distribution in Zambia (ROGERS no. 10265, BOL).

Questionable is its occurrence in Angola (Cabinda). In LISJC there is a specimen collected by GOSSWEILER in Cabinda near Belize according to the labels. This gathering consists of two sheets. The first sheet contains two branches, one branchlet with fully developed leaves, the other with some very young leaves and a flower. The material on the former sheet doubtless belongs to *T. emetica* subsp. *emetica*. It bears a label carrying '6977' written in pencil. The second sheet contains two envelopes with detached flowers and a handwritten label stating that the flowers were picked up from the ground beneath an erect tree of 35 m high and 100 cm diameter. On this label the number '6977' is written in the same handwriting as on the former. The flowers I identified as *T. gilgiana* HARMS (♂). Moreover, both in BM and in LISU there are specimens labeled 'GOSSWEILER 6977', which belong to *T. gilgiana* HARMS (see 'specimens examined' sub *T. gilgiana* HARMS).

It may be concluded that GOSSWEILER no. 6977 (in LISJC) is a mixture, part of which belongs to *T. emetica* subsp. *emetica* (and erroneously numbered '6977'), the rest to *T. gilgiana* HARMS. Most probably the material which belongs to *T. emetica* subsp. *emetica* originates from plants cultivated at Luanda (cf. EXELL and MENDONÇA in Consp. Fl. Angol. 1(2): 314. 1951). The occurrence of *T. emetica* subsp. *emetica* in Angola remains uncertain. There is a possibility that subsp. *emetica* may be found near the eastern border with Zambia.

Vernacular names. Sudan: *safsâfa* (Arab?), *apolgum* (Dinka), *korillan* (Bari).

Ethiopia: *gūmeh* (Tigre Prov.).

Yemen: *roqâh*, *rugâh*, *rogâh*, *roka* (see note).

Somali Rep.: *goro-mas*.

Congo: *mukeko*, *mukeka* (dial. Kilia).

Kenya: *lbeeri* (Samburu Hills region), *mfate* (Tana River region), *nyamadze* (Digo region).

Zambia: *musigili* tree, *mushikishi*, *waterbush tree*.

Malawi: *msikiitsi* (Chinyanja), *mwavi* (Chinyanja).



Mozambique: *m'chekeri*, *mafurreira* (Portuguese), *musikidzi*, *mushikiri* or *musikiri* (dial. Chindao), *nkhuflu* or *umkuflu* (dial. Singuni).

Swaziland: *mhisi* (Manzini Distr.), *umkuflu*.

Note: According to FISCHER, *Mittelalterliche Pflanzenkunde* : 50. 1929, the vernacular name '*roka*' (and its variants) is of Berber origin. FISCHER states it was already mentioned by IBN-EL-BEITHAR in his famous *Djamî el Moufridat* (collection of simple remedies) which dates as far back as ca. 1240, and where it was named '*Djouz er-roka*'.

Uses. Among the taxa in African *Trichilia*, *Trichilia emetica* subsp. *emetica* probably is most used, and for various purposes. The following is based on literature and on collectors' notes.

Only recently (WHITE and STYLES l.c., 1963) the differences between *Trichilia emetica* VAHL *sensu lato*, and *Trichilia dregeana* SOND., which for the greater part share their area of distribution, were more clearly indicated. The differentiation within *Trichilia emetica* between the subspecies *suberosa* and *emetica* is now made here. This implies that often it is very difficult, especially in older literature, to decide which particular taxon was referred to. Moreover, the fat obtained from the seeds from all three taxa most probably will be locally used in more or less the same way. Where these taxa occur together, the seeds probably are used indiscriminately. Future phytochemical research must show whether the constituents of the fat are similar in all three taxa or not. Eventual differences in the percentage of fatty contents of the seeds may be due to different growing-conditions or -localities, as well as to their belonging to different taxa.

DALZIEL (l.c., 2nd reprint, 1955) stated that the highest amount of fat found in the seeds as a whole is 64%, and that this fat consists of ca. 55% oleic acid and 45% palmitic acid. It is used commercially in the manufacture of soap. Formerly, large quantities of seeds and oil were exported to Marseilles under the Portuguese name '*Mafurreira*' or '*Mafura*', especially from Mozambique.

BURTT DAVY (*Manual of Fl. Pl. and Ferns of Transvaal with Swaziland* 2 : 487. 1932) noted that the word '*Mafura*' means fat, and that the same word is also applied to other oil-seeds. Already KIRK, in 1860, reported that mafura oil was exported from Inhambane in Mozambique. MARLOTH (*Fl. of S. Africa* 2 : 112. 1925) stated that in 1913 from Lourenço Marques were exported 8000 metric tons. Now soap factories are established e.g. at Lourenço Marques and at Kyela (in Tanzania), and the export has greatly declined. At present it still seems to be impossible economically to refine the oil for edible purposes, but Africans use it as a cooking fat in many regions.

According to DALZIEL (l.c., 1955) and to WILLIAMSON (*Useful Pl. of Nyasaland* : 119. 1955) the local method to obtain the fat is to immerse the seeds provided with the arillobuds in hot water. They are then left to soak for some hours and afterwards rubbed between the hands. In this way a sweet milky liquid is extracted from the arillobuds, which is used as a drink or can be made into a relish. Afterwards the seeds are crushed and a solid, yellowish, rather tasteless fat pressed from the mass. Its high melting point makes it

suitable for candles. The oil obtained from the arillodiums and the seeds is also used for oiling the body, and as a hair oil. The Thonga, in N.E. Natal, appear to boil the oil together with the fruit pulp of *Strychnos innocua* DEL. or with that of *Strychnos spinosa* LAM., which both bear edible fruits. The product is stored in clay pots as a reserve food. The edible seeds are locally chewed like kola.

The value of the 'cake' after extraction of the fat is doubtful. Some found it useless to stock or even toxic. In South Africa it is sometimes used as a fertilizer in agriculture.

Very detailed information, including references to literature, was supplied by WATT and BREYER-BRANDWIJK (Medicinal and Poisonous Pl. of S. and E. Africa 2nd ed.: 752. 1962). These authors, however, refer *Trichilia dregeana* SOND. to the synonymy of *Trichilia emetica* s.l., and accordingly their account is a mixture based on records belonging to at least two different taxa. They report a case in which the administration of a decoction of some part of the tree, used as an enema, caused death. JAMIESON (in S. Afr. J. Sci. 13 : 496. 1916) found that a decoction of the bark is non-toxic, but STEYN (Vergiftiging van Mens en Dier, 1949) reported that the cake of the seeds is toxic to guinea-pigs. An infusion of the bark or of the leaves is used by different tribes as an enema for pains in the back, for lumbago, and for dysentery. It seems to be purgative, causing sweating and vomiting. The oil of the seeds is locally used as a cure for rheumatism. According to JAMIESON (l.c., 1916) the bark yields a resin and 6.8 to 27.6 % of tannin. BALLY reports that the bark is said to be used by Somalis for preparing leather (teste BALLY no. B-2041). Probably its tannin has astringent properties. GILLET noted that in Kenya a red tea is made by boiling the bark. This infusion is mixed with milk and drunk by women after menstruation (teste GILLET no. 13505). The statement by WHITE and STYLES (l.c., 1963), that in the Zambezi Valley a root-infusion is drunk to facilitate labour in pregnancy must probably be attributed to the same property.

PARDY (l.c., 1954), SCOTT (in Utilization Notes on S. Afr. Timbers, Bull. no. 36, Dept. of For. : 75. 1953), and many others gave information about the wood. It is known as *Rooi-essenhout* or as *Natal Mahogany*. The trees being small, most logs are only from ca. 2–4.5 m long and average ca. 50 cm in diam. Often they are badly shaped, more or less fluted, and centre-rot is common. The wood is easily attacked by wood-boring insects, and so should be sawn quickly after felling. It should be treated to prevent borer attack.

The timber is rather light, soft, easily worked, and of a pinkish-brown or brown-grey colour. Sapwood and heartwood are not readily distinguished. The use of linseed-oil darkens the wood considerable to a fairly dark teak colour. It makes good furniture and is used for many general purposes. The bole sometimes serves for making canoes.

The tree, which seems to be easily raised from seeds, is frequently planted as a shade tree in towns (SANDWITH no. 5 and SWYNNERTON no. 6517); it is also used for re-forestation.

Specimens examined: Sudan: South Kordofan Prov., near Dilling (young fl. buds Dec.) BROUN 1302 (BM, OXF); Kordofan Prov., Nuba Mountains, E. of road Dilling-Kadugli (♂ fl. Jan.) DANDY 321 (BM); Bahr el Jebel R., near Juba, Hillet Nuycr (mature fr. June) DOUGLAS SIMPSON 7176 (K); *ibid.*, Juba (veget. July) DOUGLAS SIMPSON 7355 (BM); *ibid.*, Nimule (♂ fl. Febr.) DOUGLAS SIMPSON 7579 (BM); Tumat R. (♂ (♀) fl. Jan.) KOTSCHY 535 (BM, G, K (one sheet wit ♂ fl., the other with ♀ fl.), L, W); 'voyage to the sources of the White-Nile' (♂ fl.) SABATIER s.n. (G).

Ethiopia: road Asmara-Massawa, near Ghinda (mature fr. Nov.) BALDRATI 2067 (FI); Eritrea, Cheren (probably this stands for Keren?) (♂ fl. March) BALDRATI 2243 (FI); near Ghinda (very young fl. buds March) BALDRATI 2380 (FI); *sin. loc.* (immature fr. Oct.) BALDRATI 3091 (FI); *sin. loc.* (mixed gathering of mature fr. and ♂ fl.) BALDRATI 3129 (FI); Errer R. valley, 22 km S.E. of Harar, on highway to Jijiga (♂ fl. Jan.) BURGER 1437 (FI); *ibid.* (♂ fl. Jan.) BURGER 2497 (FI); Omo R. (mature fr. July) CORRADI 7832 (FI); *ibid.*, near Murle (veget. July) CORRADI 7833 (FI); *ibid.* (mature fr. July) CORRADI 7834 (FI); *ibid.* (veget. July) CORRADI 7835 (FI); *ibid.* (mature fr. July) CORRADI 7836 (FI); *ibid.* (mature fr. July) CORRADI 7837 (FI); *ibid.* (mature fr. July) CORRADI 7838 (FI); *ibid.* (mature fr. July) CORRADI 7839 (FI); *ibid.* (veget. July) CORRADI 7840 (FI); *ibid.* (veget. July) CORRADI 7841 (FI); *ibid.* (veget. July) CORRADI 7842 (FI); *ibid.* (mature fr. July) CORRADI 7842-A (FI); Errer R. valley, 20 km S.E. of Harar, S. of highway to Jijiga (♂ fl. Febr.) W. J. DE WILDE c.s. 9948 (WAG); *ibid.* (♂ fl. Febr.) W. J. DE WILDE c.s. 9949 (WAG); *ibid.* (immature fr. Febr.) W. J. DE WILDE c.s. 9963 (WAG); *ibid.* (♂ fl. and gall-fruits Febr.) W. J. DE WILDE c.s. 9964 (WAG); Choa, Datarra (fruits and fl. buds) ROCHET D'HÉRICOURT 24 (G); *sin. loc.* (fl. buds) SALT s.n. (BM); Tigre Prov., Hamedo (♂ fl. and mature fr. Sept.-Nov.) SCHIMPER 866 (BM, K, NH, S); Eritrea, Mount Dari, near Keren (♂ fl. and immature fr. March) SCHWEINFURTH 756 (G, M); Baresa R. valley, near Ghinda (♂ fl. May) SCHWEINFURTH and RIVA 2178 (G, K).

Yemen: Hojeilah, Wadi Hawayat (♂ fl. May) DEFLERS 168 (B); Hadie Mountains, ca. 20 km E. of Bait al Faqih (♂ fl. March) FORSKÅL 478 (BM, isotype of *T. emetica* subsp. *emetica*; holotype in C); Gebel Bura, near Hille (♂ and ♀ fl. Jan.) SCHWEINFURTH 365 (C, ♂ fl., G, partly ♀, partly ♂); Hodjela, Wadi Madfar (♂ fl. and young fr. Jan.) SCHWEINFURTH 921 (G).

Somali Rep.: Borana (Borama?), Malca Guba near Daua Parma (young fr., galled) CUFODONTIS 78 (W); *ibid.* (♂ fl.) CUFODONTIS 118 (W); Hacacca (Acacca) Forest (mature fr. July) PAOLI 515 (FI, holotype of *T. somalensis* CHIOV.); Touata Island, Giuba R., near Alesandra (immature fr. Dec.) TOZZI 326 (FI, holotype of *T. jubensis* CHIOV., K, isotype).

Congo: Orientale: Lake Albert region, near Mahagi-Port (young fr. Dec.) DEVILLÉ 552 (BR); *ibid.* (♂ fl. Nov.) GILBERT 606 (BM, C, MO; the locality 'Yangambi' on the labels of this material is due to a mistake, compare the citation of GILBERT 606 in Fl. Cong. Belg. 7: 164. 1958); *ibid.* (young fr. April) VAN DER BEN 1330 (WAG).

Katanga: near Elisabethville (very young fr. Oct.) ROGERS 10265 (BOL).

Uganda: *sin. loc.* (♂ fl.) DALE U-110 (NY); Northern Prov., Bunyoro Distr., Victoria Nile (♂ fl. Jan.) DALE U-530 (PRE); Acholi tribe region, near Agoro (fl. Jan.) DAWKINS D-159 (ENT); Northern Prov., Bunyoro Distr., Murchison Falls (♀ fl. and mature fr. Febr.) TAYLOR 3386 (BM, S, SRGH).

Kenya: Samburu Hills, South Horr (♂ fl. Aug.) ADAMSON B-3575 (G, K); Tana R., Bura (young fr. Jan.) BALLY B-2041 (FI, K); *sin. loc.* (♂ fl.) GARDNER 2179 (MO); Manzili R., ca. 6 km E. of Moyale (immature fr. and ♀ fl. July) GILLET 13505 (FI); Kwale (fl. buds) GRAHAM 1580 (MO); 16 km W. of Kikoneni (immature fr. Febr.) MOOMAW 1452 (K); between Nzau and Kibwezi (♂ fl. March) RAMMELL 2737 (BM, BR, MO); Digo region, Mrima Hill Forest (mature fr. Sept.) VERDCOURT 1917 (FI, K, PRE, S); Lamu Distr., Mambasasa Forest Stat., N. of Witu (very young fl. buds Jan.) VERDCOURT 2130 (FI).

Tanzania: *sin. loc.* (veget.) BUSSE 899 (G, WRS); N. of Lake Nyaza, Konde table-land (♀ fl.) GOETZE 1324 (G, L); Northern Prov., Mbulu Distr., between Marera and Mtowa, Lake Manyara Nat. Park (immature fr. Dec.) GREENWAY and HUNTER 11126 (K); Usambara Mountains, Amani Distr., near Kihui (very young fl. buds, ♂?, Aug.) GROTE 3774 (K, lectotype of *Trichilia grottei* HARMS); *sin. loc.* (veget.) SACLEUX s.n. (BM); Uluguru Mountains, Morogoro Township (♂ fl. Sept.) SCHLIEBEN 2703 (BM); *ibid.* (♂ fl. Aug.) SCHLIEBEN 4247

(BM, BR, G, M, P, S); Lake Lutamba, Lindi Township, ca. 40 km W. of Lindi (♂ fl. Sept.) SCHLIEBEN 5268 (BM, G, PRE, S); Konde table-land, near Kyimbila-station (♀ fl. April) STOLZ 174 (BM, G, M, W); Kilosa Distr. (veget. Aug.) SWYNNERTON s.n. (BM); *ibid.*, Kivungu (fl. buds Aug.) SWYNNERTON s.n. (BM); Tanga Prov., Pangani, near Mwera (♂ fl. Oct.) TANNER 2322 (K); Korogwe-Mombo road (♂ fl. Sept.) WIGG 792 (BM, MO); Morogoro Township (♂ fl. Sept.) WIGG 1656 (BM, SRGH).

Zanzibar: Chwaka (♂ fl., galled, Oct.) VAUGHAM 2004 (BM).

Angola: occurrence doubtful, see for explanation GOSSWELLER 6977 (LISJC) under 'Ecological and biological notes'.

Zambia: Southern Prov., Mazabuka Distr., Munique R. (♂ fl. Aug.) ANGUS 131 (BM, K, MO); Northern Prov., Fort Rosebery Distr., Lake Bangweulu, near Samfya (♂ fl. Sept.) ANGUS 358 (BM, COI, K, MO, PRE); Barotse Prov., Sesheke Distr., Zambezi R., near Mwandi (veget. Dec.) ANGUS 1028 (K); Siagatuba Area, Singani Chieftaincy (immature fr. and fl. buds Aug.) BAINBRIDGE 567 (FHO); Zambezi R., Victoria Falls (fl. buds Aug.) BURTT DAVY 20493 (BM, K); Guimbi (veget.) DEPT. AGR. NORTH. RHOD. in BOLUS Herb. no. 26973 (BOL); Ndola (seedlings March) FANSHAWE F-1007 (K); *ibid.* (seedlings Aug.) FANSHAWE F-1509 (K); Kafue R. (♂ fl. July) HUTCHINSON and GILLET 3581 (BM, COI); Abercorn Distr., Kalambo R. (fl. Aug.) RICHARDS 6043 (K); Eastern Prov., Mwangazi R. valley (immature fr. Nov.) ROBSON 715 (FHO, K, SRGH); between Mapanza and Choma (♂ fl. Sept.) ROBINSON 2891 (M); Chilanga Distr., Kasoka R. (♀ fl. Sept.) SANDWICH 5 (SRGH); Northern Prov., Kawambwa Distr., Lake Mweru (immature fr. Nov.) WHITE 3602 (K).

Rhodesia: Wankie Distr., Zambezi R., Victoria Falls (young fr. Nov.) ARMITAGE 288/59 (SRGH); Melsetter Distr. (very young fr. Oct.) BALL 826 (SRGH); *ibid.*, Odzi R., near Hot Springs (fr.) CHASE 1459 (BM, COI, K, PRE, W); *ibid.*, Birchenough Bridge (♂ fl. Sept.) CHASE 1761 (BM, COI); Gwelo Distr. (very young fr. May) CLEGHORN 607 (SRGH); Lomagundi Distr. (veget. Oct.) EYLES 2695 (G); S. bank Zambezi R., Victoria Falls (♀ fl. Sept.) GIBBS 110 (BM, BOL); Wankie Distr. (♀ fl.) LEVY 1130 (E); Zambezi R., Victoria Falls (♂ fl.) ROGERS 5999 (BM); *ibid.* (fr. Dec.) ROGERS 13047 (BOL); Chipinga Distr., Sabi R. valley (♂ fl. Oct.) SOANE 101 (SRGH); Sebungwe Distr., Lungwalala R. (young fl. buds July) WHEELAN 443 (BR, S).

Malawi: Lake Nyasa, Lukoma Bay (♂ fl. Aug.) BELLINGHAM s.n. (BM); Chia Area, Kota-Kota Distr. (♂ fl. Sept.) BRASS 17503 (BM, K, MO, NY, PRE, UC); Chikwawa Distr., lower Mwanza R. (♂ fl. Oct.) BRASS 18024 (K, MO, NY, UC); Njola's Village, near Mua (♂ fl. Sept.) BURTT DAVY 21710 (BM); *ibid.* (veget. Sept.) BURTT DAVY 21714 (BM); Mt. Mlanje, Nolo Hill, near Tuchila R. (♀ fl. Aug.) CHAPMAN 414 (BM, K); road Dedza-Lilongwe (mature fr. Jan.) CHAPMAN 1116 (SRGH); Nyungwe (♂ and ♀ fl. Sept.) MIFGOD 926 (BM, MO, mixed gathering of at least two individuals); Kota-Kota Distr. (veget.) YOUNG 174 (SRGH).

Mozambique: Bay de Lourenço Marques, ca. 5 km N.W. of Lourenço Marques (♂ fl. and young, galled, fr. Aug.) BOLUS 7695 (BOL, K); *ibid.* (mature fr.) EARTHY 144 (BOL); Mocuba Distr., Lugela R. (♀ fl. Sept.) FAULKNER Kew-388 (2) (BR, S); Catuane, near Santaca, Maputo R. (♂ fl. Sept.) GOMES E SOUSA 3815 (C); Manica e Sofala Prov., between Moribane and Quedas, Revué R. (♀ fl. Aug.) GOMES PEDRO 4195 (LISJC); Maputo R. (mature fr. March) HORNBY 2543 (PRE); Muda R. (♂ fl. Sept.) HONEY 933 (BOL); Bay de Lourenço Marques (♂ fl.) JUNOD 93 (G); *ibid.* (♀ fl.) JUNOD s.n. (G); Nhanda (♀ fl. Sept.) LE TESTU 439 (BM); Manica e Sofala Prov., Vila Machada, near Chiluvo (veget. April) MENDONÇA 3979 (BR); Tete Prov., Zambezi R., near Boroma (♀ fl. buds Sept.) MENYHART 590 (W); *ibid.*, banks of Mufa R. and Mutadzi R. (♀ fl. buds Sept.) MENYHART s.n. (C, probably a duplicate of MENYHART 590); Bay de Lourenço Marques (Delagoa Bay) (♂ fl. Sept.) MONTEIRO 39 (G); *sin. loc.* (♂ fl. July) MOSS 25159 (J); Lourenço Marques (mature fr. and ♀ fl.) PIMENTA 24402 (SRGH, gathering consists of at least two individuals); Sul do Save Prov., Inhambane Distr., near Mongue (veget. Jan.) SCHELPE 4492 (BM); Sul do Save Prov., Gazaland, lower Umswirizwi R. (♂ fl. Nov.) SWYNNERTON 148 (BM, K; type of *T. umbrifera* SWYNN. et BAK. f.); *ibid.*, Kurumadzi R., near Jihu (young fr. Nov.) SWYNNERTON 583-a (BM); Bay de Lourenço Marques (♂ fl. Sept.) SWYNNERTON 6517 (BM); Masieni (very young fr. and ♀ fl. Sept.) VAN DAM 25566 (PRE); Bay de Lourenço Marques, Inhaca Island (♂ fl. Aug.) WATMOUGH 344 (SRGH); *ibid.*

(young fl. buds July) WHITROUB 20333 (BOL, only part of the material belongs to *T. emetica* subsp. *emetica*); Tete Prov., Ruenya R., near Rhodesian border (♂ fl. Sept.) WILD 2646 (BR, K).

South-West Africa: Eastern Caprivi Strip, Linyanti (Chobe) R., Mpilila Island (veget. Jan.) KILICK and LEISTNER 3388 (K, M, PRE, SRGH).

Botswana: near Zambezi R. (♂ fl. Oct.) MILLER B-45 (BM, MO).

South Africa: Natal Prov., Zululand, Umfolozi Distr., between Black Umfolozi R. and Nongoma (♂ fl. Aug.) ACOCKS 11675 (NH); Natal Prov., Mhlatuze (Umhlatuzi) R., Eshowe-Empangeni road (♂ fl. Oct.) ACOCKS 12974 (PRE); Transvaal Prov., Pilgrims Rest Distr., Olifants R. (immature fr. June) CODD 4288 (PRE, SRGH); *ibid.*, Mariepskop for. res. (♂ fl. Oct.) CODD and DE WINTER 3111 (PRE); Transvaal Prov., Barberton Distr., Avoca near Barberton (♂ fl. Sept.) GALPIN 1060 (BOL, K, PRE); Natal Prov., Zululand, Pongola R., near Mkuzi (young fl. buds Sept.) GALPIN 13694 (BOL, K, NY); Pietersburg Distr., ca. 80 km N. of Gravelotte Station, bank of Great Letaba R. (veget. July) GALPIN 13866 (BOL, PRE); Natal Prov., Zululand (young fr.) GERRARD 1601 (BM, K); Transvaal Prov., Nelspruit Distr. (♂ fl. Oct.) LAM and MEEUSE 5056 (L); Zoutpansberg Distr., Kruger Nat. Park (young fr. Oct.) LANG 32093 (PRE); Natal Prov., Zululand (♂ fl. buds Sept.) LANDSELL 37646 in Natal Herb. (NH, PRE); *ibid.*, near Amatikulu (mature fr. Jan.) LAWN 1348 (NH); *ibid.*, between Mtunzini and Gingindlovu (young fr. July) LAWN 1579 (NH); *ibid.*, Richard's Bay, near Ensileni R. (veget. July) LAWN 2085 (NH); *ibid.*, Gingindlovu (♂ fl. Sept.) MEEBOLD 13073 (M); *ibid.*, Kearsney (♂ fl. Oct.) MILNER 23163 in Natal Herb. (NH); *ibid.*, near Mtunzini (young fr. May) MOGG 4447 (PRE); Northern Transvaal, Zoutpansberg Distr. (fl. and young fr. Nov.) PHILLIPS 1531 (K); *ibid.*, near Tzaneen (♂ fl. and young fr. Nov.) PHILLIPS 3308 (E, PRE); Transvaal Prov., Barberton Distr. (♂ fl. Aug.) POLE EVANS 2956 (PRE); *ibid.* (♂ fl. Oct.) ROGERS 24883 (G, J); Natal Prov., Zululand, Mtunzini (♂ fl. Sept.) THODE A-1526 (NH); Transvaal Prov., Barberton Distr., Kaap R., Eureka (♂ fl. Oct.) THORNCROFT 2241 (K, PRE); *ibid.*, Sheba Siding (♂ fl. Nov.) THORNCROFT 3066 (NH); Transvaal Prov., Pretoriuskop Distr., Kruger Nat. Park (♂ fl. Sept.) VAN DER SCHYFF 416 (K, SRGH); Natal Prov., Zululand, Hlabisa Distr., Hluhluwe Game Res. (♂ fl. Aug.) WARD 2689 (M, NH); Natal Prov., Inanda, road to Verulam (♂ fl. Aug.) WOOD 647 (BOL, K, NH).

Swaziland: Pigg's Peak Distr., Balegane Bushveld (young fl. buds Aug.) COMPTON 27988 (PRE); Manzini Distr. (♂ fl. Oct.) COMPTON 28118 (K, SRGH); *ibid.* (♂ fl. Sept.) COMPTON 29020 (K, SRGH); Stegi Distr. (♂ fl. Oct.) COMPTON 30202 (M); Pigg's Peak Distr., Komati R., near Horo (young fr. Febr.) COMPTON 30540 (PRE); Hlatikulu Distr. (veget. Oct.) COMPTON 30927 (K); Manzini Distr. (nearly mature fr. Dec.) COMPTON 31147 (K, PRE).

**b. subsp. *suberosa* J. J. DE WILDE, *subsp. nov.***

**Fig. 4B; Map 4**

Type: ESPIRITO SANTO no. 1808 (Port. Guinea: Bissau, Prabis, holotype LISC; isotype COI).

Synonyms: *Trichilia emetica* VAHL var. *chorisepala* PELLEGRIN in Bull. Soc. Bot. France 66 (4th série, tome 19) : 239, 1919. Type: VUILLET no. 713 (Mali: near Koutiala, holotype in P?, not seen).

*T. emetica* VAHL var. *trichandra* PELLEGR. in l.c. : 239, 1919. Type: VUILLET no. 710 (Upper Volta: near Bobo Dioulasso, holotype in P?, not seen).

*T. emetica* VAHL var. *macrocarpa* PELLEGR. in l.c. : 239, 1919. Type: VUILLET no. 668 (Mali: near Koulikoro, holotype in P?, not seen).

*T. emetica* VAHL var. *microcarpa* PELLEGR. in l.c. : 239. 1919. Type: VUILLET no. 667 (Mali: near Koulikoro, holotype in P?, not seen).

*T. emetica* VAHL var. *laevicarpa* PELLEGR. in l.c. : 239. 1919. Type: VUILLET no. 669 (Mali: near Koulikoro, holotype in P?, not seen).

*T. emetica* VAHL var. *paucijuga* PELLEGR. in l.c. : 239. 1919. Type: VUILLET no. 711 (Upper Volta: near Bobo Dioulasso, holotype in P?, not seen).

Literature referring to *T. emetica* subsp. *suberosa*: A. DE JUSSIEU in Mém. Mus. Hist. Nat. Par. 19 : 161 and 236. 1830; GUILL. and PERR., Fl. Seneg. 1(4) : 126. 1831; OLIVER, Fl. Trop. Afr. 1 : 335. 1868 (partly, otherwise *T. emetica* subsp. *emetica*); C.DC. in A. and C.DC., Mon. Phan. 1 : 660. 1878 (partly, otherwise subsp. *emetica*); PELLEGR. in Not. Syst. 2 : 73. 1911; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 821. 1915 (only as far as the distribution in W. Africa and Cameroun is concerned); CHEV., Expl. Bot. Afr. Occ. Fr. 1 : 113. 1920; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; AUBRÉVILLE, Fl. For. Côt. Iv. 1st ed. 2 : 148. 1936; HARMS l.c., 1940 (partly); PELLEGR. in Not. Syst. 9(1) : 24. 1940; STANER l.c., 1941 (partly); AUBRÉV., Fl. For. Soud.-Guin. : 381, pl. 80 (1-3). 1950 (partly, otherwise subsp. *emetica*, the figure belongs to subsp. *suberosa*); DALZIEL, Useful Pl. W. Trop. Afr. : 328. 1955 (partly, otherwise subsp. *emetica*); KEAY in Fl. W. Tr. Afr. 2nd ed. 1(2) : 705. 1958 (under the name: *T. roka* (FORSK.) CHIOV.); AUBRÉV., Fl. For. Côt. Iv. 2nd ed. 2 : 180. 1959 (under the name *T. roka* (FORSK.) CHIOV.); IRVINE, Woody Pl. of Ghana : 530. 1961 (partly, otherwise subsp. *emetica*; under the name *T. roka* (FORSK.) CHIOV.).

A subsp. *emetica* differt ramulis biennibus crassis, 0.8-2 cm diam., cortice molli suberosa cinctis.

Description. Shrub or small tree, 2-10 m tall and (3.5-)5-15(-20) cm d.b.h., probably evergreen but with a distinct tendency to deciduous, new leaves and flowers appearing together, bole often crooked, rather lowly branched, crown narrow, open (in the eastern part of the distributional area (Uganda) more dense and larger crowns seem possible). Bark proportionally thick, ca. 0.2-1.0 cm, rhytidoma thick, soft, corky, outside rough, irregularly or reticulately fissured, pale grey-brown, often blackened by savanna-fires; slash red-brown below cork, otherwise pale, rapidly darkening to brownish on exposure, sometimes issuing slowly droplets of thick off-white latex from near the cambium; sapwood cream, rather soft, heartwood reddish-brown, also soft.

Young leaf-bearing twigs terete, sometimes flattened and angular, olive-green to yellowish-brown, short, dense, grey tomentose; lenticels almost absent or if any, rather big, elliptic, pale brown, ca. 1-2 by 0.5 mm; older, mostly leafless parts of twigs terete, thick, ca. 0.8-2 cm diam., always corky, the soft corky outer bark forming thick irregularly or longitudinally stretched ridges up to 5 mm deep, not peeling off, the indumentum gradually disappearing, scars of

fallen leaves conspicuous, very broadly obovate or depressed obovate, sometimes more obdeltate with rounded edges, often depressed at the top (horse-shoe-shaped) and with a separate round scar of a fallen inflorescence just above it; wood cream, soft.

Leaves imparipinnate, rarely paripinnate, 13–52 cm long, often tufted at the end of the branchlets; petiole terete, more or less flattened on the upper surface, especially in the upper part and near the base, short, dense, grey tomentose, smooth, 3.5–14(–17) cm long, pulvinus slightly swollen; rachis 5–20(–29) cm long (sometimes absent in the rare case the leaves are 3-foliolate), flattened or sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolar furrow (see below), otherwise similar to the petiole; petiolules sometimes nearly absent and the leaflets more or less sessile, mostly distinctly present, narrowly sulcate on the upper surface, the raised edges of the petiolar furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see above), tomentose, petiolule of terminal leaflet 1–11(–15) mm, the others (0–)1–6 mm long.

Leaflets (1–)4–6-jugate, opposite or subopposite, not or indistinctly glandular punctate (in young leaflets the punctation is often rather distinct), variable in size, 2.5–12(–15) by 1.5–5.5(–6.5) cm, distal leaflets largest, narrowly obovate to obovate or narrowly elliptic to elliptic, proximal leaflets smaller, elliptic or obovate; apex obtuse, often slightly retuse, rarely acute, base obtuse or cuneate. Upper surface glabrous (except for some short indumentum in the furrow of the impressed midrib and on the nerves), nerves (7–)10–14(–20) on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin; veins indistinct. Lower surface mostly more or less densely tomentose, sometimes puberulous, the hairs often with a brownish resinous central canal which extends up to the middle or higher, midrib and nerves very prominent, veins slender, often distinct, as a rule glandular-translucent, rather closely reticulate. (Very young leaflets on the upper surface drying dark brown or nearly black and there with a very distinct pale brown or silvery indumentum confined to midrib and nerves).

Inflorescences rather lax, rarely more condensed, paniculately arranged, axillary or supra-axillary, on young branches but also often crowded near the top of second year branches, (2–)3–9(–14) cm long; main axes flattened or angular, wrinkled lengthwise, very dense, short, grey-tomentose, once or two times branching before the pedicel, branches up to 3 cm long. Bracts not very early deciduous, ovate or triangular, (2.5–)4–8(–10) by 1.7–5(–6) mm, acute, tomentose both sides, margin ciliate.

Male flowers: On up to 5 mm long, tomentose pedicels (pedicels mostly shorter and sometimes almost lacking); bracteoles 1 or 2, sometimes absent, rather early deciduous, ca. 1.5–4(–5) by 0.8–2(–3) mm, narrowly obovate to obovate, acute, abaxially tomentose, adaxially puberulous, margin ciliate, hairs often with a brownish, resinous central canal. Receptacle cylindrical, 0.5–3.5(–4) mm long, smooth or longitudinally slightly ridged, densely tomentose,

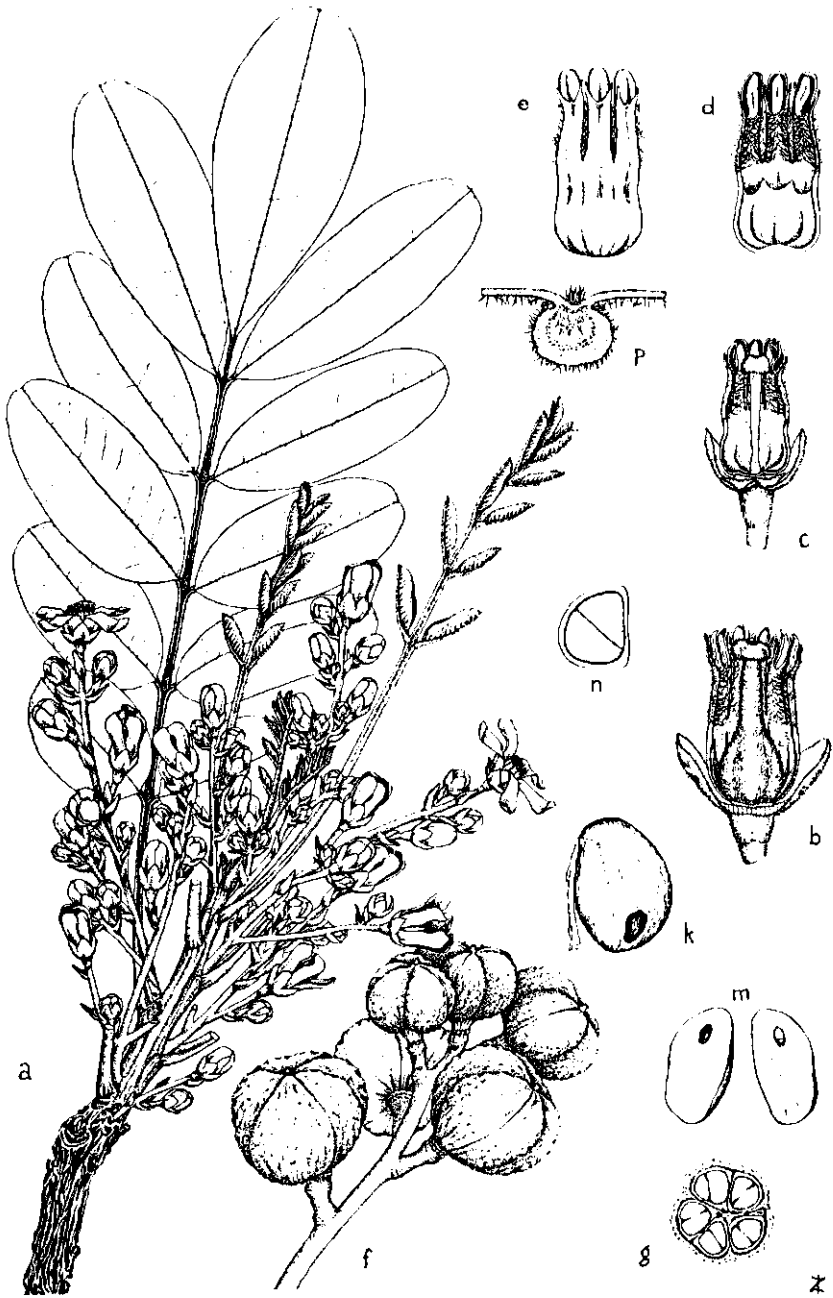
more or less jointed to the pedicel. Calyx cup-shaped, 2.5–5(–8) mm high, by 5.5–8(–12) mm wide, very deeply (almost to the base) 5-lobed, lobes imbricate in bud, 1.5–5(–7) by 2–3.5(–5) mm, very broadly ovate to depressed ovate, obtuse at apex, especially in the centre rather fleshy, outside tomentose, smooth or irregularly wrinkled, inside smooth and glabrous but often with some hairs near the base, margin ciliate. Petals (4–)5, free, (imbricate in bud, spreading and most often reflexed during anthesis), slightly fleshy, 11–18(–20) by 3–5(–7) mm, narrowly obovate or narrowly oblong, often slightly incurved at the obtuse apex, inside rough, glabrescent or puberulous, outside shortly tomentose or puberulous. Staminal tube 7.5–12 mm long (including the anthers), (8–)10-fid, incisions to about  $\frac{1}{2}$  of its length, free parts of filaments 2.5–5 mm long, glabrous or glabrescent outside, densely villous inside and on the margins, connate part of the staminal tube 3–5(–6) mm long, glabrous or puberulous and fleshy inside, the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into raised wedge-shaped issues, the tops of the wedges alternating with the bases of the free parts of the filaments, the connate part glabrous or puberulous outside; anthers dorsifix, inserted in the apical sinus of the free part of the filament, between two hairy lobes of 0.3–1.2(–1.5) mm long, 1.7–3 by 0.5–1 mm, narrowly oblong to oblong, sometimes very slightly mucronulate, glabrous, rough, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, ca. 0.5–1(–2) mm high by 0.5–1.5(–2) mm wide, pubescent, vestigial ovules present; style 4–7.5 mm long, 0.5–1 mm wide, variously pubescent, indumentum often more or less spreading, glabrous or glabrescent in the upper part; stigma subglobose to discoid, ca. 1 mm high by 1.4–2.5 mm wide, densely velutinous by very minute trichomes, often flattened and depressed at the glabrous apex.

Female flowers: Similar to male flower, but anthers often narrower, not dehiscing, not producing pollen. Ovary well developed, subglobose, often more or less 3- or 4-lobed, 2.5–5 mm diam., densely tomentose, (2–)3(–4)-celled; ovules 2 in each cell, axile, collateral; style mostly shorter than in male flowers, 4–4.5 mm long, pubescent all over, stigma as in male flower.

Infructescences up to 9 cm long, mostly shorter, with many (10) to few (1) fruit(s); fruit a (2–)3(–4)-chambered, often stipitate capsule, rather variable in shape and size, broadly obovoid to subglobose; mature fruits circular in transverse section or (2–)3(–4)-lobed, ca. 2–3 cm high by 2.5–4 cm wide (stipe excluded), (stipe up to 5 mm long, sometimes nearly absent, 6–7 mm thick, slightly tapering to the base, wrinkled lengthwise), very densely covered with an

FIG. 4B. *Trichilia emetica* VAHL subsp. *suberosa* J. J. DE WILDE, subsp. nov. – a: fl. branch,  $\frac{1}{4}$  ( $\times \frac{1}{2}$ ); b: section of  $\sigma$  fl., petals removed ( $\times 2$ ); c: id.,  $\delta$  fl. ( $\times 2$ ); d: part of staminal tube, inside,  $\delta$  ( $\times 3$ ); e: id., outside ( $\times 3$ ); f: infructescence ( $\times \frac{1}{2}$ ); g: transverse section young fr. ( $\times \frac{1}{2}$ ); k: seed ( $\times 1$ ); m: cotyledons ( $\times 1$ ); n: transv. sect. of seed ( $\times 1$ ); p: transv. sect. of the midrib of a leaflet ( $\times 10$ ). – a, b and p: W. J. DE WILDE c.s. 4050; c–e: BRETELER 602; f–n: LEEUWENBERG 4407.





indumentum of very short and rather stiff hairs, especially in not yet fully mature fruits mixed with fewer tomentose hairs, mucronulate (style remnant), crimson or violaceous (in the herbarium sometimes light brown), loculicidally dehiscent, (2-)3(-4)-valved; dry valves thick leathery or even somewhat woody, very broadly obovate, acute at apex, irregularly wrinkled and more or less verrucose.

Seeds 2 in each chamber, often one or both not or only partially developed, collateral, near or above the middle attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Mature seeds 15-20 by 11-13 mm, arillodiate, plano-convex, flat on the adjacent sides; testa for the largest part developed into a fleshy arillodium (sarcotesta), arillodium scarlet without, whitish within, ca. 1 mm thick, near apex and base of the seed up to 3 mm thick, occupying the surface of the seed nearly entirely (7/8), leaving only a small obovate or obtriangular, glossy, very dark brown dorsal spot of thin leathery testa of varying size (not sufficient mature material is available but this spot measures approximately 4-11 by 3-4 mm); cotyledons firm, fleshy, pale brown, plano-convex, 12-13 by 6-7 mm; radicle narrowly ellipsoid, longitudinally slightly flattened, ciliate on edge, in between the cotyledons at 2-2.5 mm beneath the apex.

Seedling not seen.

Note. As to the varieties distinguished by PELLEGRIN (in Bull. Soc. Bot. France 66 (4th series, tome 19) : 238. 1919), I am convinced that most (if not all) belong within the natural variation of *T. emetica* subsp. *suberosa*. However, up till now I was not able to examine the type material (which is probably in P), and so some uncertainty remains.

*T. emetica* var. *chorisepala* PELLEGR. is characterized, according to the description, by the very deeply 5-lobed calyx, (sepals nearly free). This, however, occurs commonly in *T. emetica* VAHL and there is much variation, even among the flowers on one tree. This character has no taxonomical meaning.

*T. emetica* var. *trichandra* PELLEGR. is distinguished by the staminal tube, being hairy inside the connate part. This may occur. I observed it in e.g. DE WILDE and LEEUWENBERG no. 3504 (from Ivory Coast), of which the connate part of the staminal tube is distinctly hairy inside. Also W.J. DE WILDE c.s. no. 4050 (from Cameroun) shows this, but here only the base of the connate part of the staminal tube is, inside, more or less hairy. The character appears variable, more often occurring in female flowers than in male, and of no taxonomic value.

The varieties *macrocarpa*, *microcarpa* and *laevicarpa* PELLEGR. are based on fruit characters. To which extent those characters are correlated or not with characters of the flowers is not known. I found marked differences among various stages of development of the fruits, both in shape and size. The differences in shape between spirit material and dry herbarium material originating from the same tree, are striking in e.g. LEEUWENBERG no. 4277. In spirit the fruits are subglobose, while in the herbarium they are markedly 3-4-lobed with rather deep

median grooves in the carpels. The length of the stipe also is very variable and all intermediates are found between a stipe of ca. 5 mm long and nearly no stipe at all. In my opinion no sufficiently constant variation is found in the fruits of *T. emetica* subsp. *suberosa* to base varieties on.

Concerning *T. emetica* var. *paucijuga* PELLEGR. it must be stated that only examination of the type (VUILLET no. 711) can elucidate its status. Probably it belongs in *Trichilia dregeana* SOND.

**Distribution.** Senegal, Gambia, Port. Guinea, Guinea, Mali, Ivory Coast, Upper Volta, Ghana, Togo, Dahomey (no specimens seen), Nigeria, Cameroun, Central African Republic (no specimens seen), Sudan, Uganda.

**Ecology.** *T. emetica* subsp. *suberosa* is widely distributed in AUBRÉVILLE's 'Soudano-Guinéenne' belt, characterized by an annual precipitation of roughly 500–1800 mm and a rather severe dry season varying in length between 4 and 8 months. According to the Vegetation Map of Africa (KEAY et al. 1959) this corresponds with the Forest-Savanna Mosaic (the vegetation-type transitional between the Moist Forest and the real Savanna-Woodlands), and the Savanna Woodlands, both relatively moist or dry types. In the whole northern part of these vegetation types, extending from Senegal to Uganda, the subspecies *suberosa* occurs. From similar vegetation types south of the Guineo-Congolian rain forest block, where it is not found, the hitherto known distributional area is separated by the Lake Victoria interval.

Due to the characteristic thick cork-layer on stem and branches *T. emetica* subsp. *suberosa* is in the annually burnt savanna vegetation fairly fire-tolerant. Especially in the above-mentioned Forest-Savanna Mosaic and in the relatively moist Savanna-Woodland type the subspecies *suberosa* seems to be in optimum growing conditions. It occurs rarely very abundantly. Only in the eastern part of the Central African Republic, AUBRÉVILLE found it rather frequent on fallows (AUBRÉVILLE, Fl. For. Soud.-Guin. 1950).

In the often burnt savanna-woodlands it is usually very poorly developed. DE WILDE and LEEUWENBERG found it at an altitude of 300–400 m in Ivory Coast, ca. 100 km S. of Bouna on the road to Bondoukou, in recently burnt orchard-savanna. The corky bark of the ca. 1.5–2 m high shrub or treelet being blackened by fire (DE WILDE and LEEUWENBERG no. 3504, WAG). KEAY collected it in Nigeria in the Upper Ogun For. Res., Oyo Distr., in open savanna country with *Isoberlinia doka* CRAIB et STAPF (KEAY no. FHI-22521, FHO, K). Also in Nigeria it was found by WHITE in the Nimbria For. Res., Jos Prov. Here it was growing as a fire-trimmed tree, ca. 6 m high, in derived savanna with scattered relict forest trees and small patches of forest, together with *Parkia*, *Daniellia*, *Hymenocardia*, *Afromosia* and others (WHITE no. 8347, FHO). In Cameroun we found it as a ca. 6 m high tree in forest-savanna mosaic between Meiganga and Ngaoundéré at an altitude of ca. 900 m. The flowering season is there October–November. The flowers are pale yellowish-green or whitish. In this area *T. emetica* subsp. *suberosa* does certainly not occur very frequently (W. J. DE WILDE

c.s. no. 4050, WAG). HOYLE observed it in Sudan on a two days march N.W. of Said Bundas in Bahr el Ghazal Prov. He stated: 'Small tree. Only one seen here in *Parinari-Monotes* scrub woodland with grass, heavily burnt' (HOYLE no. 501, BM). In N.W. Uganda it was collected several times. DAWKINS found it there near Gulu, Acholi Distr., at an altitude of ca. 1200 m. in annually burnt, recently cultivated bush with regrowth of *Butyrospermum*, *Bridelia*, *Terminalia spekei* ROLFE, *Hymenocardia acida* TUL., *Combretum* and *Grewia* (DAWKINS no. 237, ENT). In the Acholi Distr. it also was collected by STYLES north of the Gulu-Kitgum road. STYLES states that the annual rainfall in this area is ca. 1500 mm. He observed that the flowers have a faint sweet smell and that they are much visited by bees. Flowering time in Uganda seems to be December-March. Also here *T. emetica* subsp. *suberosa* seems to be not common, generally growing singly (STYLES nos. 254 and 265, both in FHO).

Mature fruits were found by LEEUWENBERG near Katiola in Ivory Coast on a small, ca. 3 m high tree in June (LEEUWENBERG no. 4277, WAG). DE LEEUW (no. 43, WAG) collected nearly mature fruits in May near Zaria, Nigeria, in open low savanna-woodland.

Vernacular names. Gambia: *bouriète* (dial. Diola).  
Port. Guinea: *quécó* (dial. Mandinga).  
Mali: *flo-finzan*, *soula-finzan*, *foula-finzan* (dial. Bambara), *ouara tigué*, which means: 'groundnut of the wild animal' (dial. Bambara).  
Upper Volta: *kikiramtanga-ouamtabéga* (dial. Mossi).  
Ghana: *chele*, *yofuosi*, *kisiga*, *asabrabise* (N.W. Ashanti).  
Nigeria: *jan saiva*, *jan saye* (dial. Hausa), *goron talaka*, which means: 'poor man's kola'.  
Sudan: *umshara*, *um hagri* (Arab).

Uses. It was already noted above that *T. emetica* subsp. *suberosa* mostly occurs scattered in Savanna-Woodlands often forming only poor developed trees or treelets. Very rarely it is abundant. This renders it unlikely that subsp. *suberosa* plays a very important role in local economy. In literature it always was combined with subsp. *emetica* (see there), which has much more economic value. DALZIEL (l.c., 2nd reprint 1955) stated that according to AMMANN and VUILLET seeds of West African samples of *T. emetica* yielded up to 44.7% fat and approach in size and oil-content those of East Africa. However, the oil seems to be rarely used in West Africa. Together with other oils an ointment is made and applied for parasitic skin diseases, itch and ringworm. The pounded bark is used for the same purposes, and according to AUBREVILLE (l.c., 1950) also for fever and syphilis. IRVINE (l.c., 1961) noticed that the arillodium is sometimes chewed like *kola*, to which refers also one of the vernacular names in Nigeria. Branches with corky bark were sold on the market in Bouaké, Ivory Coast, as toothbrushes (teste LEEUWENBERG no. 4464). From both northern Cameroun and Uganda it is reported that the roots are used to cure stomach pains (SEC. RECH. FOR. CAM. no. 4451, and STYLES no. 254). KERHARO and BOUQUET (Plantes méd.

et tox. de la Côte d'Ivoire-Haute Volta : 159. 1950) mentioned that in Ivory Coast and Upper Volta subsp. *suberosa* is frequently used as an emetic and as a laxative. KERHARO and ADAM (in Acta Tropica Suppl. 8 : 325. 1964) stated that in Senegal an infusion of the pounded roots is used in a medicine to cure leprosy.

Specimens examined: Senegal: sin. loc. (♂ fl.) DUPUIS s.n. (TCD); sin. loc. (♂ fl. buds and one loose young fruit April) LEPRIEUR s.n. (G); sin. loc. (♂ fl. buds) LEPRIEUR s.n. (W); sin. loc. (♂ fl. and very young fr.) PIRROTTET 133 (BM, mixture of a male and a female individual).

Gambia: Albrede (very young fr. June) LEPRIEUR s.n. (L); *ibid.* (very young fr. May) PIRROTTET 333 (G).

Port. Guinea: Gabu (immature fr. March) ESPIRITO SANTO 495 (COI, only the sheet with fruiting material (the sheet with flowering material probably belongs to ESP. SANTO 495-A), LISJC); Bafata, Bambadinea (♂ fl. March) ESPIRITO SANTO 495-A (COI (the flowering part of ESP. SANTO 495), LISJC); Bissau, Prabís (♂ fl. Febr.) ESPIRITO SANTO 1808 (COI, isotype, LISJC, holotype); Gabu, Canjadudi (immature fr. June) ESPIRITO SANTO 2511 (COI, LISJC, LISJC); Boé, Guiledje (♂ fl. June) ESPIRITO SANTO 2925 (COI, LISJC, LISJC); Bafata, Tantam-Cossé (nearly mature fr. Sept.) ESPIRITO SANTO 3341 (LISC).

Guinea: Kombo R. (presently Koumba R.?) (♂ fl. and young fr.) HEUDELDT 25 (G, mixture of a male and a female individual).

Mali: Kougueniéba (♂ fl. March) CHEVALIER 556 (K); Béléko (very young fr. April) LAHITTE s.n. (IFAN); Kelliga, Bongouni (young fr. May) LAHITTE s.n. (IFAN); near Kayes (♂ fl. April) LEGAGNEUX in Herb. D'ALLEIZETTE 1190 (L); Tampaka, W. of Kita (♂ fl. Dec.) ROBERTY 10279 (G, IFAN); Kénieba (♂ fl. March) ROBERTY 17076 (G).

Ivory Coast: 106 km S. of Bouna on road to Bondoukou (♂ fl. March) DE WILDE and LEEUWENBERG 3504 (WAG); 8 km S. of Katiola (mature fr. June) LEEUWENBERG 4277 (WAG, with fr. in spirit coll.); 3 km N. of Tafiré (veget. June) LEEUWENBERG 4438 (WAG); 8 km S. of Katiola (♂ fl. June) LEEUWENBERG 4451 (WAG); Bouaké (veget. June) LEEUWENBERG 4464 (WAG); Ouangofetini, Bouna Nat. Park (♂ fl. Jan.) OLDEMAN 887 (WAG).

Upper Volta: 10 km N. of Léraba R. on road Ferkessédougou-Banfara (veget. June) LEEUWENBERG 4293 (WAG); 29 km S. of Bobo Dioulasso on road to Banfara (nearly mature fr. June) LEEUWENBERG 4407 (WAG, with fr. in spirit coll.); road Bobo Dioulasso Sikasso (♂ fl. Jan.) ROBERTY 6987 (G); 60 km E. of Banfara (♂ fl. Jan.) ROBERTY 13406 (G).

Ghana: Boro, near Wa (veget. June) ADAMS 645 (GC); Wa (veget. June) ADAMS 795 (GC); Ashanti, 230 km on Berekum-Sampa road (immature fr. Dec.) ADAMS 5269 (GC); Yendi (♂ fl. May) AKPABLA 528 (GC); ca. 3 km S. of Bande (veget. March) GOODALL 15052 (GC); 2 km S. of Nabori (veget. March) GOODALL 15203 (GC); 9 km E. of Tumu (veget. March) GOODALL 15325 (GC); 9 km W.S.W. of Tumu (veget. March) GOODALL 15354 (GC); 6 km S.W. of Pina (veget. April) GOODALL 15424 (GC); Nakpanduri (immature fr. June) HARRIS s.n. (GC); N.W. Ashanti, Nwereme (veget. May) IRVINE 2500 (E, GC); Kpandu (♂ fl. Febr.) ROBERTSON 104 (BM); Bosomoa For. Res. (veget. June) VIGNE 3001 (BM, MO).

Togo: 20 km S. of Sansanné Mango (fr. May) ROBERTY s.n. (IFAN).

Nigeria: Samaru, near Zaria (nearly mature fr. May) DE LEEUW 43 (WAG); Oyo Prov., Oyo Distr., Old Oyo For. Res. (♂ fl. Febr.) KEAY FHI-16007 (FHO); *ibid.*, Upper Ogun For. Res., ca. 18 km E. of Shepeteri (fl. March) KEAY FHI-22521 (FHO, K); Kano Prov., Dangora Distr., Dangora For. Res. (immature fr. April) LATILO FHI-27426 (WAG); Jos Prov., Nimbria For. Res. (fl. Febr.) WHITE 8347 (FHO); Bauchi Prov., Yankari Game Res., Wikki Warm Springs (fl. April) WHITE 8862 (FHO).

Cameroun: Adamaoua Plateau, 8 km S. of Ngaoundéré, on road to Meiganga (♂ fl. Oct.) BRETELIER 602 (WAG); 15 km N.E. of Meiganga (♀ fl. Nov.) W. J. DE WILDE c.s. 4050 (WAG); Northern Cameroun, sin. loc. (very young fr. Jan.) SEC. RECH. FOR. CAM. 4451 (P); W. of Mokolo, ca. 9 km on road Mokolo-Mogodé (♂ fl. Jan.) LEEUWENBERG 7509 (WAG); 56 km

on road Garoua–Ngaoundéré (♂ fl. Jan.) LEEUWENBERG 7610 (WAG); 52 km on road Ngaoundéré–Garoua (♂ fl. Jan.) LEEUWENBERG 7616 (WAG); 'Wakwa', ca. 10 km S. of Ngaoundéré (♀ fl. Jan.) LEEUWENBERG 7651 (WAG).

Sudan: N.W. Equatorial Prov., 2 days march N.W. of Said Bundas, Boro R. Headwaters (♂ fl. Jan.) HOYLE 501 (BM).

Uganda: West Teso, Atuboi (fl. June) DALE U-753 (K, MO); Northern Prov., Acholi Distr., ca. 12 km from Gulu on road to Kitgum (♂ fl. Febr.) DAWKINS 237 (ENT); sin. loc. (♂ fl.) EGGELING 1644 (E); Northern Prov., Acholi Distr., Abera For. Stat., near Oding village, N. of Gulu–Kitgum road (♂ fl. Dec.) STYLES 254 (FHO); *ibid.* (♂ fl. Dec.) STYLES 265 (FHO); Northern Prov., W. Madi Distr., Itia For. Res., S. of Moyo–Laropi road (♂ fl. Dec.) STYLES 286 (FHO).

## 5. *Trichilia gilgiana* HARMS

Fig. 5; Map 5

*Trichilia gilgiana* HARMS in ENGL., Bot. Jahrb. 23 : 161. Sept. 1896; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. June 1896 (*nomen*); ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 822. 1915; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B38. 1922; EXELL c.s. in Journ. of Bot., Br. and Foreign 65 (Suppl. 1) : 62. 1927; GOSSWEILER and MENDONÇA, Carta Fito-geogr. Angol. : 54. 1939; PELLEGRIN in Not. Syst. 9(1) : 21. 1940; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; STANER in Bull. Jard. Bot. Brux. 16 (2–3) : 161, tab. 5. 1941 (partly, excl. *T. kisoko* DE WILD.); EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 315. 1951; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958; STANER and GILBERT in Fl. Cong. Belg. 7 : 166. 1958 (partly, excl. *T. kisoko* DE WILD.).

Type: ZENKER no. 728 (Cameroun: Yaoundé, holotype not seen, destroyed in B; lectotype, COI; iso-lectotypes: BM, BR, GOET, K, M, NY, S, WRSL).

Synonyms: *Trichilia bipindeana* C.DC. in Ann. Conserv. et Jard. Bot. Genève 10 : 161. 1907; PELLEGRIN in Not. Syst. 9(1) : 20. 1940; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Type: ZENKER no. 3000–a, partly (see notes), (Cameroun: Bipindi, lectotype, G (former Herb. DELESSERT); iso-lectotypes, BM (fragment, partly), WRSL (fragments, partly), E (partly), G (former Herb. BOISSIER), K).

*Trichilia hylobia* HARMS in Notizbl. Bot. Gart. Berl. 7 (no. 65) : 231. 1917; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 22. 1940. Syntypes: TESSMANN no. 898 (Río Muni or Cameroun?: Campo R. region, Akonango, lectotype, K); TESSMANN no. 1073 (Río Muni or Cameroun?: not seen, probably destroyed in B); MILDBRAED no. 4544 (Cameroun: Molundu Distr., between Lokomo, Bumba and Bange, 15°15'E.–2°50'N., not seen, probably destroyed in B).

Note. *Trichilia bipindeana* was described by CASIMIR DE CANDOLLE in 1907 (l.c.). He based it on ZENKER no. 3000–a, which he saw in the herbaria DELES-

SERT and BOISSIER, now both in G. An examination of the material of ZENKER 3000-a, on loan from BM, BR, COI, E, G, GOET, K, L, M, MO, P, S, W, and WRSL proved that ZENKER no. 3000-a is composed of *T. gilgiana* HARMS (♀) and *T. rubescens* OLIV. (♂). Fortunately both the Geneva sheets belong to *T. gilgiana*, and so C. DE CANDOLLE's description of *T. bipindeana* matches with *T. gilgiana*. *Trichilia bipindeana* C.DC. must be placed in the synonymy of *T. gilgiana* HARMS. To avoid further confusion I designated ZENKER no. 3000-a in the former herbarium DELESSERT (G) as lectotype of *T. bipindeana* C.DC.

Duplicates of ZENKER no. 3000-a proved to be either *T. gilgiana* (G (former herb. BOISSIER), and K) or *T. rubescens* (BR, COI, GOET, L, M, MO, P, S, and W), or a mixture of both (BM, E, WRSL). Elements of this material belonging to *T. gilgiana* are designated iso-lectotypes of *T. bipindeana* C.DC. In consequence of this, PELLEGRIN (Not. Syst. 9(1): 20. 1940), who probably only saw the Paris material, erroneously decided *T. bipindeana* to be synonymous to *T. rubescens* OLIV. (see also under *Trichilia rubescens* OLIV.).

Diagnostic and differential characters. Evergreen tree, up to ca. 30 m tall. Leaflets (2-)5-8-jugate, acuminate (rarely acute) at apex, distinctly glandular dashed and dotted, glabrous. Midrib impressed on upper surface of leaflet. Inflorescence with conspicuous bracts and bracteoles which are rather long persistent. Free parts of the filaments densely bearded inside; connate part of the staminal tube inside glabrous. Style thinly velutinous in the upper part, otherwise glabrous (rarely velutinous all over). Fruit 3-chambered, pyriform or fig-shaped, ca. 3-3.5 cm diam. (stipe excluded), markedly gradually stipitate. Stipe 0.5-1.0 cm long.

Description. Medium-sized evergreen tree, (5-)10-20(-32) m tall; bole usually cylindrical, sometimes more or less fluted, up to 95 cm d.b.h., usually 20-40 cm diam.; crown strongly branched, hemispherical or not; bark thin, 0.3-0.5 cm thick, rhytidoma outside smooth, with small dilatation lines, greyish-brown, peeling off in small plates; slash pale pink, soon changing to reddish-brown, with strong cedar smell, the inner bark near the cambium exuding a bit of sticky, greyish-white latex; sapwood creamy-white. Young twigs terete or somewhat flattened, dark brown, puberulous; lenticels inconspicuous or absent; older twigs terete, greyish-brown or brown, puberulous or glabrescent, longitudinally wrinkled; outer bark thin, not peeling off, greyish-brown, inner bark thin, reddish-brown; wood greyish-white.

Leaves imparipinnate, rather often the terminal leaflet absent and the leaves paripinnate, (20-)30-45(-55) cm long; petiole terete, flattened on the upper surface, puberulous or glabrescent, wrinkled lengthwise, (4.5-)6-10(-11) cm long; rachis (5-)10-20(-26) cm long, flattened or sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), otherwise similar to the petiole; petiolules terete, slightly sulcate on the upper surface, the raised edges of the petiolular furrow decurrent in the slightly

raised edge of the flattened side of the leaf-rachis, puberulous, petiole of terminal leaflet (6-)10-20(-25) mm, the others (2-)4-8(-9) mm long.

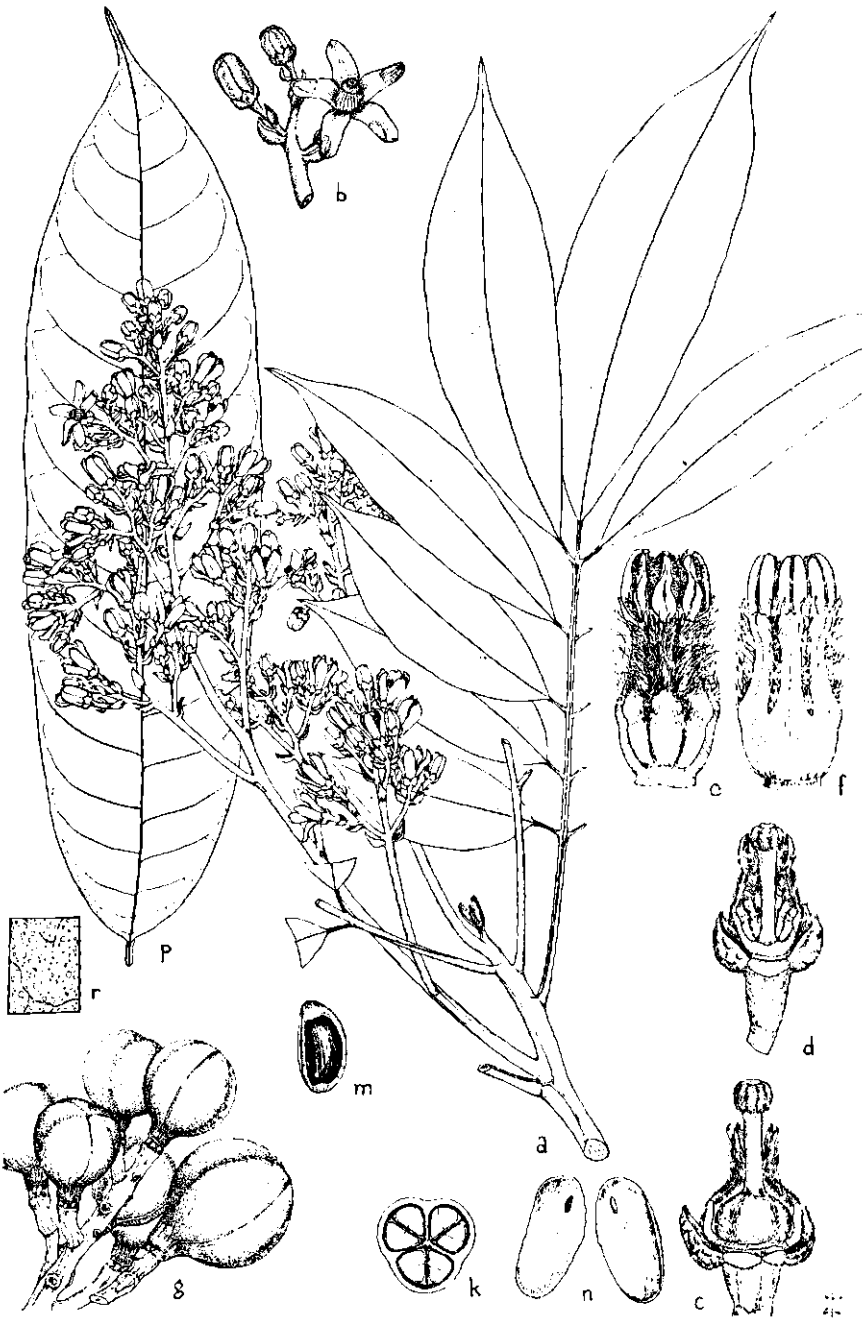
Leaflets (2-)5-8-jugate, opposite or subopposite, glandular dashed and dotted, (5.5-)9-21(-28) by (1.5-)2.5-5.5(-7.8) cm, distal leaflets largest, narrowly obovate, narrowly oblong or sometimes narrowly elliptic, proximal leaflets smaller, narrowly elliptic or narrowly ovate, other leaflets intermediate, apex long acuminate, rarely acute, often mucronulate by the midrib, base cuneate or obtuse, sometimes asymmetric, margin indistinctly and narrowly revolute. Upper surface glabrous, midrib impressed, nerves (9-)11-17(-21) on either side of midrib, opposite or not, straight but curving and anastomosing before reaching the margin, veins more or less distinct, finely reticulate, glandular-transparent. Lower surface glabrous except for some minute hairs on the prominent midrib and nerves, veins distinct, finely reticulate.

Inflorescences lax to rather condensed, paniculately arranged, axillary, or supra-axillary, assembled near the top of the branches, (5-)10-20(-30) cm long, main axes flattened or angular, wrinkled lengthwise, puberulous, two or three times branched before the pedicels, branches up to 8 cm long; bracts usually persistent, 3-7(-9.5) by 1.5-4(-7) mm, the lower ones largest, higher ones smaller, elliptic, ovate or broadly ovate, acute at apex, abaxial puberulous, adaxial glabrous or slightly puberulous near the base.

Male flowers: Pedicels (3-)4-5(-8) mm long, puberulous, longitudinally wrinkled, bracteoles 2, usually persistent, not opposite, 1.5-3.5 by 1.0-1.5 mm, ovate to triangular, acute at apex, similar to the bracts. Receptacle cylindrical, 1-3 mm long, slightly tapering to the base, puberulous, jointed to the pedicel. (In spirit collections the receptacle is often somewhat darker in colour than the pedicel). Calyx cup-shaped, 2-3 mm high by 4.5-6 mm wide, deeply 5-lobed, lobes imbricate in bud, 1.5-2.2 by 1.8-3.0 mm, very broadly ovate or depressed ovate, obtuse or acute at apex, rather fleshy, irregularly wrinkled, inside glabrous, outside puberulous. Petals (4-)5, free, imbricate in bud, reflexed during anthesis, (7.0-)8-10(-11.5) by 2-4.5(-5) mm, narrowly elliptic to elliptic or narrowly obovate, fleshy, slightly incurved at the obtuse apex, inside glabrous, outside puberulous. Staminal tube 4.5-6.5 mm long (including the anthers), (9-)10(-11)-fid, cleft over about 3/5 of its length, free parts of the filaments (1.5-)2-3 mm long, glabrous outside, densely bearded inside and on the margins, connate part of the staminal tube ca. 1.5-2.0 mm long, somewhat urceolate, thick and fleshy, inside glabrous and smooth, outside sometimes with some scarce hairs or also glabrous; anthers dorsifix, attached by a very short, ca. 0.1 mm long stalk, inserted in the sinus between two narrowly triangular,

FIG. 5. *Trichilia gilgiana* HARMS - a: fl. branch, ♂ ( $\times \frac{1}{2}$ ); b: part of inflorescence, ♂ ( $\times 1$ ); c: section of ♀ fl., petals removed ( $\times 3$ ); d: id., ♂ fl. ( $\times 3$ ); e: part of staminal tube, inside, ♂ ( $\times 6$ ); f: id., outside ( $\times 6$ ); g: infructescence ( $\times \frac{1}{2}$ ); k: transverse section of fr. ( $\times \frac{1}{2}$ ); m: seed ( $\times \frac{1}{2}$ ); n: cotyledons ( $\times 1$ ); p: leaflet ( $\times \frac{1}{2}$ ); r: portion of leaflet, beneath ( $\times 12$ ). -a: BRETELIER 2482; b, d-f, p-r: BRETELIER 2489 (spirit mat.!); c: DEVRED 100 (spirit mat.!); g-k: WAGEMANS 1051; m-n: GILBERT 9775.





glabrous lobes of 0.1–0.6 mm long, (the latter sometimes indistinct or missing), at the top of the free part of the filament, 1.2–2.0 by 0.5–0.8 mm, narrowly oblong, slightly mucronulate at apex, rough, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base, ovary sterile, glabrous or with a few hairs, vestigial ovules present; style (2.5–)3–4.5(–5) mm long, 0.5–0.8 mm diam., thinly velutinous near the apex, otherwise glabrous, sometimes velutinous all over; stigma globular to cylindrical, 1.0–1.5 mm diam., outside longitudinally slightly furrowed, clothed with a velvety tissue of very minute, dense (glandular?) hairs and there often adherent to the anthers, glabrous and with a depression at the apex.

Female flowers: Similar to male flower, but anthers not dehiscing, not producing pollen. Ovary well developed, pyramidal, ca. 2.0 mm high, by 2.2–3.0 mm diam., densely tomentose or shortly sericeous, 3-celled; ovules 2 in each cell, axile, collateral; style slightly shorter than in male flowers, 2.5–3.5 mm long, usually thinly velutinous all over, stigma as in male flower.

Fruit a 3-chambered capsule, pyriform or (if mature) fig-shaped, ca. 3.0–3.5 cm diam. (stipe excluded), markedly stipitate (stipe ca. 0.5–1.0 cm long, up to 1.0 cm thick, tapering to the base), very shortly puberulous, becoming glabrous during maturing, brownish-violescent, loculicidally dehiscent, 3-valved, valves longitudinally slightly wrinkled.

Seeds 2 in each chamber, collateral, sometimes 1 seed reduced by abortion. Mature seeds ca. 20 by 12 mm, arillodiate, more or less plano-convex, flat on the adjacent sides, testa for the largest part developed into a soft and fleshy arillodium (sarcotesta), arillodium orange-red without, whitish within, up to 2 mm thick, occupying the surface of the seed for about 2/3, leaving a glossy, dark brown dorsal spot of ca. 13–15 by 7–8 mm of thin leathery testa; cotyledons firm, fleshy, pale brownish, plano-convex, 13–15 by 7–8 mm, radicle narrowly ellipsoid, longitudinally flattened, 2.5–3 by 1.0 mm, in between the cotyledons at about 2 mm beneath the apex.

Seedling: Germination epigeal. Hypocotyl ca. 4 cm long, puberulous. Cotyledons sessile, fleshy, not developing. Epicotyl ca. 4.5 cm long, densely puberulous. Tap root. First two leaves opposite, simple, petiolate, 6–8 by 3.5–4.5 cm, elliptic or ovate, broadly cuneate to obtuse at the base, acuminate at apex, glabrous both sides. Petiole 1–1.4 cm. Following leaves alternate, simple, similar to the above-described. No evidence about the first compound leaf.

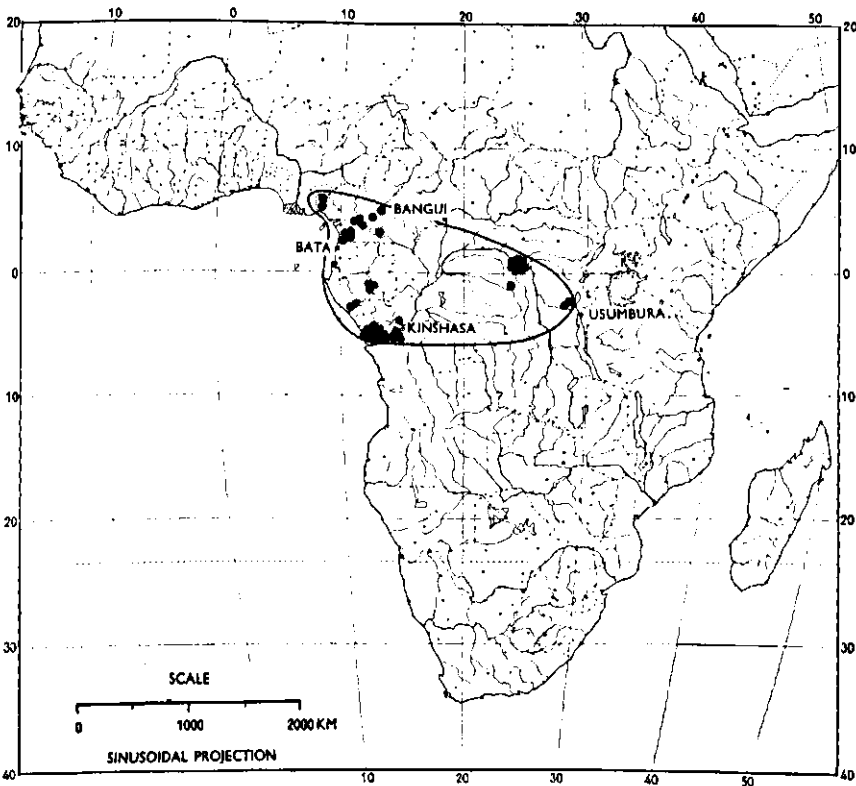
Notes to the synonyms. *T. bipindeana* C.DC. (l.c., 1907) is now based on a part of ZENKER no. 3000-a (Cameroun; see note above). It is a female specimen. A comparison of this lectotype with the type of *T. gilgiana* HARMS, viz. ZENKER no. 728 (also from Cameroun, but a male specimen) leaves no doubt about the identity of both. The conclusion must be that *T. bipindeana* is a later synonym of *T. gilgiana* HARMS.

Of the type material on which *T. hylobia* HARMS (l.c., 1917) was based, a duplicate of TESSMANN no. 898 at K, seems the only specimen extant. TESSMANN no. 898 (K) is designated here as the lectotype. It is a flowering male specimen. The

petals are 8–9 mm long, the connate part of the staminal tube is distinctly glabrous inside, the free parts of the filaments are densely bearded inside, the style is entirely pubescent or velutinous, the vestigial ovary is 3-locular. The leaves are at most 4-jugate.

HARMS, in the protologue to *T. hylobia*, stated that it has very much in common with *T. gilgiana* HARMS but that it was distinct in having bigger flowers and more acute calyx-lobes. In my opinion these characters do not hold. Both the protologue to *T. hylobia* as well as the lectotype (TESSMANN no. 898) fall well within the variation of *T. gilgiana* HARMS. MILDBRAED no. 8814 (K), collected near Dengdeng in Cameroun, is identified by HARMS as *T. hylobia* HARMS (a label accompanying MILDBRAED no. 8814 states: 'Det. HARMS'). Without the slightest doubt this material belongs in *T. gilgiana* HARMS. *T. hylobia* HARMS must be considered a later synonym of *T. gilgiana* HARMS.

Distribution. South Nigeria, Cameroun, Rio Muni, Gabon, Congo (Brazzaville), Congo and Angola (Cabinda).



MAP 5. Distribution of 5. *Trichilia gilgiana* HARMS.

Ecology. Throughout its distributional range *T. gilgiana* is well represented in the rain forest belt, especially on those places where the high forest is disturbed, and in older secondary forests.

In Cameroun BRETELIER c.s. found it in ancient cultivated areas near Yaoundé and in secondary forests, at an alt. of ca. 900 m. GERMAIN and TOUSSAINT observed it in Bas Congo in the understory of *Terminalia superba*-forest. From Yangambi the species is reported by LEONARD and by LOUIS as a shrub or medium tree, growing in *Scorodophloeus zenkeri*-forest at an alt. of ca. 470 m. PIERLOT found it in Kivu at 2°03'S.-28°28'E., at 950 m alt., as a small tree together with *Julbernardia seretii* (DE WILD.) TROUPIN, *Cynometra alexandri* C. H. WRIGHT, *Cynometra hankei* HARMS, and *Pentadesma butyracea* SAB. In Cabinda the species was frequently collected by GOSSWEILER. It seems to be rather common there in mixed forests, near Bucu Zau and Belize. Fruits may be bright purplish-red (viz. GOSSWEILER no. 6756, and MONTEIRA and MURTA no. 213).

A good character to recognize the flowering tree in the field is in the colour of the flowers. The petals are creamy-brown ('caramel') outside, distinctly pink inside, paler near the top, darker at base. The staminal tube is also pink. Moreover, the flowers have a rather strong, sweet scent, resembling that of lilies-of-the-valley (*Convallaria majalis* L.). By these characters it is impossible to confuse the species in the field with *T. monadelphica* (THONN.) J. J. DE WILDE (cf. VERMOESEN l.c.: B38, 1922), which is rather similar in the herbarium.

Vernacular names. Not known from Nigeria, Cameroun and Gabon. Congo: *soko* or *kisoko* (Mayumbe), *mukudja-mbeo* (dial. Kitembo), *holumbelikolo* (dial. Turumbu), *hofofondje* or *hofofondje-ho-fufow* (dial. Turumbu), *damadili* (dial. Ngwaka), *tshisalasansa* (dial. Tshiluba). Angola: Cabinda: *kissoco* or *quisoco*.

Uses. No information regarding utility was found.

Specimens examined: Nigeria: Ogoja Prov., Ikom Distr., Afi River For. Res. (fl. Dec.) KEAY FHI-28222 (K); South Nigeria, eastern region, Oban (♂ fl.) TALBOT 1370 (BM, K).

Cameroun: 4 km S.E. of Nguélémdouka, road to Doumé (♂ fl. Nov.) BRETELIER 2126 (WAG, with fl. in spirit coll.); N'Kolbisson, 7 km W. of Yaoundé (♂ fl. Dec.) BRETELIER c.s. 2276 (WAG, with fl. in spirit coll.); ibid. (veget. Dec.) BRETELIER c.s. 2294 (WAG); 33 km E. of Yaoundé, road to Ayos (♂ fl. Jan.) BRETELIER c.s. 2482 (WAG); Yaoundé (♂ fl. Jan.) BRETELIER c.s. 2489 (WAG, with fl. in spirit coll.); Lomié Distr., between Assobam and Lomié (♂ fl. April) MILDBRAED 5100 (HBG); Dengeng (♂ fl. buds April) MILDBRAED 8814 (K); Yaoundé (♂ fl.) ZENKER 728 (lectotype of *T. gilgiana* in COI, iso-lectotypes at BM, BR, GOET, K, M, NY, S, WRSL) (erroneously labeled: 'ZENKER and STAUDT'); Bipindi (♂ fl.) ZENKER 3000 a (lectotype of *T. bipindeana* in G (former Herb. DELESSERT), iso-lectotypes at BM (partly), E (partly), G (former Herb. BOISSIER), K, WRSL (partly)); ibid. (♂ fl.) ZENKER 3388 (BM, BR, COI, E, G, GOET, K, L, M, MO, S, W, WRSL).

Río Muni (or Cameroun?): Campo R. region (♂ fl. March) TESSMANN 898 (K, lectotype of *T. hylobia* HARMS).

Gabon: near Tchibanga, Mayombe bayaka forest (♂ fl. May) LE TESTU 1734 (BM, BR, K); upper course of N'Gounyé R., between N'Dendé and Labo (♂ fl. Dec.) LE TESTU 5154 (BM);

upper course of Ogooué R., near Lastoursville (♂ fl. April) LE TESTU 7204 (BM, BR, K); *ibid.* (♂ fl. March) LE TESTU 7956 (BM, IFAN, K); near Lastoursville (♂ fl.) LE TESTU 8706 (UC).

Congo (Brazzaville): road to Mayéyé (♀ fl. and young fr. May) BOUQUET 1274 (P, WAG).

Congo: Équateur: Yongo, Ikela Territory (♂ fl. Nov.) EVRARD 5269 (BR, K).

Oriente: Yangambi (young fr. Febr.) DONIS 3680 (BR); *ibid.* (♂ fl. Febr.) DONIS 3738 (BR); *ibid.* (♀ fl. March) DONIS 3779 (BR); *sin. loc.* (immature fr. April) GILBERT 1015 (BR); Yangambi (mature fr.) GILBERT 9775 (BR); *ibid.* (veget.) HOMÈS 269 (WAG); *ibid.* (♂ fl. Nov.) LÉONARD 185 (BR); *ibid.*, road to Ngazi (♂ fl. Oct.) LOUIS 502 (BR); *ibid.* (immature fr. Aug.) LOUIS 2391 (BR, S); Yangambi, Isalowe Reserve (♂ fl. Oct.) LOUIS 6378 (BR, MO, PRE); Yangambi, plateau of the Lusambila R. (♂ fl. Oct.) LOUIS 6458 (BR); *ibid.* (♂ fl. March) LOUIS 8471 (BR, C, MO, NY); Yangambi, plateau of the Luweo R. (nearly mature fr. July) LOUIS 10559 (BR); Yangambi, Isalowe Reserve (♂ fl. Febr.) LOUIS 13632 (BM, BR, C, K); Yangambi, plateau (mature fr. Sept.) MAUDOUX 339 (BR); Yangambi, 9 km on road to Yaosuka (nearly mature fr. April) MAUDOUX 3251 (BR).

Léopoldville: Temvo (♂ fl. April) DE MEULEMEESTER 12 (BR); M'Vuazi, Thysville Territory (♀ fl. March) DEVRED 100 (BR, with fl. in spirit coll., K); *ibid.*, Lombo Forest (♂ fl. April) DEVRED 1153 (BR); *ibid.*, Ntava Forest (immature fr. July) DEVRED 1199 (BR); *sin. loc.* (immature fr.) DONIS 436 (BR); Luki, Manzonzi Valley (immature fr. June) DONIS 1852 (BR); *ibid.*, Valley of the Kinkoko R. (mature fr. Aug.) DONIS 1974 (BR); *ibid.* (♂ fl. March) DONIS 2435 (BR, with fl. in spirit coll.); Gimbi (immature fr. July) GERMAIN 2398 (BR); *ibid.*, Valley of the Lukokoto R. (♂ fl. Febr.) TOUSSAINT 822 (BR, with fl. in spirit coll.); Luki, Valley of the Minkudu R. (♀ fl. March) TOUSSAINT 2196 (BR, C); *ibid.* (♂ fl. April) TOUSSAINT 2252 (BR, MO, NY); Luki, Nkula Park (very young fr. April) WAGEMANS 17 (BR); *ibid.* (immature fr. June) WAGEMANS 84 (BR); *ibid.* (young fr. June) WAGEMANS 86 (BR); Luki (nearly mature fr. Oct.) WAGEMANS 1051 (BR); *ibid.* (seedling Febr.) WAGEMANS 1128 (BR); Gimbi, Fuka Park (♀ fl. and very young fr. March) WAGEMANS 1915 (BR).

Kivu: between Walikale and Kalche (♂ fl. March) LEBRUN 5252 (BR, MO); Shabunda (♂ fl. Aug.) PIERLOT 739 (BR).

Angola: Cabinda: Maiombe, Buco Zau (immature fr. Sept.) GOSSWEILER 6653 (BM, COI, K, LISJC, LISU); *ibid.* (fr. Oct.) GOSSWEILER 6756 (BM, COI, LISJC, LISU); *ibid.* (♂ fl. Dec.) GOSSWEILER 6897 (BM, COI, K, LISJC, LISU); near Belize (♂ fl.) GOSSWEILER 6977 (BM, LISU); *ibid.*, banks of the Belize R. (♂ fl. March) GOSSWEILER 7031 (BM, COI, K, LISU); a 'duplicate' of GOSSWEILER 7031 in LISJC belongs in *T. gillettii* DE WILD.!; Caio Province, Buco Zau (♂ fl. April) GOSSWEILER 7988 (BM, COI, K (with young fr. probably belonging to another specimen), LISJC, LISU); road Buco Zau to Belize (immature fr. June) MONTEIRO and MURTA 213 (BM); *ibid.* (♂ fl. June) MONTEIRO and MURTA 219 (PRE).

## 6. *Trichilia gillettii* DE WILD.

Fig. 6; Map 6

*Trichilia gillettii* DE WILD. in Ann. Mus. du Congo, Sér. 5 (Bot.) 1 : 50. 1903; *id.*, *ibid.*, 2 : 40. 1907; *id.*, *ibid.*, 2 : 264. 1908; TH. and HÉL. DURAND, Syll. Fl. Cong. : 92. 1909; *id.* in Bull. Jard. Bot. Brux. 2 : 92. 1910; DE WILD. in Bull. Jard. Bot. Brux. 5 : 284. 1919; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B35. 1922; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 22. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 155. 1941, in syn. *T. heudelotii* PLANCH. ex OLIV.; STANER and GILBERT in Fl. Cong. Belg. 7 : 167. 1958.

Syntypes: GILLET no. 1962 (Congo: Kimuenza, lectotype, BR), VAN HOUTTE in coll. GILLET no. 2032 (Congo: Kimuenza, paratype, BR, not seen), and GILLET no. 2097 (Congo: Kimuenza, paratype, BR).

Synonym: '*Trichilia heudelotii* PLANCH. ex OLIV.' sensu STANER in Bull. Jard. Bot. Brux. 16(2-3): 155, tab. 3. 1941.

Note: STANER (l.c., 1941) appears to adopt the view that *T. heudelotii* PLANCH. ex OLIV. and *T. gillettii* DE WILD. are the same taxon. He placed *T. gillettii* in the synonymy of *T. heudelotii*. His description, the figure, and the cited material make it certain that *T. gillettii* DE WILD. was at hand, a fact recognized by STANER himself in 1958 (STANER and GILBERT in Fl. Cong. Belg. 7: 167. 1958).

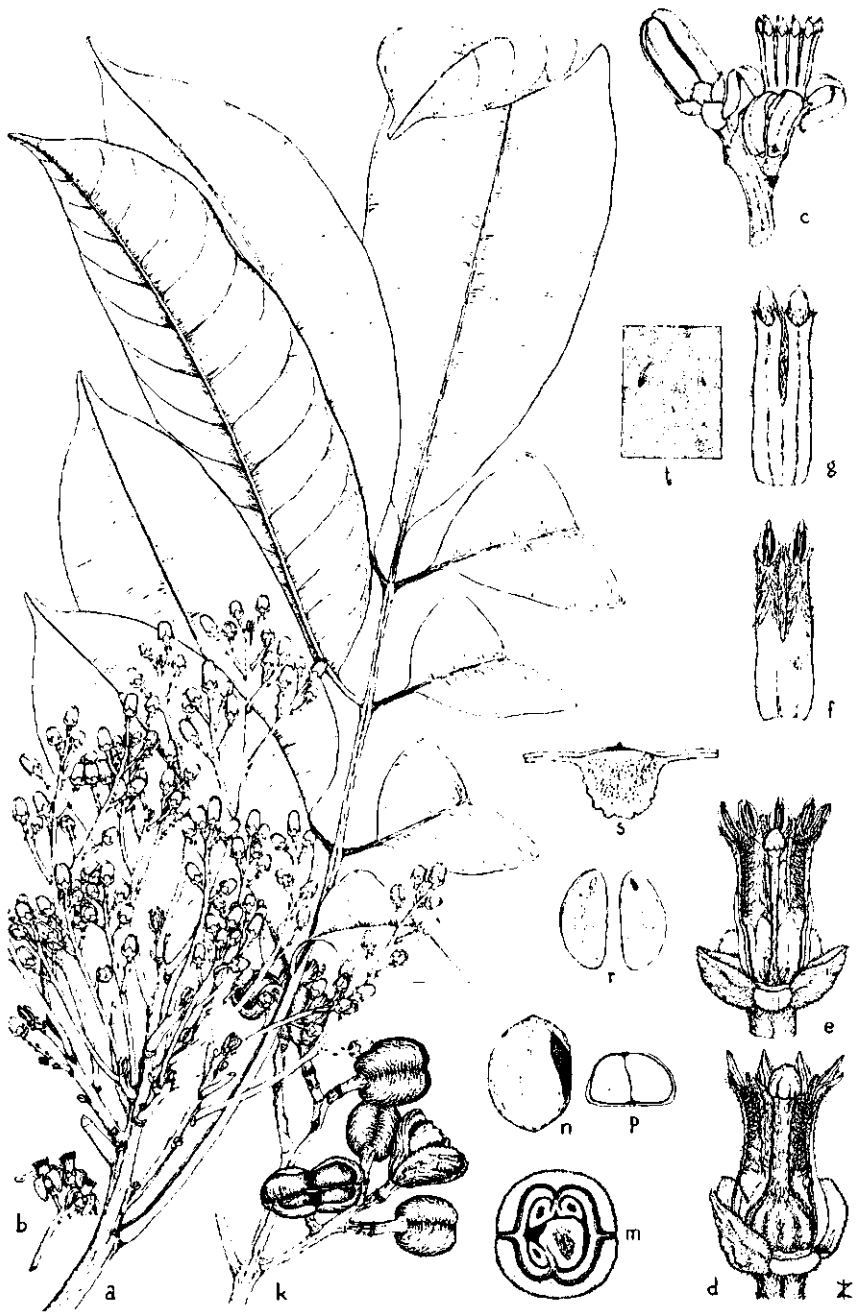
Diagnostic and differential characters. Tree, up to 35 m tall, usually much smaller. Young twigs thin (4-5 mm diam.) brown, reddish-brown or dark brown. Leaflets (1-)3-4-jugate, distinctly but finely glandular dashed and dotted, acuminate (rarely acute) at apex, glabrous both sides. Midrib on upper surface of leaflet flat (rarely shallowly impressed). Ovary 2-celled. Fruit incompletely 2-chambered (septum perforated), markedly stipitate, ca. 15-20 mm diam. (stipe excluded). Stipe 5-10 mm long.

Description. Medium-sized tree, (5-)10-25(-35) m tall, bole cylindrical, up to 15 m high, (10-)15-35(-60) cm diam. breast-high, sometimes with low, small buttresses at the base; bark thin, 0.5-1.0 cm thick, rhytidoma longitudinally fissured, peeling off in scales, greyish-brown; slash pink or pale brown, with faint cedar scent; sapwood rather soft, pale yellow or pinkish.

Young twigs terete or in the youngest parts somewhat flattened and angular, thin, 4-5 mm diam., brown to dark brown, puberulous; lenticels absent or nearly so, always inconspicuous; older twigs terete, indumentum becoming looser with age, and finally the twigs glabrous; outer bark thin, brown or reddish-brown, longitudinally often fissured or ridged by dilatation, inner bark dark brown, thin, brittle; wood yellowish or pinkish.

Leaves imparipinnate, rather often the terminal leaflet absent and the leaves paripinnate, 14-44 cm long; petiole terete, more or less flattened on the upper surface, especially near the base, puberulous or glabrescent, wrinkled lengthwise, 3.8-12 cm long, pulvinus slightly swollen, contracted at the insertion, often transversely wrinkled, rachis (1.2-)3-12(-15.5) cm long, flattened or sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolar furrow (see below), otherwise similar to the petiole; petiolules terete, sulcate on the upper surface, the raised edges of the petiolar furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see

FIG. 6. *Trichilia gillettii* DE WILD. - a: fl. branch, ♀ (× ½); b: part of inflorescence, ♀ (× ½); c: fl. bud and fl., ♂ (× 2); d: section of ♀ fl., petals removed (× 4); e: id., ♂ fl. (× 4); f: part of staminal tube, inside, ♂ (× 4); g: id., outside (× 4); h: infructescence (× ½); m: young fr. in transverse section (× 3); n: seed (× 1); p: transv. sect. of seed (× 1); r: cotyledons (× 1); s: transv. sect. of the midrib of a leaflet (× 10); t: portion of leaflet, beneath (× 15). - a-b, d, m, s-t: LOUIS 1413; e, e-g: LOUIS 7987; h: DESCOINGS 8671; n-r: LOUIS 4084.



above), puberulous, longitudinally wrinkled, petiolule of terminal leaflet (8-)13-25 mm, the others (5-)7-13(-15) mm long.

Leaflets (1-)3-4(-5)-jugate, opposite or subopposite, distinctly but finely glandular dashed and dotted, (5.5-)7-19(-21) by (2-)3-7(-7.5) cm, distal leaflets largest, narrowly elliptic to elliptic or narrowly obovate to obovate, proximal leaflets smaller, ovate to narrowly ovate, other leaflets intermediate, apex acuminate, rarely acute, base cuneate or obtuse, often more or less oblique, margin very narrowly revolute. Upper surface glabrous (young leaflets with some hairs along the midrib), midrib flat or shallowly impressed, sometimes with a narrow, minute rim, running centrally and starting above the base of the leaflet, nerves 9-15 on either side, opposite or not, slightly arched but curving and anastomosing before reaching the margin, veins indistinct. Lower surface glabrous except for some hairs along midrib and bases of the nerves; midrib and nerves prominent, veins laxly reticulate, often not very distinct.

Inflorescences lax to rather condensed, paniculately arranged, axillary, supra-axillary or pseudo-terminal, often assembled near the top of the branches, (4-)5.5-15(-21) cm long; main axes flattened or angular, wrinkled lengthwise, puberulous (the hairs sometimes with a brownish glandular canal in the centre near the base), one, two or three times branched before the pedicels, branches up to 8 cm long; bracts very early deciduous, ca. 3.5-5.0 by 1.5-2.5 mm, ovate, often boat-shaped, acuminate at apex, abaxially puberulous, adaxially glabrous, slightly puberulous near the base, margin ciliate.

Male flowers: Pedicels 1.0-2.5(-4.0) mm long (sometimes absent), pubescent, longitudinally wrinkled, bracteoles 2, very early deciduous, 1.8-2.6 by 0.7-1.0 mm, similar to the bracts. Receptacle cylindrical, 0.8-1.5(-2.0) mm long, puberulous, wrinkled lengthwise, tapering to the base, jointed to the pedicel, often more hairy near the joint. Calyx cup-shaped, ca. 1.8-3.0 mm high by 3.5-5.0 mm wide, deeply 5-lobed, lobes imbricate in bud, 1.0-2.5 mm in diam., broadly ovate, apex acute, more or less fleshy, irregularly wrinkled, thinner towards the margin, outside puberulous, inside smooth and glabrous, margin ciliate. Petals (4-)5, free, imbricate in bud, spreading during anthesis, ca. (6.5-)7.5-9.5(-10) by 1.5-3.0 mm, narrowly oblong or narrowly obovate, slightly incurved at the obtuse apex, inside glabrescent, (minutely papillate), outside puberulous. Staminal tube (4.5-)5.5-7.5(-8.1) mm long (including the anthers), (8-)10-fid, cleft over about 1/2 to 3/5 of its length; free parts of the filaments 2.3-3.6 mm long, glabrescent outside, densely tomentose inside and on the margins; connate part of the staminal tube (1.5-)2.0-3.0 mm long, glabrous (sometimes more or less hairy at the very base) and fleshy inside, the fleshy tissue produced on the inner surface ending to above in wedge-shaped raised issues (the tops of the wedges ending beneath the bases of the sinuses between the free parts of the filaments), outside glabrous; anthers dorsifix, attached near the base by a short stalk, inserted in the sinus between two narrowly triangular, inside hairy lobes of 0.2-0.7(-1.0) mm long, at the top of the free part of the filament, 1.4-2.3 by 0.4-0.7 mm, narrowly oblong, mucronulate at apex, rough, and with some very scarce long hairs mainly on the dorsal side,



opening laterally, lengthwise, pollen well developed. Pistillode scarcely or not expanded at the base, ovary sterile, tomentose, vestigial ovules present; style ca. 3.0–5.0 mm long, 0.3–0.6 mm diam., slender, thinly appressed pubescent, nearly glabrous in the higher part, stigma pyramidal or subglobular, 0.8–1.1 mm diam., outside longitudinally slightly furrowed, densely velutinous by very minute trichomes and there often adherent to the anthers, glabrous at the apex.

Female flowers: Floral characters similar to male flowers, but anthers not dehiscing, not producing pollen. Ovary well developed, more or less globular, laterally slightly compressed, 1.5–2.0 mm diam., longitudinally with 6 shallow grooves, densely and shortly sericeous, 2-celled; ovules 2 in each cell, axile, collateral; style more stout than in male flowers, thinly appressed pubescent with rather long silky hairs, stigma as in male flower.

Fruit an incompletely 2-chambered (sometimes by abortion 1-chambered), markedly stipitate capsule, (septum only present as a ledge between the carpels), more or less globular or reniform, laterally slightly compressed, ca. 15–20 mm in diam. (stipe excluded), (stipe 5–11 mm long, up to 4 mm thick, tapering to the base, wrinkled lengthwise), shortly puberulous, becoming almost glabrous during maturity, often shallowly 2- or 4-lobed at apex, with short style remnant between the lobes, loculicidally dehiscent, 2-valved, dry valves thick leathery or slightly woody, reniform, transversely wrinkled, spreading or even reflexed in mature fruit.

Seeds 2 or only 1 in each chamber (in the last case 1 seed reduced by abortion, or this seed only partly developed). Mature seeds 15–20 by 10–13 mm, arillose, more or less plano-convex, flat on the adjacent sides, testa for the largest part developed into a fleshy arilodium (sarcotesta), arilodium orange-red without, whitish within, up to 1 mm thick, occupying the surface of the seed nearly entirely, leaving laterally (at the dorsal side) an elliptic spot of 7–14 by 4 mm of leathery, dark brown testa; cotyledons firm, fleshy, pinkish-brown, plano-convex, 12–15 by 5–7 mm, radicle ellipsoid, 1.1–1.5 by 0.6–0.8 mm, between the cotyledons at 0.5–1.5 mm beneath the apex. Endosperm absent.

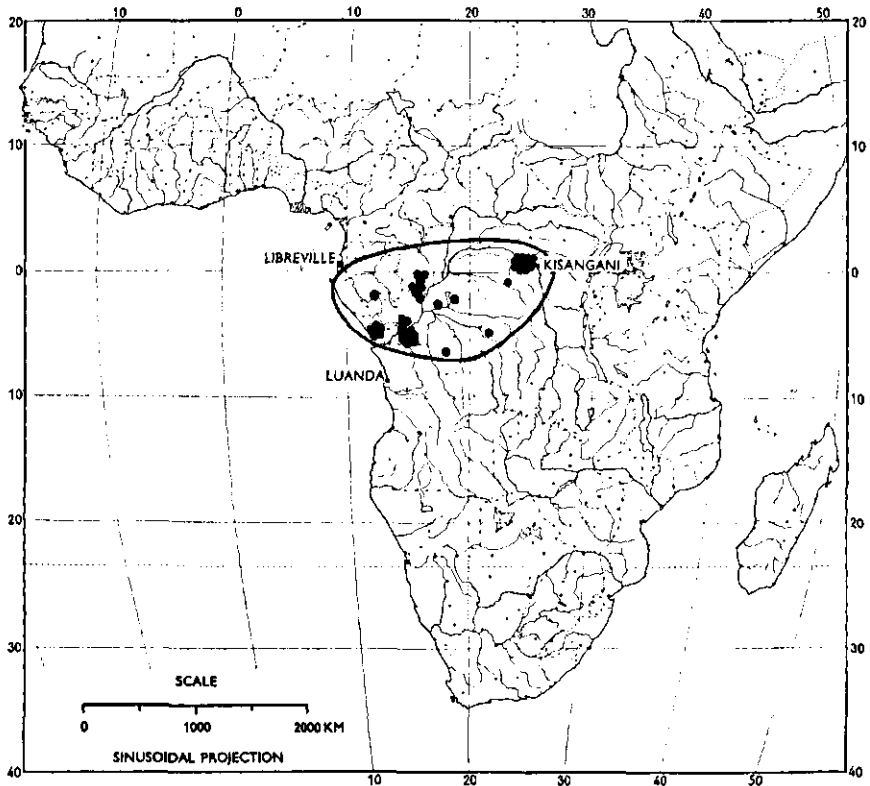
Seedling not seen.

Notes. *T. gillettii* DE WILD. is closely related to *T. welwitschii* C.DC. Main distinctive characters are found in the number of the leaflets (usually 11, 13 or 15 in *T. welwitschii*, and 7 or 9 in *T. gillettii*), in the indumentum on the lower surface of the leaflets (pubescent to puberulous and with minute resinous secretions in *T. welwitschii*, glabrous or glabrescent in *T. gillettii*), and in the fruits, which, as a rule, are completely 2-chambered in *T. welwitschii*, while those of *T. gillettii*, even in a young stage, often show a perforated sept.

Distribution. Gabon, Congo-Brazzaville, Congo, Angola.

Ecology. The ecology of *T. gillettii* largely seems to resemble that of *T. welwitschii* (see there).

From Gabon I only saw one specimen collected by LE TESTU (no. 6477, BM)



MAP 6. Distribution of 6. *Trichilia gillettii* DE WILD.

in the upper course of the N'Gounyé River (also named N'Goumé R.), near Miyango (probably identical with the village Myanga, south of M'Bigou).

In recent years rich material of *T. gillettii* was collected in Congo-Brazzaville, where it is often found on hills in remnants of high forest, but it also occurs in secondary forest, in open, probably drier forest, and in gallery forests. DESCOINGS (nos. 6809, 7009, 7459, 8075, all both in IEC and at WAG) in his field-notes repeatedly stated that the leaflets are discoloured. Also DE NÉRÉ (no. 197, IEC, WAG) mentions this point. In dried material, however, this character is not distinct. It is to be noted that none of the collectors' data concerning *T. gillettii* from other regions contain this field-character.

In Congo *T. gillettii* was frequently found near Yangambi. From this locality it is often reported to grow in primary forest along riversides (viz. LOUIS nos. 4084, 5675, 7987, and 13435, BR). However, in the same locality, this collector found *T. gillettii* also in primary forest on the plateau at an altitude of 470 m (LOUIS nos. 474, 1413, 2344, 2504, 3022 etc., all in BR).

A specimen collected by LOUIS (no. 11034, in BM, BR, C, MO) on an island in the Congo R. near Yangambi is rather aberrant. The leaflets are not glandular

dashed and dotted. In addition they are glabrescent to thinly puberulous on the lower surface, but without the characteristic glandular secretions peculiar to the indumentum of leaflets of *T. welwitschii* C.DC. The apex of the leaflets is more or less obtuse. LOUIS, in his collector's note, stated it was a rather tall tree, diam. 75 cm, and with three buttresses up to 1 m high at its base. This tree was growing in periodically inundated primary forest, rich in lianas. The flowers remain within the varietal range of *T. gillettii*, but with some diffidence I refer LOUIS no. 11034 to this species. Possibly it concerns a hybrid.

In Léopoldville province CALLENS (no. 3877, BR, MO) found *T. gillettii* in secondary forest, and COMPÈRE (no. 1955, BR) reports it as a tree, up to 15 m high, growing on fallows with shrubs.

In Angola *T. gillettii* seems to be confined to Cabinda, where it grows in wet rain forest, often on river banks.

The fragrant flowers are described in field-notes as yellowish-white or pale greenish with auburn anthers. LOUIS (nos. 1413, 2504, 3786, and 4084, all in BR) described the fruits as pear-shaped, 'grey-beige', mauve or violaceous.

Vernacular names. Not known from Gabon and Congo-Brazzaville.

Congo: *bolumbe-likolo* or *inaolo-a-bolumbe-likolo* or *bolumbe-likolo-bo-libande* (dial. Turumbu), *bofondje* or *bofondje-lo-lowe* (dial. Turumbu), *ikoko* (dial. Turumbu), *lifundji* (dial. Turumbu), *kititi* or *kituti* (Kikongo), *hono* (Lac Léopold II), *dikonde-dibishi* (Tshiluba).

Angola: *kucantando* (Mayombe), *quissôco* (Mayombe).

Note. From vernacular names it is clear that local inhabitants often do not distinguish between *T. welwitschii* C.DC. and *T. gillettii* DE WILD.

Uses. No information concerning *T. gillettii* is present. VAN NAEMEN (no. 738, BR) stated that the tree produces abundantly seeds which are very rich in fat.

Specimens examined: Gabon: Upper course of N'Gounyé R., near Miyango (♂ fl. April) LE TESTU 6477 (BM).

Congo (Brazzaville): Bangou Forest, M'Passa Ecole (immature fr. Aug.) BOUQUET 535 (P, WAG); Boundji, near Ekoo (♂ fl. June) BOUQUET 1452 (P, WAG); near Brazzaville (♂ fl. June) DN (probably DE NÉRÉ?) 1 (P); road Brazzaville-Kinkala, near Tonkama (fr. Dec.) DE NÉRÉ 197 (IEC, WAG); near Boko (mature fr. Jan.) DE NÉRÉ 300 (IEC, WAG); near Gamboma (♂ fl. June) DESCOINGS 7009 (IEC, WAG); Gamboma, 11 km on road to Baya (♂ fl. June) DESCOINGS 6809 (IEC, WAG); Likouala R., near Makoua, 15 km on road to Eloumbi (immature fr. June) DESCOINGS 7391 (IEC, WAG); Makoua, 15 km on road to Fort Rousset (young fl. buds June) DESCOINGS 7459 (IEC, WAG); near Edou, 39 km on road to Boundji (fr. July) DESCOINGS 8075 (IEC, WAG); Fort Rousset, 10 km on road to Gamboma (mature fr. July) DESCOINGS 8671 (IEC, WAG).

Congo: Équateur: Tshuapa R. district (immature fr. May) DUROIS 676 (BR).

Oriente: Yangambi (♂ fl. Jan.) DIFOR 914 (BR); *ibid.*, forest reserve on plateau of Isalowe R. (♂ fl. Dec.) DIFOR 1496 (BR); Yangambi (♂ fl. buds Jan.) DONIS 3402 (BR); *ibid.* (young fl. buds Jan.) DONIS 3410 (BR); *ibid.* (♂ fl. Jan.) DONIS 3423 (BR); *ibid.* (♀ fl. and very young fr. Febr.) DONIS 3604 (BR); *ibid.* (♀ fl. Febr.) DONIS 3740 (BR); *ibid.* (veget.) HOMES 183 (WAG); *ibid.*, 6 km on road to Ngazi (♂ fl. Oct.) LOUIS 474 (BR); *ibid.*, plateau of Lusam-

bila R., 8 km N.E. of Yangambi (♀ fl. and very young fr. March) LOUIS 1413 (BM, BR, C, FHO, FI, K, MO, NY, PRE); *ibid.*, plateau of Isalowe R. (♂ fl. July) LOUIS 2344 (BR, FI, S, UC); *ibid.*, 8.5 km on road to Ngazi (immature fr. Aug.) LOUIS 2504 (BR); *ibid.*, plateau of Isalowe R. (♂ fl. Dec.) LOUIS 3022 (BM, BR); *ibid.*, bank of Isalowe R. (immature fr. April) LOUIS 3786 (BR); *ibid.* (mature fr. June) LOUIS 4084 (BR); *ibid.*, 5.5 km N. of Congo R. (♂ fl. July) LOUIS 5675 (BR); *ibid.*, plateau of Isalowe R., 3 km on road to Yakusu (♂ fl. Febr.) LOUIS 7763 (BR, C, MO, NY); *ibid.*, bank of Isalowe R. (♂ fl. Febr.) LOUIS 7987 (BR, C, MO, NY); *ibid.*, on isle in Congo R. named: 'Booke-wa-Mbole' (♂ fl. Aug.) LOUIS 11034, aberrant specimen! (BM, BR, K); *ibid.*, on isle Bassao (♂ fl. Jan.) LOUIS 13435 (BR, UC); *ibid.*, near outlet of Isalowe R. in Congo R. (♀ fl. March) LOUIS 13911 (BR).

Léopoldville: Kisantu, road to Zongo (♂ fl. March) CALLENS 538 (BR); *ibid.*, near Kipake (very young fr. June) CALLENS 3632 (BR); *ibid.*, near Kinkosi (mature fr. Dec.) CALLENS 3877 (BR, MO); *ibid.*, near Tampa (very young fl. buds July) CALLENS 4138 (BR); Lac Léopold II, near Patambalu (♀ fl. and young fr. July) CAUWE 3003 (BR); Tampa, on road Madimba-Kasangulu (♂ fl. April) COMPÈRE 1955 (BR); Kiyaka, Kwango (♂ fl. and galled, fruit-like pistillodes Aug.) DEVRED 2427 (BR); Kimuenza (♂ fl. Jan.) GILLET 1962 (BR, lectotype!); *ibid.* (♀ fl. March) GILLET 2097 (BR, paratype!, slightly aberrant by rather hairy connate part of staminal tube inside); *ibid.* (young fr. May) GILLET 2165 (BR); near Léopoldville (young fl. buds) GILLET s.n. (BR); Kimuenza (♀ fl. July) ROBYS 4392 (BR, WAG); Vése, near Kisantu (♂ fl.) VAN NAEMEN 738 (BR).

Kasai: Mweka Terr., Bena Longo (♂ fl. June) DECHAMPS 60 (BR); Nioki (♀ fl., young and mature fr. Oct.) FLAMIGNI 9035-bis (BR).

Localities in Congo not known or not verified: Bunu (♂ fl.) FLAMIGNI 6297 (BR); *sin. loc.* (♂ fl.) FLAMIGNI 6332 (BR); *sin. loc.* (♂ fl.) GILLET s.n. (BR); *sin. loc.* (young fl. buds July) MICHELSON 956 (BR); *sin. loc.* (♂ fl. Sept.) VANDERYST 10602 (BR).

Angola: Cabinda: Maiombe, near Belize (♂ fl. Febr.) GOSSWEILER 6981 (BM, COI, K, LISJC, LISU); *ibid.* (♂ fl. March) GOSSWEILER 7031 (LISJC; 'duplicates' of GOSSWEILER 7031 present in BM, COI, K, and LISU belong to *T. gilgiana* HARMS!); Maiombe, Chiaca (mature fr. Sept.) MISSÃO ESTUDOS FLORESTAIS 329 (LISJC); *ibid.*, near Buco-Zau (♂ fl. and young fr., probably from different individuals, June) MISSÃO EST. FLOR. 437 (LISJC); *ibid.* (♂ fl. June) MISSÃO EST. FLOR. 519 (LISJC); *ibid.* (♂ fl. June) MONTEIRO et MURTA 102 (BM); *ibid.* (mature fr. Sept.) MONTEIRO, SANTOS et MURTA 321 (BM).

## 7. *Trichilia grandifolia* OLIV.

Fig. 7; Map 7

*Trichilia grandifolia* OLIV., Fl. Trop. Afr. 1 : 335. 1868, non C. DE CANDOLLE 1917; C.DC. in A. and C.DC., Mon. Phan. 1 : 674. 1878, erroneously named *T. grandiflora*; HENRIQUES in Bol. Soc. Brot. 10 : 106. 1892, erroneously named *T. grandiflora*; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. 1896; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 821. 1915; HENRIQUES in Bol. Soc. Brot. 27 : 188. 1917; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 108, 110. 1940; EXELL, Cat. Vasc. Pl. S. Tomé : 137. 1944.

Type: MANN no. 1055 (São Tomé: *sin. loc.*, holotype, K, 2 sheets).

Note: C. De CANDOLLE in Notizbl. Bot. Gart. Berlin 6 (no. 62):500. 1917 validly published the name *Trichilia grandifolia*. It is based on ULE no. 9518, a specimen collected in Peru. Although I did not see this specimen, from the description it is perfectly clear that this concerns another taxon. The name *T. grandifolia* C.DC. (*l.c.*, 1917) is illegitimate because of the earlier homonym *T. grandifolia*

OLIV., and therefore must be rejected. Already HARMS (l.c. : 115. 1940) published a new name for it, viz. *Trichilia elsae* HARMS.

Diagnostic and differential characters. Medium-sized tree, 15–30 m tall. Leaflets (2–)3–4-jugate, (5–)10–25(–35) by (3–)5–10(–13) cm, acuminate at apex, obtuse, truncate or subcordate at the base. Petals 11–16.5 mm long. Connate part of the staminal tube very thick and fleshy and hairy inside. Ovary 2-celled. Young fruit beaked at apex. Mature fruit globose, ca. 8–9 cm diam. Endemic to São Tomé.

Description. Medium-sized tree, 18–30 m tall, probably evergreen. Young twigs terete or in the youngest parts somewhat flattened or slightly angular, rather stout, (4–)5–10 mm diam., brown to very dark brown, more or less dense puberulous; lenticels absent or inconspicuous; older twigs terete, soon becoming glabrous; outer bark thin, pale brown, brittle, longitudinally often slightly ridged, inner bark dark brown, thin; sapwood whitish or cream, heartwood pinkish.

Leaves imparipinnate, 20–50(–60) cm long; petiole terete, flattened or sulcate on the upper surface, especially near the base, puberulous or glabrescent, finely wrinkled lengthwise, brown or reddish-brown, (4–)7–16 cm long, up to 6 mm diam., pulvinus slightly or not swollen, contracted at the insertion; rachis 4–16 cm long, flattened or sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), otherwise similar to the petiole; petiolules terete, sulcate on the upper surface, the raised edges of the petiolular furrow decurrent in the raised edge of the flattened side of the leaf rachis (see above), puberulous or glabrescent, longitudinally wrinkled, petiolule of terminal leaflet (4–)10–15(–25) mm, the others (3–)5–10(–13) mm long.

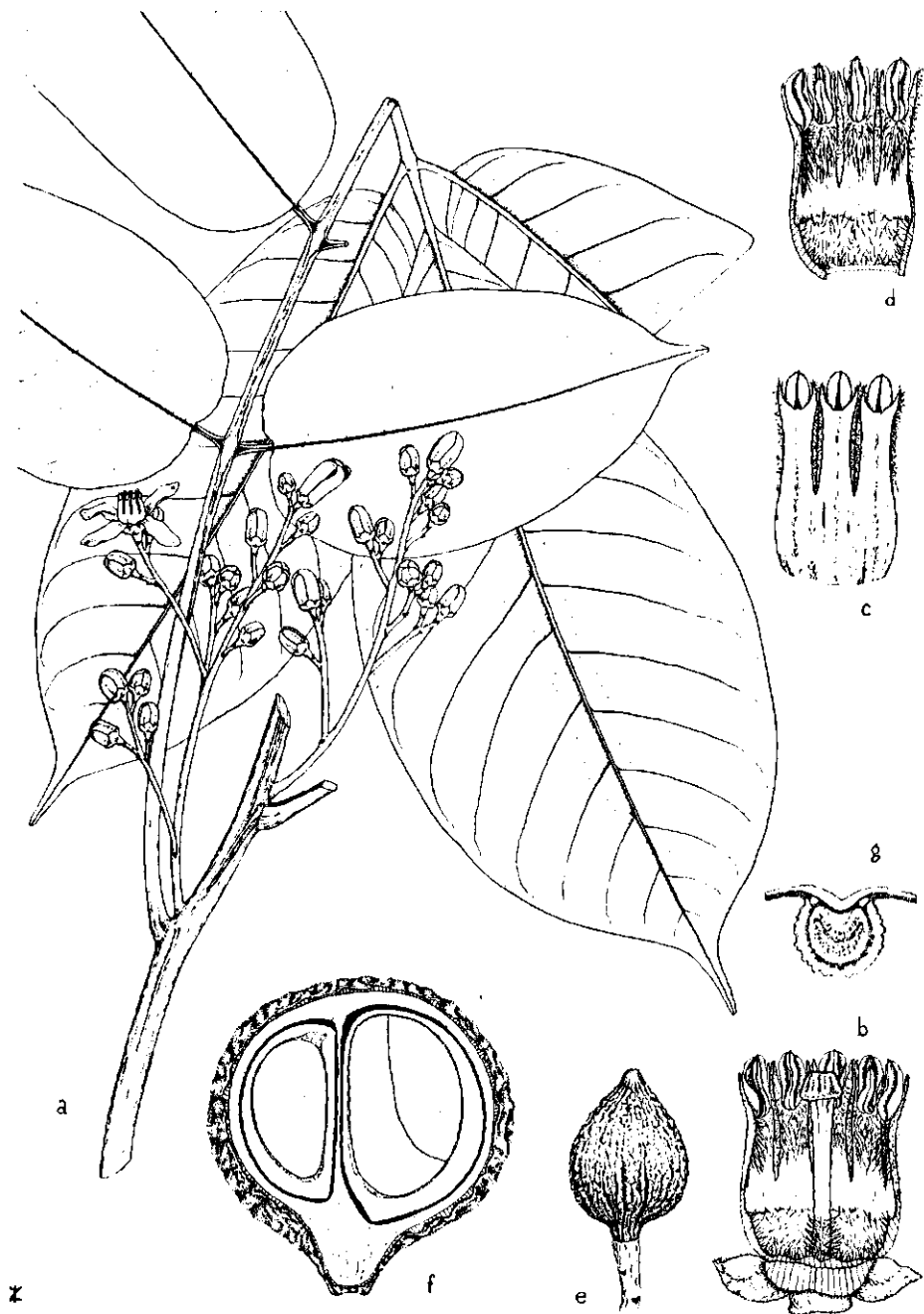
Leaflets (2–)3–4-jugate, opposite or subopposite, not or very indistinctly glandular dashed and dotted, (5–)10–25(–35) by (3–)5–10(–13) cm, rather variable in shape and size, distal leaflets largest, narrowly obovate to obovate, elliptic or oblong, proximal leaflets smaller, ovate, other leaflets intermediate, apex rather long acuminate, base cuneate to obtuse in terminal and distal leaflets, obtuse, truncate or even subcordate in proximal leaflets, margin sometimes very narrowly revolute. Upper surface glabrous or glabrescent, midrib impressed, nerves 10–15(–18) on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin, veins laxly reticulate. Lower surface glabrescent, in young leaflets the midrib and nerves sometimes scarcely puberulous, midrib and nerves prominent, veins laxly reticulate, often not very distinct.

Inflorescences very lax, paniculately arranged, rather few-flowered, axillary, supra-axillary or pseudo-terminal, often near the top of the branches, (4–)7–12(–15) cm long, main axes flattened or angular, finely wrinkled lengthwise, puberulous (the hairs often with a brownish, glandular central canal near the

base and higher up), one or two times branched before the pedicels, branches up to 9 cm long; bracts very early deciduous (not seen, probably similar to the bracteoles, but larger).

Male flowers: Pedicels 2–3(–5) mm long, pubescent, longitudinally wrinkled; bracteoles 2, early deciduous, 1.1–1.6 by 1.0–1.1 mm, elliptic, ovate or broadly ovate, acute at apex, abaxial and on the margin puberulous, adaxial glabrous (except for some hairiness at the base), hairs with very distinct, brownish-black, resinous canal in the centre. Receptacle cylindrical, 1.3–2.0 mm long, densely puberulous, grooved lengthwise, often tapering to the base, jointed to the pedicel. Calyx shallowly cup-shaped, ca. 1.5–2.0 mm high by 5.5–7.5 mm wide, very deeply 5-lobed, lobes slightly imbricate in bud, spreading during anthesis, 1.7–3.0 mm long by 2.0–4.0 mm broad, very broadly ovate, apex acute or obtuse, rather thick and fleshy, thinner towards the margin, irregularly wrinkled, outside pubescent, inside smooth and glabrous, margin ciliate, hairs with brownish, resinous central canal. Petals 5, free, sometimes at the very base slightly adnate to the staminal tube, imbricate in bud, reflexed during anthesis, ca. 11–15(–16.5) by 4.0–5.0 mm, narrowly elliptic to narrowly oblong, firm, rather thick and fleshy, often slightly incurved at the more or less obtuse apex, inside densely covered with very short trichomes together with a puberulous indumentum especially in the median, outside densely appressed puberulous. Staminal tube 9–11.5 mm long (including the anthers), (9–)10(–11)-fid, cleft over about half its length or slightly more; free parts of the filaments ca. 4–5.5 mm long, glabrous outside, densely villous inside and on the margins; connate part of the staminal tube ca. 3.5–4.5 mm long, inside in the lower 3–4 mm hairy, very thick and fleshy, distinctly as a fusion with an intrastaminal disk from which the very uppermost crenate rim is sometimes even free from the connate filaments, outside glabrescent, puberulous or locally tomentose; anthers dorsifix, attached by a very short, ca. 0.1 mm long stalk, inserted in the sinus between two narrowly triangular, villous lobes of ca. 1–2 mm long, at the top of the free part of the filament, 2.3–2.8 by 0.8–1.0 mm, narrowly oblong to oblong, slightly mucronulate at apex, glabrous, opening laterally, lengthwise, pollen well developed. Pistillode only scarcely expanded at the base, ovary sterile, 2-celled, up to 1.5 mm high by 2 mm wide, villous, vestigial ovules present and distinct, 2 in each cell, axile, collateral; style 4–5.5 mm long, 0.8–1.0 mm diam., tapering to the base, with only a few hairs, otherwise glabrous or at best rough by very minute trichomes, sometimes furrowed lengthwise; stigma capitate to pyramidal, 1.0–1.3 mm high by 1.5–2.1 mm wide, outside longitudinally slightly furrowed, densely covered with extremely short, rather stiff trichomes (and there in bud often adherent to the anthers), flattened at the apex, with a depression in the centre.

FIG. 7. *Trichilia grandifolia* OLIV. – a: fl. branch, ♂ ( $\times \frac{1}{2}$ ); b: section of ♂ fl., petals removed ( $\times 3$ ); c: part of staminal tube, outside, ♂ ( $\times 3$ ); d: id., inside ( $\times 3$ ); e: young fr. ( $\times \frac{1}{2}$ ); f: longitudinal section of fr. ( $\times \frac{1}{2}$ ); g: transv. sect. of the midrib of a leaflet ( $\times 10$ ). – a: QUINTAS 1348; b–d: MANN 1055; e–g: LUCAS 8.



Female flowers: Not seen.

Fruit (only incomplete available) a 2-chambered capsule, only one seed in each chamber developed, the other seed reduced by abortion. Young fruit ca. 4 by 3 cm, distinctly beaked at apex, shortly stipitate, stipe up to 5 mm long, ovary-wall very thick and lignescent, up to 5 mm diam., outside verrucose, covered with an indumentum of very short glandular trichomes, inside smooth and with scattered, often glandular hairs. Mature (?) fruit more or less globose, ca. 8–9 cm diam., stipitate (stipe up to 1 cm long, thick and woody, slightly tapering to the base), fruit-wall outside verrucose, corky, up to 7 mm thick. Seed ca. 4–5.5 cm long by 2–4 cm broad, testa for the largest part developed into a thick (and more or less lignescent) arilodium, locally up to 4 mm thick, outside smooth and dark reddish-brown, the inner layer of the seed-coat leathery (or even woody), cotyledons very firm, up to 4.3 by 2.8 cm, unequal, inside everywhere densely dotted with small glandular, often brown or blackish resinous pits.

Seedling not seen.

Note. This very interesting endemic species to São Tomé is incompletely known. The present description is based on three collections only, and certainly conveys no proper conception about its variability. No female flowers came to hand, and the fruiting material of LUCAS no. 8 (COI) leaves no room for a thorough examination of the fruits. Future collectors to São Tomé are urgently requested to pay attention to this species. Both a study of the intrastamineal disk, and of the fruit and especially the seed-coat may add to a better understanding of the morphology and taxonomy of *Trichilia*.

No other *Trichilia* species seem to occur on São Tomé. EXELL (cf. Supplement to the Cat. of Vasc. Pl. of S. Tomé: 3. 1956) stated concerning the probable origin of the endemic species on S. Tomé that: 'A species might arrive on the island from the mainland (ca. 500 km of ocean) as one individual or comparatively few individuals. Such a species may multiply to form a homogeneous isolated island population. Meanwhile, on the continent, the said species might come into contact, from time to time, with related species, hybridize with them and become more or less profoundly modified. Such species may not have evolved into 'endemics' on the island but have merely remained themselves, so to speak'.

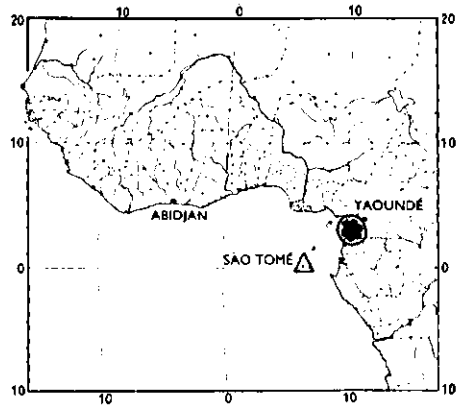
As the volcanic island of São Tomé is probably of comparatively recent origin (Tertiary period), and as *Trichilia grandifolia* has near relatives on the mainland, it may be that the taxon *Trichilia*, as far as Africa is concerned, maintained on the island its 'original' constitution and that the continental species developed afterwards, in a rather recent period. The hypothesis of recent species segregation in *Trichilia* section *Trichilia* on the African mainland was suggested by VERMOESEN (in Rev. Zool. Afr. 10(1) Suppl. Bot.: B20 and B27. 1922).

If there is any truth in this line of argument, one had to ask for the means by which the species arrived on the island. According to EXELL (l.c., 1956) it is not likely that there was any former land-connection with the continent. The island



seems never to have been inhabited by mammals or men till its discovery in 1470 (except for bats, no mammals were found on it). As for the three main possibilities for transport: wind, ocean currents and birds (or bats), by which the seeds could possibly have reached the island, wind seems unlikely, as the fruits and even the seeds are far too heavy. That birds swallow the big seeds as a whole, and deposit them 500 km away, is also difficult to believe. The only possible transport would be by ocean currents. From my own experience with *Trichilia* seeds from mainland-species, this also seems highly improbable, as those seeds only possess a short viability, in the moist tropical climate especially due to putrefaction of the arillodium and of the fleshy cotyledons. In *Trichilia grandifolia*, however, the arillodium has developed into a thick and seemingly corky organ, quite different from that of the mainland-species, and it really seems possible that dispersion by way of water, over long distances, is not to be excluded. In the line of argument referred to above, *T. grandifolia* must have occurred on the continent, where it became extinct.

Distribution. Endemic to São Tomé.



MAP 7. Distribution of 18. *Trichilia zewaldae* J. J. DE WILDE (circle) and 7. *Trichilia grandifolia* OLIV. (triangle), both taxa with a narrow distribution.

Ecology. Although very little is known about the particular ecology of this species, EXELL (Catalogue of the Vascular Plants of S. Tomé : 18–21. 1944) gave a good account of its habitat. According to EXELL it grows in submontane evergreen forest, which occurs on S. Tomé from an altitude of about 800 m up till 1400 m. The main characteristics of the climate of this region are the much lower mean minimum temperature and the very much lower absolute minimum temperature combined with greater rainfall and higher humidity as compared with the evergreen rain-forest at lower altitudes. This means for the submontane evergreen forest, corresponding to altitude and topography, roughly a mean annual rainfall which varies from 1000–5000 mm, and a mean temperature of 10–16°C in August and of 13–19°C in March.

According to EXELL, it seems that this submontane forest consists of forest-trees with tall, straight trunks branching usually only at considerable height. It is largely composed of different species from those met with in lowland forest. It is rich in lianes which form together with the crowns of the forest-trees a dense canopy. A lower layer in this forest-type is largely composed of *Rubiaceous* shrubs; epiphytes are very abundant.

The probable habit of *T. grandifolia* may be guessed from this outline. In the submontane forest it must be one of the upper-storey trees. It might have a straight trunk, branching to a probably rather small crown.

MANN, as well as QUINTAS, record in their field-notes an altitude which falls into this region (resp. 1200 and 900 m). QUINTAS (no. 1348, COI) stated that the flowers are white with reddish tipped petals. EXELL (l.c. : 20. 1944) gives the species composition of this forest-type, and mentions among it *T. grandifolia*.

Vernacular names and uses. No vernacular names nor any particular use came to my attention.

Specimens examined: São Tomé: on the way to Lagoa Amélia (young fr., and mature(?) fr. in longitudinal section Dec.) LUCAS 8 (COI, 2 sheets); sin. loc. (♂ fl. Aug.) MANN 1055 (K, holotype, 2 sheets); Traz-os-Montes (♂ fl. June) QUINTAS in Herb. A. F. MOLLER no. 1348 (COI, 3 sheets; LISU, 1 sheet).

NOTE: HIERN (Cat. Afr. Pl. collected by Dr. FRIEDRICH WELWITSCH in 1853-'61, Dicotyledons 1 : 134. 1896) referred with doubt a sample of seeds (WELWITSCH, Coll. Carp. no. 314, BM) to *T. grandifolia* OLIV. On examination these seeds show the cotyledons superposed, and no fleshy arilodium nor arillus is developed. Decidedly they are not seeds of *Trichilia*.

## 8. *Trichilia martineau* AUBRÉV. et PELLEGR.

Fig. 8; Map 8

*Trichilia martineau* AUBRÉV. et PELLEGR. in Bull. Soc. Bot. France 83 : 491. 1936; AUBRÉVILLE, Fl. For. Côt. Iv. 1st ed. 2 : 152, pl. 185 (1-5). 1936; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 22. 1940; EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed. : 199. 1952 (as *Trichilia* sp.1); HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 704. 1958; AUBRÉVILLE, Fl. For. Côt. Iv. 2nd ed. 2 : 186, pl. 195(1-5). 1959; IRVINE, Woody Pl. of Ghana : 529. 1961; WHITE in KEAY, ONOCHIE and STANFIELD, Nigerian Trees 2 : 276. 1964 (as *Trichilia* sp.A).

Type: AUBRÉVILLE no. 1365 (Ivory Coast: Yapo, holotype, P).

Diagnostic and differential characters. Rather tall tree, up to 45 m high. Young twigs thin (ca. 3-5 mm diam.), dark reddish-brown or blackish. Leaflets (3-)4-6(-9)-jugate, more or less distinctly finely glandular punctate; glabrous and conspicuously glossy above, glabrescent and not shining on the lower surface; from the middle (or lower) gradually tapering into the long and narrow apex. Midrib on the upper surface flat (not impressed). Ovary 3-celled.

Fruit 3-chambered, subglobose or pear-shaped, ca. 20–30 mm diam. (stipe excluded), markedly stipitate. Stipe up to 10 mm long.

**Description.** Rather tall tree, up to 30(–45) m high and 80 cm d.b.h., bole straight or slightly sinuous, cylindrical, branching at considerable height, without (or with very low) buttresses; crown rather open, framed by strong ascending branches; bark ca. 1.5 cm thick; rhytidoma longitudinally fissured, peeling off in small, more or less rectangular, grey-green scales which measure ca. 5 by 1 cm; slash pale pinkish, exposed to the air rapidly becoming pinkish-brown or brown, near the cambium exuding a little inodorous, sticky, cream-coloured latex; sapwood cream or pale pink.

Young twigs terete, thin, ca. 3–5 mm diam., very dark brown to blackish, glabrescent; lenticels absent or indistinct; older twigs similar to the young ones, outer bark very thin, dark reddish-brown, often longitudinally fissured by dilatation, inner bark pale brown, thin, hard and brittle; wood pale pink or cream-coloured.

Leaves imparipinnate (sometimes paripinnate in the absence of the terminal leaflet), 20–35 cm long, (leaves of saplings up to 60 cm long); petiole terete, somewhat flattened on the upper surface, especially near the base, glabrescent, finely wrinkled lengthwise, 4.5–8(–12) cm long, pulvinus slightly swollen and contracted at the insertion; rachis 6.5–15(–30) cm long, flattened on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolar furrow (see below), otherwise similar to the petiole; petiolules terete, slightly sulcate on the upper surface, the raised edges of the petiolar furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see above), glabrescent, longitudinally and often also transversely wrinkled, petiolule of terminal leaflet (7–)9–14(–25) mm, the others 6–11(–13) mm long.

Leaflets (3–)4–6(–9)-jugate, usually opposite or subopposite, finely, more or less distinctly punctate with minute translucent glands, (4.5–)5.5–10(–12.5) by (1.5–)2–3.5(–4.7) cm, (leaflets of saplings up to 17.5 by 6 cm), narrowly ovate to ovate, terminal leaflets sometimes narrowly elliptic, from the middle (or lower) more or less gradually tapering into a long and narrow apex, which is often curved to one side, base cuneate or obtuse, sometimes asymmetric. Upper surface glabrous, conspicuously glossy, midrib not prominent, flat, with a narrow, minute rim, running centrally and starting well above the base of the leaflet; nerves 9–13 on either side, opposite or not, slightly arched, curving and anastomosing before reaching the margin, veins indistinct. Lower surface glabrescent, not shining, midrib prominent, nerves slightly prominent, veins very slender but distinct, laxly reticulate.

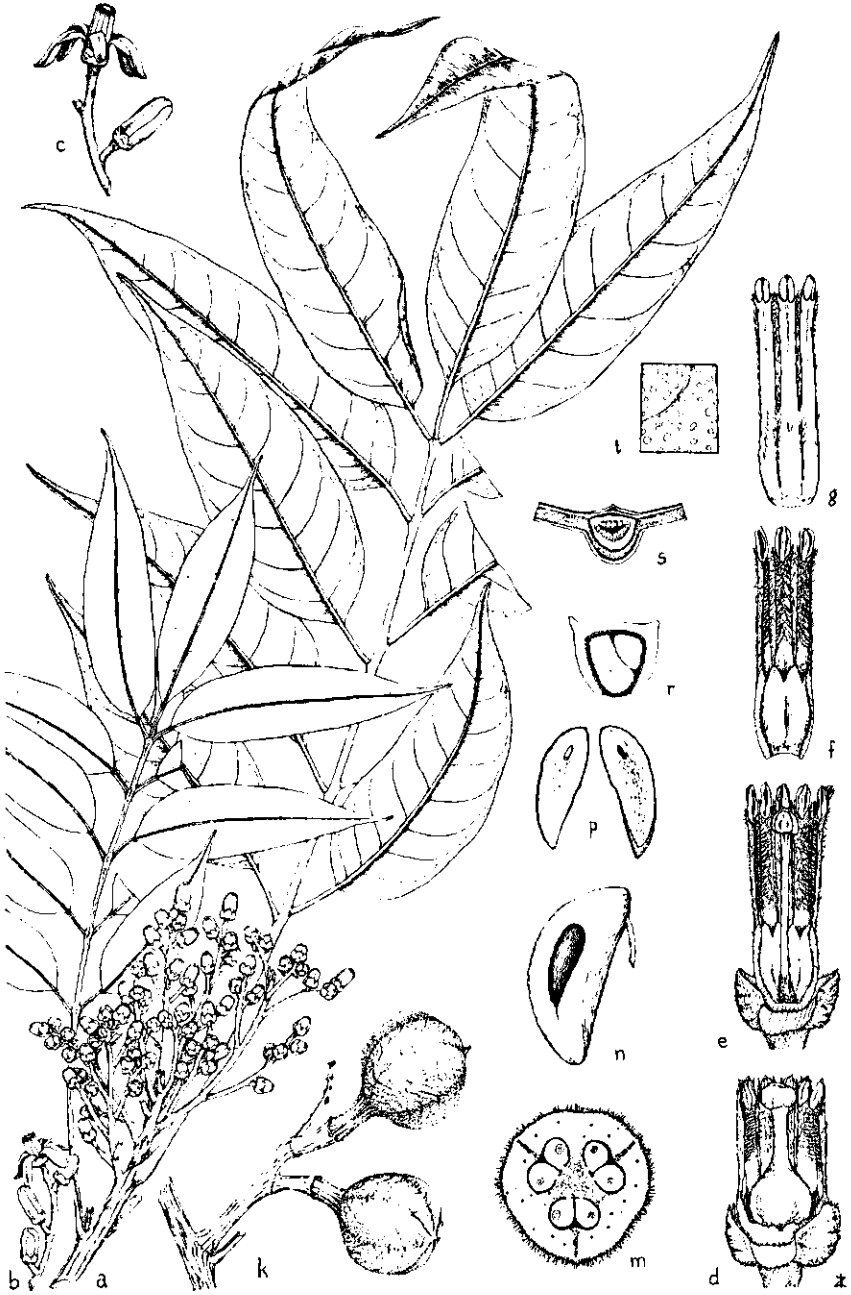
Inflorescences rather lax, paniculately arranged, axillary, often assembled near the top of the branches, 3.5–12 cm long; main axes terete or flattened, wrinkled lengthwise, puberulous, once or twice branching, branches up to ca. 4 cm long. Bracts very early deciduous, (narrowly) triangular, ca. 2.0–3.0 by 1.0 mm, both surfaces pubescent, hairs with a brownish, resinous central canal, which extends up to their middle or higher.

Male flowers: Pedicels 1.5–5.0 mm long, pubescent; bracteoles 1 or 2, very early deciduous, 1.5–2.0 by 1.1–1.5 mm, (broadly) elliptic, obtuse, abaxially pubescent, adaxially glabrous, margin ciliate. Receptacle cylindrical, 0.5–1.5 mm long, pubescent, jointed to the thinner pedicel (in spirit material the receptacle often slightly differing in colour from the pedicel). Calyx cup-shaped, 2.0–2.5 mm high by 3.5–5.0 mm wide, 5-lobed, lobes imbricate in bud, 1.1–1.5 by 1.5–3.0 mm, depressed-ovate, apex obtuse, thick and fleshy, thinner to the margin, outside pubescent, (hairs similar as described for the bracts), irregularly wrinkled, inside smooth and glabrous, margin ciliate. Petals (4–)5, free, imbricate in bud, reflexed during anthesis, rather fleshy, thinner near the base, 9.0–12.0 by 2.0–3.8 mm, (narrowly) oblong, often slightly incurved at the obtuse apex, inside with a very short, fine, velvety indumentum, outside puberulous. Staminal tube ca. 7–9 mm long (including the anthers), 10-fid, incisions to about 1/2 or 2/3 of its length; free parts of the filaments 3.5–5.0 mm long, nearly glabrous or with some appressed, rather long hairs outside, densely tomentose inside and on the margins; connate part of the staminal tube 2.0–3.5 mm long, glabrous and fleshy inside (the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into small wedge-shaped raised issues, the tops of the wedges alternating with the bases of the free parts of the filaments), outside glabrous or with some scarce appressed hairs; anthers dorsifix, attached near the base by a very short stalk, inserted in the apical sinus between two blunt or narrowly triangular, slightly hairy lobes of 0.2–1.0 mm long, at the top of the free part of the filament, 1.2–1.6 by 0.5–0.8 mm, narrowly elliptic to elliptic, blunt or mucronulate, rough, opening laterally, lengthwise, pollen well developed. Pistillode slender, scarcely expanded at the base, ovary sterile, appressed pubescent, vestigial ovules present; style 6.0–7.3 mm long, 0.2–0.3 mm wide, glabrous; stigma pyramidal, ca. 1 mm wide, densely velutinous by very minute trichomes, flattened and glabrous at the slightly 3-lobed apex, which is depressed or shallowly grooved in the centre.

Female flowers: Similar to male flower, but anthers smaller, not dehiscing, not producing pollen. Ovary well developed, subglobose, 2.0–3.2 mm wide, appressed pubescent, (2–)3(–4)-celled; ovules 2 in each cell, axile, collateral; style shorter than in male flowers, 3.2–4.7 mm long, 0.7–1.0 mm wide, appressed pubescent in the lower part, towards the top the indumentum thinner or nearly absent; stigma discoid or pyramidal, ca. 1.0 mm high by 1.2–1.6 mm wide, otherwise as in male flower.

Fruit a (2–)3-chambered, markedly stipitate capsule, subglobose or pear-

FIG. 8. *Trichilia martineau* AUBRÉV. et PELLEGR. — *a*: fl. branch, ♀ (× 1/2); *b*: part of inflorescence, ♀ (× 1/2); *c*: fl. bud and fl., ♀ (× 1); *d*: section of ♀ fl., petals removed (× 3); *e*: id., ♂ fl. (× 3); *f*: part of staminal tube, inside, ♂ (× 3); *g*: id., outside (× 3); *k*: branch with fr. (× 1/2); *m*: ovary in transverse section (× 9); *n*: seed (× 1); *p*: cotyledons (× 1); *r*: transv. sect. of seed (× 1); *s*: transv. sect. of the midrib of a leaflet (× 15); *t*: portion of leaflet, upper surface (× 15). — *a-d*, *m*, *s-t*: OLDEMAN 719 (from spirit mat.); *e-g*: AUBRÉVILLE 853; *k*, *n-r*: AUBRÉVILLE 1920.



shaped, ca. (20-)25-30 mm diam. (stipe excluded), (stipe ca. 10 mm long, up to 6 mm thick, tapering to the base, wrinkled lengthwise), shortly tomentose, mucronulate (style remnant), brown, loculicidally dehiscent, 3-valved; dry valves thick, leathery, obovate.

Seeds 2 in each chamber, collateral. Mature seed 22-25 by 7-16 mm, arillose, plano-convex, flat on the adjacent sides; testa for the largest part developed into a fleshy arillodium (sarcotesta), arillodium orange-red without, whitish within, ca. 2 mm thick, occupying the surface of the seed nearly entirely, but leaving an often elongated, glossy, dark brown or blackish dorsal spot of thin leathery testa which measures ca. 8-11 by 3-6 mm; cotyledons firm, fleshy, pale brown outside, whitish within, plano-convex, 13-17 by 5-6 mm, radicle narrowly ellipsoid, longitudinally slightly flattened, ca. 2.0-3.0 by 1.0 mm, between the cotyledons at 1.0-3.5 mm beneath the apex.

Seedling not seen.

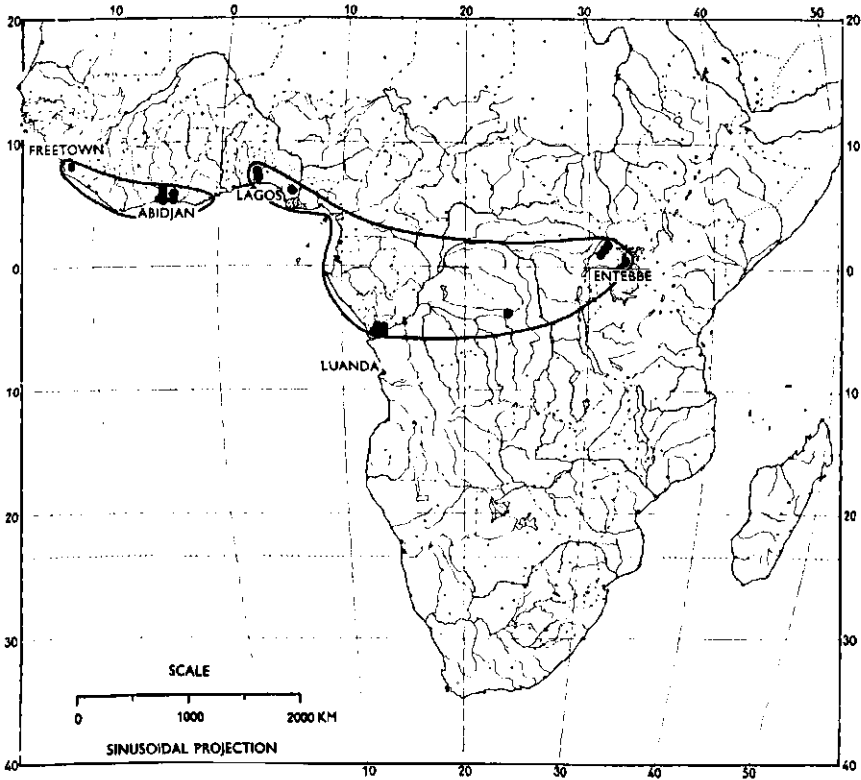
Notes. AUBRÉVILLE's description (in both the 1936 and 1959 editions of Fl. For. Côt. Iv.): 'Folioles . . . ., luisantes en dessous', is due to a slip of the pen because AUBRÉV. and PELLEGR. in their original description of the species (l.c., 1936) correctly stated: 'Foliola . . . ., supra nitida'.

In Fl. For. Côt. Iv. (both editions) AUBRÉVILLE mentioned that the seeds are entirely covered by the aril (arillodium or sarcotesta). I was able to examine mature seeds in AUBRÉVILLE no. 1920 (P) and in TOUSSAINT no. 2174 (BR). Here, a small blackish spot of the testa indicates where the testa does not develop into a sarcotesta.

Distribution. Sierra Leone, Ivory Coast, Nigeria, Congo, Uganda.

Notes. In this study *T. martineau* is for the first time recorded for Congo and Uganda. In Congo *T. martineau* is apt to be confused with *T. gillettii* DE WILD. However, the large dimensions of the tree of the former, the characteristics of the leaflets (narrowly acuminate apex, conspicuously glossy above, distinctly visible reticulate nervation beneath) and the usually 3-celled ovary are sufficiently distinctive.

The Uganda material certainly belongs in this species. Flowering specimens from that area are rare, but the dimensions of the tree (up to 45 m) mentioned in the collector's notes (teste EGGELING nos. 4039 and 4375, ENT) together with the characters of the leaflets strongly suggest that the sterile specimens also belong in *T. martineau*. EGGELING and DALE (The Indigenous Trees of the Uganda Protectorate 2nd ed. : 199. 1952) refer to them as *Trichilia* sp.1, and give a short description. It appears that the vegetative characters agree with those of *T. martineau*. The petals are described to measure ca. 6.4 mm long. Some petals, however, (EGGELING no. 4039, ENT), which I was able to measure, reach 8.5-9.2 mm, and so enter into the range of measurements found in *T. martineau*. The fruits are described as: 'Very shortly stalked, globose or sub-globose, about 12.5 mm in diam.'. When this would concern mature fruits, they



MAP 8. Distribution of 8. *Trichilia martineau* AUBRÉV. et PELLEGR. Continuous lines demarcate the disjunct areas, situated within the Guineo-Congolian rain forest region.

are considerably different from those of *T. martineau*. However, fruits of EGGLING no. 3060, cited, and referred by EGGLING and DALE (l.c., 1952) to *Trichilia* sp.1, which I examined at K, are long stipitate (stipes up to 10 mm long) and measure 20–25 mm in diam. (stipe excluded). Also in other details these fruits perfectly agree with those of *T. martineau*. The above cited statement, made by EGGLING and DALE (l.c., 1952), can hardly be applied to these fruits, and I wonder on which specimens their statement was based. Further information about the Uganda occurrence and additional material from that area are wanted.

**Ecology.** *T. martineau* is confined to the moist forest at low and medium altitudes (KEY et al., Vegetation Map of Africa 1959) in the great Guineo-Congolian rain forest region. According to AUBRÉVILLE (Fl. For. Côt. Iv. 2nd ed. 2: 186. 1959), in Ivory Coast it occurs both in true evergreen forests, in deciduous forests as well as in the transitional moist semi-deciduous forest. It seems to be a not very common upper-storey tree in primary or old secondary

high forests. In Uganda KIGUNDU (no. 80/62, ENT) found it in the Mabira forest at an altitude of 1200 m.

Vernacular names. Not known from Sierra Leone.

Ivory Coast: *miétandabo*.

Nigeria: *ogiovalor* (Bini).

Congo: *kua-dia-n'kula* (dial. Kikongo). According to TOUSSAINT, no. 220 (BR) this means: 'Scales of the pangolin', probably referring to the scaly bark.

Uganda: *musuga* (Luganda).

Uses. No information regarding uses was found.

Specimens examined: Sierra Leone: near Moyamba (♂ fl. Dec.) KING 299 (K).

Ivory Coast: road Abidjan-Bingerville (immature fr. March) AKÉ ASSI 7994 (UCI); Rasso For. Res., near Agboville (veget. Dec.) AUBRÉVILLE 572 (IFAN, P); Banco For. Res., near Abidjan (♂ fl.) AUBRÉVILLE 853 (P); *ibid.* (♂ fl.) AUBRÉVILLE 924 (P); Yapo For. Res. (♂ fl.) AUBRÉVILLE 1365 (P, holotype); near Agboville (mature fr.) AUBRÉVILLE 1920 (P); Banco Arboretum, near Abidjan (veget. Oct.) DE WILDE 3115 (WAG); Banco For. Res., near Abidjan (♀ fl. March) DE WILDE 3620-A (WAG, spirit coll.); Banco Arboretum, near Abidjan (veget. Oct.) OLDEMAN 445 (WAG); Anguédédou forest, ca. 20 km N.W. of Abidjan (♀ fl. Dec.) OLDEMAN 719 (WAG, also in spirit coll.).

Nigeria: Sapoba, S.E. of Benin (♂ fl. Febr.) KENNEDY 2184 (FHO); Oyo Prov., near Ibadan (veget. Sept.) ONOCHIE 7677 (FHO); Ijebu Prov., Omo For. Res., near Etemi (veget. Oct.) TAMAJONG FHI-20976 (K).

Congo: Léopoldville: Luki, valley of the N'Tosi R. (♀ fl. Nov.) DONIS 1559 (FHO, K); *ibid.*, N'Kula For. Res. (♂ fl. Oct.) MAUDOUX 84 (BR); *ibid.*, valley of the N'Kula R. (fr. Febr.) TOUSSAINT 220 (BR); *ibid.*, valley of the N'Kakala R. (mature fr. Febr.) TOUSSAINT 2174 (BR, K).

Kasai: Lodja Terr., near Okoka (fr. June) GERMAIN 7579 (BR).

Uganda: Bunyoro Prov., Budongo forest (mature fr.) EGGELING 3060 (K); *ibid.* (♂ fl. Aug.) EGGELING 4039 (ENT, K); *ibid.*, near Bungoro (♂ fl. May) EGGELING 4375 (ENT, K); Buganda Prov., Mabira forest (young fr. Sept.) KIGUNDU 80/62 (ENT).

## 9. *Trichilia megalantha* HARMS

## Fig. 9; Map 9

*Trichilia megalantha* HARMS in ENGL., Bot. Jahrb. 23: 160. Sept. 1896; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4): 305. June 1896 (*nomen nudum*); HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2): 493. 1928; AUBRÉVILLE, Fl. For. Côt. Iv. 1st ed. 2: 156, pl. 185 (B-6). 1936 (excl. AUBRÉVILLE no. 946 = *T. dregeana* SOND.); PELLEGRIN in Not. Syst. 9(1): 25. 1940 (excl. AUBRÉVILLE no. 946 = *T. dregeana* SOND.); HARMS in Nat. Pflanzenf. 2nd ed. 19B1: 110. 1940; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2): 705. 1958 (excl. AUBRÉVILLE no. 946 = *T. dregeana* SOND.); AUBRÉVILLE, Fl. For. Côt. Iv. 2nd ed. 2: 188, pl. 195 (B-6). 1959 (excl. AUBRÉVILLE no. 946 = *T. dregeana* SOND.); IRVINE, Woody Pl. of Ghana: 529. 1961; WHITE in KEAY, ONOCHIE and STANFIELD, Nigerian Trees 2: 273. 1964; *id.* 2: 276. 1964 (as *Trichilia* sp.B.).



Type: ROWLAND s.n. August 1893 (Nigeria: Western Lagos, holotype destroyed in B; isotype, K, here designated as the lectotype).

Misapplied name: *T. megalantha* auct. non HARMS; EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed.: 197. 1952 (the cited specimens, collected in Uganda, belong to *T. dregeana* SOND.).

Diagnostic and differential characters. Medium-sized evergreen tree, usually 15–30 m tall. Older twigs without peeling bark, reddish-brown to dark brown. Leaflets 4–6(–7)-jugate (but 6- or 7-jugate leaves at least present!), acute or acuminate at apex, variously hairy on lower surface. Petals 18–28 mm long. Ovary 3-celled. Trop. W. Africa from Ivory Coast to Nigeria.

Description. Medium-sized to rather tall, evergreen tree, (8–)15–30(–36) m high, diam. breast-high up to 160 cm but usually 30–70 cm, bole cylindrical, up to 12 m long, sometimes with very low and blunt buttresses; crown often rather compact and dense but sometimes spreading and more open. Bark dark grey, grey or reddish, rough, scaling; slash pale pink or yellowish-white, exposed to air rapidly darkening to reddish-brown or brown, fibrous, faintly scenting, near the cambium sometimes exuding sparse, cream, tacky latex; sapwood whitish, soft.

Young twigs terete or flattened and angular, rather stout, ca. 5–8 mm diam., dark brown, purplish-brown or blackish, densely covered with an indumentum of short pale brown hairs, hairs often with reddish-brown, resinous contents in central canal; lenticels absent or indistinct; older twigs terete with hard, dark brown, grey-brown or reddish-brown outer bark, longitudinally wrinkled (dilatation lines), not flaking, the indumentum gradually disappearing; scars of fallen leaves often conspicuous, very broadly obovate or obdeltate with rounded edges, often more or less flattened or depressed at the top (horseshoe-shaped), and with a separate scar of a fallen inflorescence just above it; wood cream-coloured or pale brown, rather soft.

Leaves imparipinnate, 15–45 cm long (leaves of saplings up to 70 cm long); petiole terete, more or less flattened or even sulcate on the upper surface, densely puberulous, longitudinally finely wrinkled, 3.5–11(–16.5) cm long, pulvinus slightly swollen, contracted at the insertion; rachis 6.5–19(–30) cm long, flattened or sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolar furrow (see below), otherwise similar to the petiole; petiolules terete, narrowly sulcate on the upper surface, the raised edges of the petiolar furrow decurrent in the raised edge of the flattened side of the leaf-rachis (see above), densely puberulous or tomentose, petiolule of terminal leaflet 4–10 mm, the others 1–7(–10) mm long.

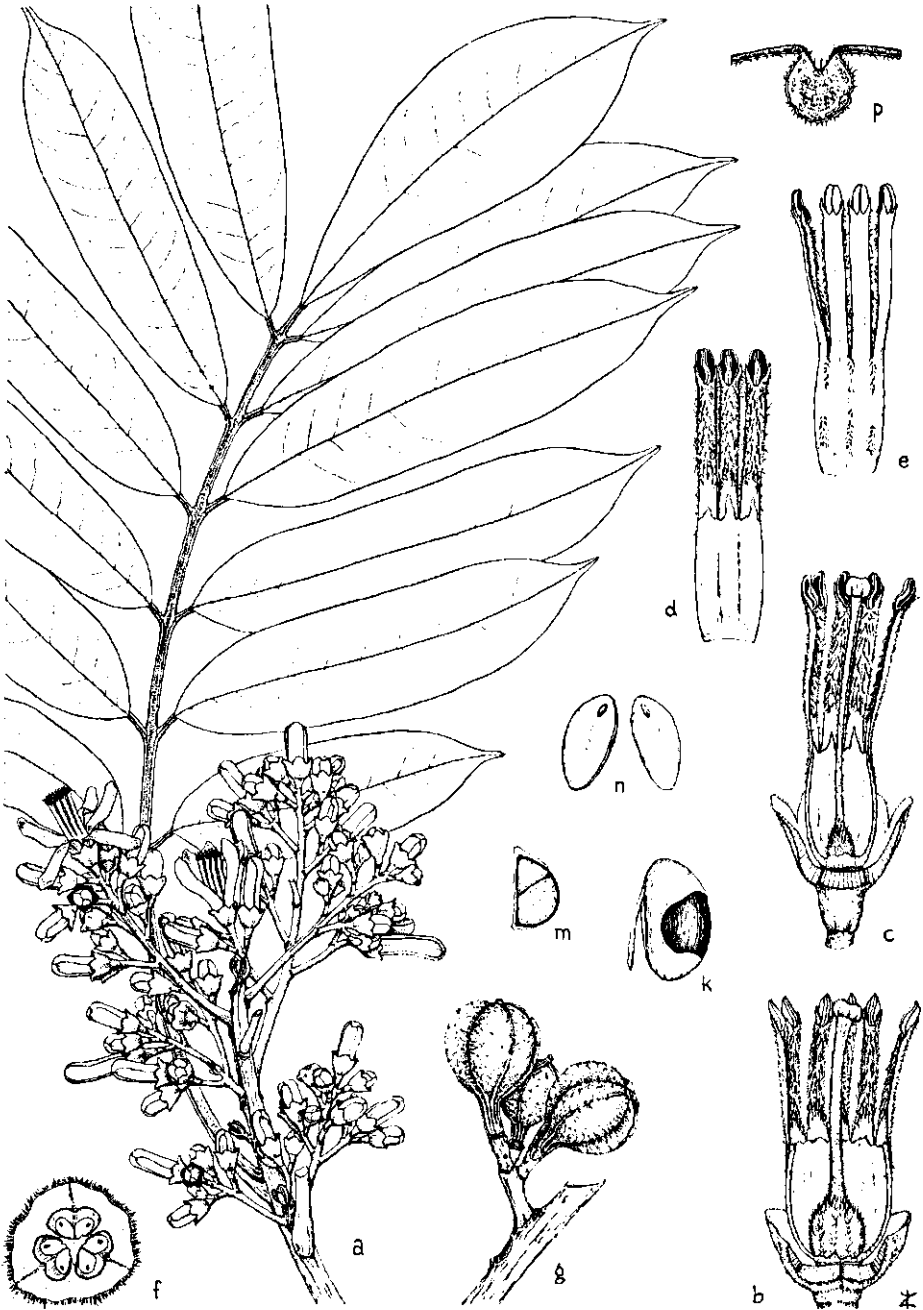
Leaflets 4–6(–7)-jugate (most often 6-jugate leaves at least present), opposite or subopposite, not or only indistinctly and very finely glandular-punctate, 4–15(–18) by 1.5–4.5(–7.5) cm, distal leaflets largest, narrowly obovate to

obovate, narrowly oblong to oblong or narrowly elliptic to elliptic, proximal leaflets smaller, narrowly elliptic to elliptic; apex acute or acuminate, base usually cuneate, sometimes obtuse, drying greenish-brown or brown, and often dark brown or blackish on the upper surface of young leaflets. Upper surface glabrous but with some sparse and short indumentum in the furrow of the impressed midrib and nerves, nerves (7-)9-15(-17) on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin; veins indistinct. Lower surface with varying indumentum, usually puberulous or tomentose, sometimes velutinous, the hairs often with narrow central canal, filled with a brownish, resinous content; midrib and nerves very prominent, veins slender, more or less distinct, rather closely reticulate, in young leaflets often glandular-translucent.

Inflorescences rather lax, rarely more condensed, paniculately arranged, axillary or pseudo-terminal, often assembled near the top of the branches, 4.5-13 cm long; main axes terete or flattened and angular, wrinkled lengthwise, dense, short greyish-brown or rusty tomentose, mostly once or two times branching before the pedicel; branches short, up to 4 cm long. Bracts very early deciduous, ovate or obovate, often boat-shaped, ca. 3-4 by 1-2 mm, acute or obtuse at apex, abaxially pubescent, adaxially puberulous or glabrescent, margin ciliate.

Male flowers: On up to 3 mm long, puberulous or shortly tomentose pedicels (pedicels mostly shorter and sometimes almost lacking); bracteoles 2, very early deciduous, ca. 1 by 0.5 mm, ovate, abaxially pubescent, adaxially glabrous, margin ciliate. Receptacle cylindrical, slightly tapering to the base, ca. 1-2 mm long, longitudinally often faintly grooved, densely appressed pubescent, jointed to the pedicel. Calyx cup-shaped, firm and rather fleshy, (3.7-)4.5-6.5 mm high by 6-8.5(-10) mm wide, 5-lobed to about 1/3 or maximal 1/2 of its length, lobes 1.3-2.8 by 2.0-4.3 mm, depressed ovate or suborbiculate, rounded at apex, outside densely appressed pubescent, irregularly wrinkled, inside smooth and glabrous, margin ciliate, hairs often with reddish-brown resinous content in central canal. Petals 5, free, or at the very base slightly adnate to the staminal tube, (imbricate in bud, spreading and usually reflexed during anthesis), firm and fleshy, 18.5-28 by 2.5-5 mm, narrowly oblong, slightly incurved at the obtuse and somewhat thickened apex, inside densely puberulous or covered with a dense indumentum of very short trichomes, outside ditto. Staminal tube 16-22.5 mm long (including the anthers), 10-fid, incisions to about 1/2 or 2/3 of its length; free parts of the filaments 8-12 mm long, glabrous outside, densely villous inside and on the margins; connate part of the staminal tube 5-11 mm

FIG. 9. *Trichilia megalantha* HARMS - a: fl. branch, ♂ (× 1/2); b: section of ♀ fl., petals removed (× 2); c: id., ♂ fl. (× 2); d: part of staminal tube, inside, ♂ (× 2); e: id., outside (× 2); f: transverse section of ovary (× 5); g: branch with immature fr. (× 1/2); k: seed (× 1); m: transv. sect. of seed (× 1); n: cotyledons (× 1); p: transv. sect. of the midrib of a leaflet (× 10). - a, c-e, p: ROWLAND S.N., Aug. 1893; b, f: KRUKOFF 77; g-n: VIGNE 2434.



long, glabrous and fleshy inside (the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into raised wedge-shaped issues, the tops of the wedges often alternating with the bases of the free parts of the filaments), the connate part glabrescent or locally puberulous outside; anthers dorsifix, inserted in the apical sinus of the free part of the filament, between two narrowly triangular more or less hairy lobes of 0.5–1.3 mm long, 2.0–2.8 by 1.0 mm, narrowly obovate to obovate or oblong, often mucronulate, rough, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode slender, scarcely or not expanded at the base; ovary sterile, ca. 1–2 mm diam., subpyramidal, pubescent, vestigial ovules present; style 13–18.5 mm long, 0.6–0.9 mm wide, variously hairy, indumentum more or less dense, hairs often rather long and spreading; stigma subglobular to discoid, 1.1–1.5 mm high by 1.8–2.1 mm wide, velvety by very minute trichomes, longitudinally furrowed, flattened and often crateriform at the glabrous, obscurely 3-lobed apex.

Female flowers: Similar to male flower, but anthers not dehiscent, not producing pollen. Connate part of the staminal tube more or less hairy inside, especially towards the base (if always?). Ovary well developed, ovoid, longitudinally grooved, ca. 2.5–3.5 mm high by 3.5–4.0 mm wide, densely pubescent, 3-celled; ovules 2 in each cell, axile, collateral; style somewhat shorter than in male flower, ca. 12–13 mm long, pubescent, stigma ca. 1.2 mm high by 2.0–2.5 mm wide. Calyx sometimes rather long persistent in the ripening fruit.

Fruit a 3-chambered, stipitate capsule, broadly obovoid, slightly 3-lobed in transverse section, ribbed in the median of each carpel, ca. 15–25 mm diam. (stipe excluded), (stipe 3–10 mm long, always distinct, 5–7 mm thick, more or less tapering to the base, wrinkled lengthwise), very densely covered with a pale brown indumentum of very short and rather stiff hairs, mixed with fewer, but rather long tomentose hairs, often mucronulate (style remnant), loculicidally dehiscent, 3-valved; dry valves thick leathery, very broadly obovate, acute at apex, transversely wrinkled.

Seeds 2 in each chamber, often one or both not or only partially developed, collateral, just beneath the apex attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Seeds (if mature?) ca. 11–15 by 5–8 mm, arillodiate, plano-convex, flat on the adjacent sides; testa for the largest part developed into a fleshy arillodium (sarcotesta), arillodium orange-red without, whitish within, up to ca. 1 mm thick, occupying the surface of the seed for about  $\frac{2}{3}$ – $\frac{3}{4}$ , leaving a large, variously shaped but often more or less square or subcircular, glossy, very dark brown spot of thin leathery testa, which measures ca. 7–10 mm in diam.; cotyledons firm, fleshy, pale brown, plano-convex, 9–13 by 5–6 mm; radicle obovoid, ca. 2 by 1 mm, longitudinally flattened, not ciliate on edge, in between the cotyledons at 0.5–1.5 mm beneath the apex.

Seedling not known.

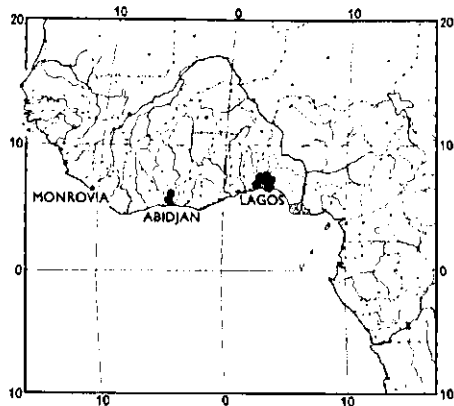
Note. It is to be emphasized that the present description of fruit and seed is

based on scanty and incomplete material. Detached fruits annotated 'VIGNE no. 2487' are present in the carpological collection of FHO. These fruits are mature, but the material is in a bad condition. The label going with the fruits states: 'shrunken about 1/2 size', but this was not included in the measurements given above. Vegetative herbarium material of VIGNE no. 2487, also present in FHO, I identified as *T. megalantha*. This material shows fruiting-stalks to which the detached fruits may belong.

Detached fruits of VIGNE no. 2434, which I was able to examine in FHO, are not fully mature. This specimen was not supplemented by vegetative material. The label has: 'dry fruits about 2/3 fresh size'. These fruits very much resemble fruits of *T. martineaui* AUBRÉV. et PELLEGR. However, some of the fruits are attached to a fragment of a twig, which is rather thick (ca. 8 mm), and densely but shortly pubescent, characters I never found in *T. martineaui*. Moreover, seeds of this specimen show a more or less circular spot, where the testa is not developed into the arillodium. In seeds of *T. martineaui* this spot is found to be more elongated. For these reasons I regard VIGNE no. 2434 as *T. megalantha*.

In general it may be stated that more complete fruiting material of *T. megalantha* is wanted.

Distribution. Ivory Coast, Ghana, Nigeria.



MAP 9.  
Distribution of 9. *Trichilia megalantha*  
HARMS.

Ecological and biological notes. *Trichilia megalantha* seems to be confined to a rather small area in tropical West Africa, where it occurs in the drier parts of the moist evergreen lowland forest. This particular forest-type is often called 'moist semi-deciduous' forest, forming transition between moist evergreen forest and semi-deciduous forest. In this drier forest-type it seems to replace *T. tessmannii* HARMS, which is bound to the more humid forest areas. In the moist semi-deciduous forest area the dry season is slightly more marked than in the evergreen rain forest (average annual rainfall around 2000 mm). As human influences strongly disturbed the natural zonation in the West African forest vegetation, the present outline merely refers to the supposed original

habitat. Nowadays, *T. megalantha* is also found in secondary forest and in old farm regrowth in the zone originally occupied by moist evergreen lowland forest.

KRUKOFF (no. 77, MO, NY, UC) collected it in Ivory Coast near Agboville in what he called: 'Virgin deciduous forest'. AKPATA (no. 18460 in FHI) found it in Ila Distr., Oyo Prov., Nigeria, growing together with *Triplochiton scleroxylon* K. SCHUM., *Celtis* and *Antiaris* (probably *A. africana* ENGL.), species bound to, or at least originating from, the deciduous forest. ONOCHIE (no. 21977 in FHI) collected it in the Ijaiye For. Res. near Ibadan, Nigeria, in a similar vegetation type. The field-notes state: 'In high forest with *Celtis*, *Mansonia*, *Drypetes* and *Nesogordonia papaverifera* (A. CHEV.) R. CAPURON', all typical representatives of the deciduous forest.

The petals are reported to be pale green, cream, or pale white in colour, fleshy and brittle; the flowers heavily scented (HAMBLER no. 15, K; OGUA in FHI no. 3423, K, MO).

Vernacular names. Ivory Coast: *mutigbanaye* (Agboville).  
Ghana: *appayai* (Ashanti).

Uses. No information regarding uses was found.

Specimens examined: Ivory Coast: Agn bi R. (♂ fl.) AUBR VILLE 2357 (P); young tree, cultivated in Banco Arboretum, near Abidjan (veget. Oct.) DE WILDE 3113 (WAG); near Agboville (♀ fl. June) KRUKOFF 77 (MO, NY, UC).

Ghana: Ashanti, Ofin Headwaters Res. (fl.) VIGNE 1906 (FHO); sin. loc. (nearly mature fr.) VIGNE 2434 (FHO); Ashanti, Pamu, Berekum Res. (mature fr. Sept.) VIGNE 2487 (FHO).

Nigeria: Oyo Prov., Ife Distr., Ila-Ora Road (veget. Sept.) AKPATA FHI-18460 (FHI); near Ibadan (♂ fl. June) HAMBLER 15 (K); Ojo, ca. 10 km N. of Ibadan, on the road to Oyo (♂ fl. May) KEAY FHI-37848 (FHO); Ibadan (♂ fl. June) OGUA FHI-3423 (K, MO); near Ibadan, Ijaiye For. Res. (veget.) ONOCHIE FHI-21977 (FHI); Ibadan (♂ fl. April) ONOCHIE FHI-38331 (COI, FHO, WAG); Western Lagos (♂ fl. Aug.) ROWLAND s.n. (K, lectotype of *T. megalantha* HARMS).

## 10. *Trichilia monadelpha* (THONN.) J. J. DE WILDE Fig. 10, 20b; Map 10

*Trichilia monadelpha* (THONN.) J. J. DE WILDE in Acta Bot. Neerl. 14 : 453-460. 1965.

Type: THONNING s.n. (Danish Guinea (presently Ghana), lectotype in C).

Basionym: *Limonia? monadelpha* THONN. in SCHUMACHER, Beskr. af Guin. Pl. : 217. 1827; id. in Vidensk. Selsk. Naturv. Math. Afh. 3 : 237. 1828 (the same paper as in 1827); W. J. Hooker, Niger Flora : 255. 1849; OLIVER, Fl. Trop. Afr. 1 : 336. 1868; KEAY in HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958; JUNGHANS in Bot. Tidsskrift 58 : 88. 1962. Type: See above.

Synonyms: *Trichilia heudelotii* PLANCH. ex OLIV., Fl. Trop. Afr. 1 : 334. 1868; C.DC. in A. and C.DC., Mon. Phan. 1 : 659. 1878; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. 1896; HOLLAND, Useful Pl. of Nigeria, in Kew Bull. Add. Ser. 9(1) : 148. 1908; PELLEGRIN in Not. Syst. 2 : 73. 1911; CHEVALIER, Expl. Bot. Afr. Occ. Franç. 1 : 114. 1920; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B36. 1922; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; AUBRÉV., Fl. For. Côt. Iv. 1st ed. 2 : 154, tab. 186-a. 1936; KENNEDY, For. Fl. S. Nig. : 163. 1936; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 23, fig. 1A. 1940, pro parte, excl. the cited synonyms *T. djalonis* A. CHEV. (erroneously cited as *T. djalonensis*) and *T. zenkeri* HARMS; EXELL and MENDONÇA, Conspec. Fl. Angol. 1(2) : 315. 1951; DALZIEL, Useful Pl. of W. Trop. Afr. 2nd reprint : 329. 1955; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 704. 1958, pro parte, excl. *T. heudelotii* var. *zenkeri* (HARMS) AUBRÉV., *T. djalonis* A. CHEV., and *T. velutina* A. CHEV.; STANER and GILBERT in Fl. Cong. Belg. 7 : 168. 1958; AUBRÉV., Fl. For. Côt. Iv. 2nd ed. 2 : 186, tab. 196-a. 1959; IRVINE, Woody Pl. of Ghana : 528. 1961; VOORHOEVE, Liberian high forest Trees : 248. 1965.

Types: HEUDELLOT no. 842 (Guinea, Karkandy, lectotype, K!; duplicates at FHO, G, OXF, and P? (not seen)); MORSON in Herb. BROWN s.n. (Sierra Leone, paratype, K, P); MANN no. 163 (partly, the other part belongs in *T. rubescens* OLIV., see there) (Fernando Póo, paratype, K).

*Trichilia integriflamenta* C.DC. in Ann. Conserv. bot. Genève 10 : 157. 1907; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 23. 1940. Type: ZENKER no. 837 (Bipinde, Cameroun, holotype in G; isotypes at BM, E, GOET, K, L, M, S, W, WRSL).

*Trichilia johannis* HARMS in Notizbl. Bot. Gart. Berlin 7 (no. 65) : 231. 1917; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Type: MILDBRAED no. 8779 (near Dengdeng, Cameroun, holotype destroyed in B, lectotype in K).

*Trichilia acutifoliola* A. CHEV., Expl. Bot. Afr. Occ. Franç. 1 : 112. 1920, partly. (See also under *T. ornithothera*). Types: CHEVALIER no. 16112 (Bouroukrou, 25–30 Dec. 1906, Ivory Coast, lectotype in P); CHEVALIER no. B-22310 (near Yapo, Ivory Coast, paratype, COI).

*Trichilia candollei* A. CHEV., Expl. Bot. Afr. Occ. Franç. 1 : 113. 1920; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Types: CHEVALIER no. 16262 (Mbasso on the Comoé R., Ivory Coast, lectotype in P; duplicates in G and K); CHEVALIER nos. 15238, 17358, 17486, 19143, and 19744 (all from Ivory Coast, paratypes, not seen); CHEVALIER no. 20110 (Anyama, Potou lagoon, Ivory Coast, paratype, P!); CHEVALIER no. 22757 (Adjara, 7 km from Porto-Novo, Dahomey, paratype, not seen).

*Trichilia oddoni* sensu PELLEGR. in Not. Syst. 9(1) : 24. 1940, partly, only as far as the name *Trichilia acutifoliata* A. CHEV. (by PELLEGRIN erroneously cited as *Trichilia acutifoliolata* A. CHEV.) is concerned.

'*Trichilia zenkeri* HARMS' sensu STANER in Bull. Jard. Bot. Brux. 16(2-3): 165, tab. 6. 1941.

Nomina subnuda: *Trichilia acutifoliata* A.CHEV. in Vég. util. Afr. trop. Franç. 5: 213. 1909; PRAIN in Index Kew. Suppl. 4: 239. 1913, erroneously cited as *Trichilia acutifolia* A.CHEV.; HARMS in Nat. Pflanzenf. 2nd ed. 19B1: 110. 1940. Based on: CHEVALIER no. 16112 (Ivory Coast, Bouroukrou, 25-30 Dec. 1906, in P).

*Trichilia* (erroneously printed as *Tachilia*) *candollei* A.CHEV. in Vég. util. Afr. trop. Franç. 5: 214. 1909. Based on: CHEVALIER no. 16262 (Ivory Coast, Mbasso on the Comoé R., G, P).

Diagnostic and differential characters. Small tree in understorey of lowland rain forest, and especially in secondary regrowth, at altitudes up to ca. 650 m. Leaflets (3-)4-6(-7)-jugate, at most glabrescent beneath, not or very minutely and indistinctly glandular-punctate, acuminate at apex. Petals (6.5-)7-10(-11) mm long. Connate part of the staminal tube always more or less hairy inside. Lobes (appendages) on top of the free parts of the filaments absent or very short (0.1-0.2 mm). Disk apparently absent. Ovary 3-celled. Fruit ca. 15-25 mm diam., obovoid-subglobose, shortly stipitate, usually 3-valved, pinkish or violaceous. Seed 15-17 by 8-11 mm, with orange-red arilodium and large black spot on dorsal side.

Description. Small evergreen tree, about 4-16 m tall and 15-25(-40) cm d.b.h., bole cylindrical, not (or rarely very slightly) buttressed, often low branching; crown large, open, rather spreading. Bark thin, ca. 0.5 cm thick; rhytidoma smooth, pale grey to dark brown or greenish-brown (often resembling *Platanus*); slash pale brownish or pink, rapidly turning ochreous to pale brown or brown, emitting a 'cedar-wood' fragrance, sometimes near the cambium a little slightly sticky creamy-white latex appears; sapwood cream, rather soft, heartwood reddish-brown, quite hard.

Young twigs terete or (vigorous shoots) sometimes angular, brown, short grey tomentose; lenticels almost absent; older twigs terete, longitudinally wrinkled or with dilatation lines, short brown tomentose to gradually glabrescent, sometimes lenticellate (lenticels small, elliptic or round, pale brown or brown, ca. 0.5-1 mm diam.); outer bark thin, not peeling off, brown, inner bark thin, dark brown, wood cream, not very hard.

Leaves imparipinnate, rarely paripinnate, 15-57 cm long, (often widely varying in length on one tree); petiole terete, more or less flattened on the upper surface, especially in the upper part and near the base, short tomentose, rather smooth, 4-13 cm long, pulvinus slightly swollen, wrinkled, contracted at the insertion; rachis (4-)8-20(-23) cm long, flattened or sulcate on the upper surface (especially between the insertion of the leaflets), otherwise similar to the petiole; petiolules terete, narrowly sulcate on the upper surface, short tomentose, longitudinally wrinkled, petiolule of terminal leaflet (4-)5-11(-13) mm, the others 2-7(-8) mm long.



Leaflets (3-)4-6(-7)-jugate, opposite or subopposite, not or very minutely and indistinctly glandular-punctate, variable in size, 4-26 by 1.7-9 cm, distal leaflets largest, narrowly obovate to obovate, proximal leaflets smaller, narrowly ovate to ovate; apex acuminate, rarely acute, mucronulate, base cuneate or obtuse, margin sometimes very narrowly revolute. Upper surface glabrous (except for a short indumentum in the furrow of the impressed midrib), nerves (6-)8-15(-18) on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin; veins indistinct. Lower surface glabrescent, the hairs often with a brownish, resinous central canal which extends up to the middle or higher, midrib and nerves very prominent, veins slender but distinct, as a rule glandular-translucent, rather closely reticulate. (Young leaflets drying dark brown, puberulous on the lower surface and there with densely pubescent midrib and nerves, indumentum soon diminishing with age).

Inflorescences lax or rather condensed, paniculately arranged, axillary or supra-axillary, often crowded near the top of the branches, 1.5-12(-21) cm long; main axes flattened or angular, wrinkled lengthwise, shortly tomentose, once, twice or three times branching before the pedicel, branches up to 9 cm long. Bracts early deciduous, ovate or triangular, often boat-shaped, 2.2-5.0 by 1.2-2.8 mm, acute, abaxially shortly pubescent, adaxially puberulous to glabrous, hairs often with a brownish, resinous central canal.

Male flowers: On up to 2 mm long, shortly tomentose, longitudinally wrinkled pedicels, sometimes sessile; bracteoles 1 or 2, sometimes absent, early deciduous, ca. 1.5 by 0.5 mm, narrowly ovate to ovate, acute, abaxially appressed pubescent, adaxially glabrous. Receptacle cylindrical, tapering to the base, 0.8-2.5 mm long, smooth or longitudinally wrinkled, appressed puberulous, jointed to the pedicel. Calyx cup-shaped, 1.5-2.7 mm high by 3-5 mm wide, 5-lobed (lobes imbricate in bud), (0.6-)1.0-1.7 by 1.2-2.5 mm, depressed ovate, obtuse or acute at apex, rather fleshy, outside pubescent, irregularly wrinkled, inside smooth and glabrous, margin shortly ciliate. Petals (4-)5, free (imbricate in bud, reflexed during anthesis), rather fleshy in the upper part, (6.5-)7-10(-11) by 1.7-2.7 mm, narrowly oblong, often slightly incurved at the obtuse apex, inside glabrous or somewhat rough, outside puberulous. Staminal tube 5.5-7.5 mm long (including the anthers), (8-)10-fid, incisions to about 1/2 or 3/5 of its length, free parts of the filaments 2.3-3.8 mm long, glabrous or with a few, rather long, appressed hairs outside, densely tomentose inside and on the margins, connate part of the staminal tube 2.0-3.0 mm long, more or less hairy (indumentum rather variable but hairs always present) and fleshy inside (the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into raised wedge-shaped issues, the tops of the wedges alternating with the bases of the free parts of the filaments), the connate part glabrous or glabrescent outside; anthers dorsifix, attached near the base, inserted in the apical sinus of the free part of the filament, between two very short, hairy lobes of 0.1-0.2(-0.4) mm long (often one or both lobes not distinct or absent and so the apex of the filament more or less truncate), 1.0-1.7 by 0.4-

0.6 mm, narrowly oblong to oblong, slightly mucronulate, with some hairs on the dorsal side, especially near the base, otherwise rough, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, pubescent, vestigial ovules present; style 4.0–5.5 mm long, 0.5–0.9 mm wide, pubescent; stigma globular, 0.5–1.0 (–1.3) mm diam., densely velutinous by very minute trichomes, flattened and slightly (2–)3-lobed at the apex and there deeply depressed and often hollow in the centre.

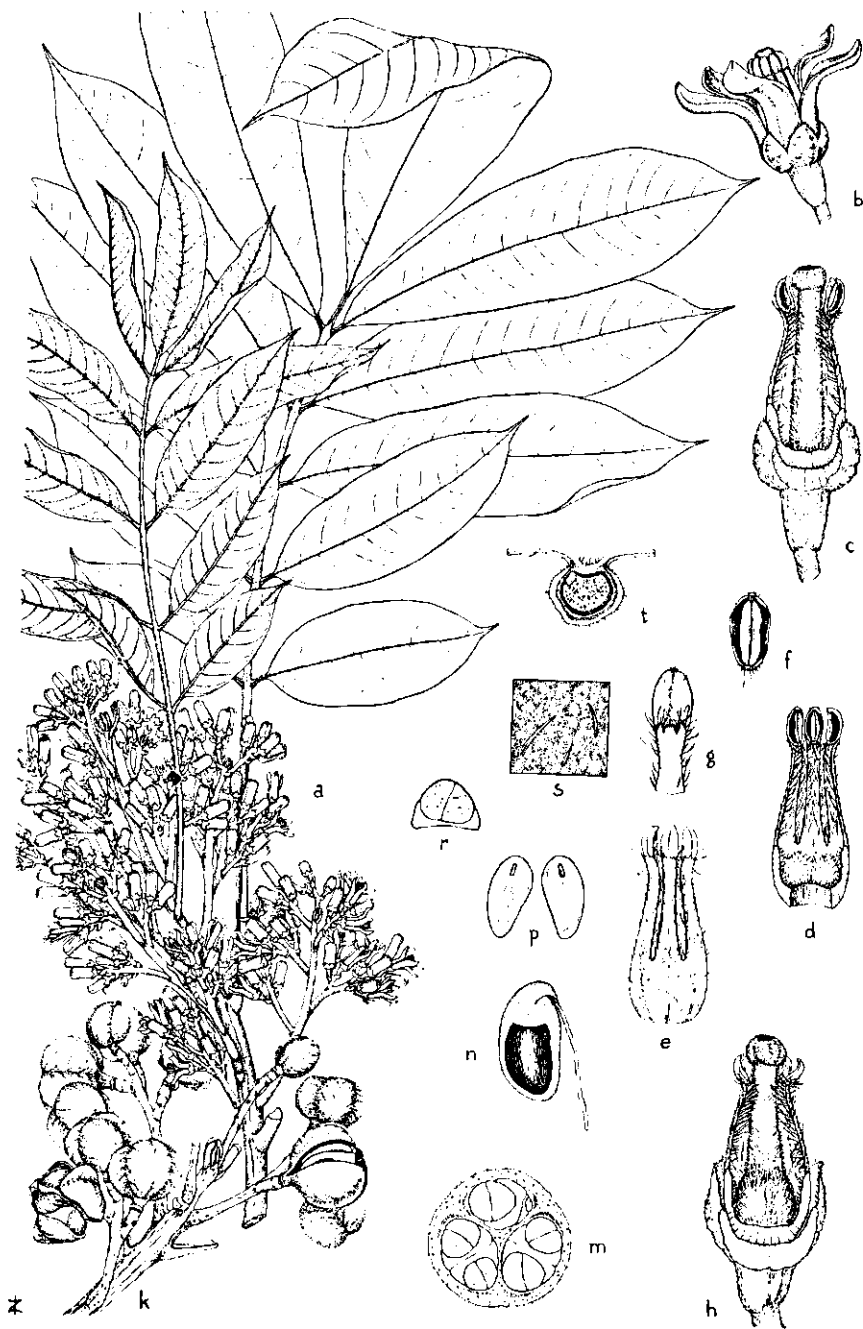
Female flowers: Similar to male flower, but anthers often narrower, not dehiscing, not producing pollen. Ovary well developed, globular, 2–3 mm diam., appressed pubescent, (2–)3(–4)-celled; ovules 2 in each cell, axile, collateral; style shorter than in male flower, 3–4 mm long, pubescent, stigma as in male flower.

Fruit a (2–)3(–4)-chambered, shortly stipitate capsule, obovoid-subglobose; dry, mature fruits (2–)3(–4)-lobed, ca. 15–25 mm diam. (stipe excluded), (stipe 1–5 mm long, ca. 3(–6) mm thick, slightly or not tapering to the base, wrinkled lengthwise), densely covered with a mealy indumentum of very short trichomes, puberulous, often mucronulate (style remnant), pinkish-grey or violaceous, loculicidally dehiscent, (2–)3(–4)-valved; dry valves thick leathery or even slightly woody, broadly ovate, acute at apex, transversely wrinkled.

Seeds 2 in each chamber, collateral, 1.5–2.5 mm beneath the apex attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Mature seeds 15–17 by 8–11 mm, arillodiate, plano-convex, flat on the adjacent sides; testa for the largest part developed into a fleshy arillodium (sarcotesta), arillodium scarlet or orange-red without, whitish within, ca. 1 mm thick, near apex and base of the seed up to 3 mm thick, occupying the surface of the seed for about 2/3, leaving a large truncate-elliptic dorsal spot of glossy, leathery, very dark brown or blackish testa, which measures ca. 10–11 by 6–7 mm; cotyledons firm, fleshy, olive-green or pale brown outside, whitish within, plano-convex, 9.5–12 by 4.5–6 mm; radicle narrowly ellipsoid, longitudinally slightly flattened, 1.6–2.5 by 0.5–0.9 mm, in between the cotyledons at 1–2 mm beneath the apex.

Seedling: Germination epigeal. Tap root. Hypocotyl 1.5–4 cm long, pubescent. Cotyledons sub-opposite, sessile, green, fleshy, not developing, falling about 3 months after germination. Epicotyl 2–3.5 cm long, pubescent. First two

FIG. 10. *Trichilia monadelpha* (THONN.) J. J. DE WILDE—*a*: fl. branch, ♂ ( $\times 1/2$ ); *b*: ♂ fl. ( $\times 2$ ); *c*: section of ♂ fl., petals removed ( $\times 4$ ); *d*: part of staminal tube, inside, ♂ ( $\times 4$ ); *e*: id., outside ( $\times 4$ ); *f*: anther, ♂, ventral side ( $\times 8$ ); *g*: id., dorsal side ( $\times 8$ ); *h*: section of ♀ fl., petals removed ( $\times 4$ ); *k*: branch with fr. ( $\times 1/2$ ); *m*: transverse section young fr. ( $\times 1$ ); *n*: seed ( $\times 1$ ); *p*: cotyledons ( $\times 1$ ); *r*: transv. sect. of seed ( $\times 1$ ); *s*: portion of leaflet, beneath ( $\times 20$ ); *t*: transv. sect. of the midrib of a leaflet ( $\times 10$ ). — *a*, *f*–*g*: DE WILDE and LEEUWENBERG 3455; *b*–*e*: DE WILDE 3406 (spirit mat.); *h*: DE WILDE and LEEUWENBERG 3453 spirit mat.); *k*, *s*–*t*: DE WILDE 3196; *m*–*r*: DE WILDE 3403 (spirit mat.).



leaves opposite, simple, petiolate, ca. 3.5–5.5 by 2–3 cm, obovate or elliptic, broadly cuneate to obtuse at the base, shortly acuminate at apex, glabrous above except for some indumentum in the furrow of the impressed midrib, glabrescent beneath, hairs especially on the prominent midrib and nerves; very minutely and indistinctly glandular-punctate. Petiole 2–7 mm, pubescent. Following leaves alternate, simple, similar to the above-described or slightly larger and with petioles up to 1.5 cm long. The fifth leaf after the cotyledons may be compound and is found to be two-foliolate at an age of the seedling of ca. 9 months.

Remarks: The combination *T. monadelpha* (THONN.) J.J. DE WILDE. In a preliminary published note (J.J. DE WILDE, l.c., 1965) it was pointed out that a name-change for the well-known and widely distributed species *Trichilia heudelotii* PLANCH. ex OLIV. was unavoidable. For the sake of completeness the argumentation for the name-change is repeated here.

KEY (in HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2): 705. 1958) mentioned under *Trichilia* as 'imperfectly known species: *Limonia?* *monadelpha* THONN. in SCHUM., Beskr. af Guin. Pl.: 217. 1827'. He stated: 'I have examined an authentic specimen of this from the VAHL herbarium, Copenhagen. It consists only of an incomplete leaf, which might possibly be regarded as coming within the rather broad interpretation of *Trichilia heudelotii* which I have given above. A more exact determination would be most inconvincing. I consider, therefore, that it is scientifically undesirable to make a new combination to replace the well-known *T. heudelotii* PLANCH. ex OLIV. which has excellent and widely distributed type specimens'.

THONNING (l.c., 1827) gives a for that time very good description of *Limonia?* *monadelpha*. THONNING's diagnosis and description are as follows:

'*L.?* *monadelpha*; foliis impari-pinnatis; foliolis subsexjugis, paniculis axillaribus brevibus.

Voxer ved Aquapim.

Frutex vel Arbor inermis: ramulis teretiusculis, subtomentosis. Folia sparsa, impari-pinnata: foliola quinque-sexjuga, brevissime petiolata, elongato-obovata, acuminata, subacuta, integerrima, glaberrima, costata, tenuissime venosa, sex-novem-pollicaria, inferiora gradatim minora, extima tria digitato-ternata. Petiolus teres, basi crassus, subtomentosus, pedalis: petioli partiales sesquilineares. Stipulae nullae. Panicula axillaris, brevis; bracteis solitariis, minutis; floribus magnitudine florum Citri.

Perianthium minimum, quinquefidum, acutum. Corolla penta-petala: petala linearia, alba. Filamenta decem, longitudine fere corollae, conniventia, interne pubescentia, basi in urceolum coalita. Antherae ovatae erectae. Germen-Stylus longitudine filamentorum, pubescens. Stigma subcapitatum.'

Evidently, detailed and ample information is given about *L.?* *monadelpha* by THONNING. A question mark was added by THONNING because he doubted whether the species belonged in the genus *Limonia* L. (*Rutaceae*). According to the

Code (art. 34, note 1) the effectively published name *L.? monadelpha* THONN. must, notwithstanding the question-mark, be considered valid.

From the description it appears beyond any reasonable doubt that a *Meliacea* is described, and from the *Meliaceae* genera occurring in the locality mentioned in THONNING's protologue only the genus *Trichilia* shows the characters given in the description.

Already in 1849, W.J. HOOKER in his *Niger Flora*, giving a survey of the *Trichilia*'s known to him from that area, stated that according to PLANCHON, *Limonia? monadelpha* THONN. was probably also a *Trichilia*. Whether or not PLANCHON saw type-material of *Limonia? monadelpha* remains uncertain, but OLIVER in publishing *Trichilia heudelotii* PLANCHON (in *Fl. Trop. Afr.* 1 : 334, 1868) must have based it on information or material given or seen by PLANCHON. Whatever link, if any, may exist between HOOKER's and OLIVER's references to PLANCHON's opinions, there exists no previous published remark contradicting the view that *L.? monadelpha* THONN. would belong in the genus *Trichilia*. As to the species no decision was ever taken.

From the protologue of *L.? monadelpha* THONNING, it appears that the type locality is near 'Aquapim'. Nowadays this locality is known as Akwapim, a region situated ca. 50 km north of Accra (Ghana). THONNING collected (from 1799-1803) in this area, which is near Christiansborg, his base.

The number of *Trichilia* species occurring in this particular area is small and the detailed description of *L.? monadelpha* agrees in all characters with *Trichilia heudelotii* PLANCH. ex OLIV.

JUNGHANS (in *Bot. Tidsskrift* 58 : 88, 1963) pointed out that *Limonia? monadelpha* also had been called *L. multijuga* and *L. pinnata* in manuscript, under which names it therefore might be found in various herbaria. He added that THONNING's own collections were burnt in Copenhagen in 1807, due to the bombardment of that city by the English, but that VAHL already as early as in 1804 distributed many THONNING-specimens. JUNGHANS gives information in which herbaria missing types may be found.

In order to trace possible isotypes the directors of the herbaria of B, G, LE, M, P, and S were requested if specimens bearing the names *Limonia monadelpha*, *L. multijuga*, or *L. pinnata* (from THONNING's, and VAHL's herbarium) were preserved in their herbaria, to forward these for examination. However, they all kindly informed me that no specimen could be traced.

The curator of the Botanical Museum of the University in Copenhagen (C), Denmark, Dr. SKOVSTED was kind enough to send me on loan the leaf-fragment mentioned by KEAY (l.c.; also as Kew negative no. 2595, Dec. 1955). The sheet seems to originate from VAHL's herbarium and is annotated 'Thonninge Guinea' and '*Limonia*'. It unmistakably belongs in the taxon currently known as *Trichilia heudelotii* PLANCH. ex OLIV., and even in *T. heudelotii* in a narrower circumscription. Whether the Copenhagen specimen is part of the holotype I cannot decide, and it is unlikely that this can be proved or disproved, but there is no reason not to accept it as belonging to the type-material of *Limonia? monadelpha*.

Furthermore Dr. SKOVSTED informed me that a renewed search for material of *Limonia* originating from THONNING's or VAHL's herbarium had not produced other specimens.

From the Ghana Herbarium (GC) I had on loan IRVINE no. 2103. This specimen was collected at Berekusu, Akwapim, the type locality of *Limonia? monadelpha*. Although this material is vegetative, it is correctly identified by IRVINE as *T. heudelotii* PLANCH. ex OLIV. IRVINE no. 354 from which I examined material present in GC and K was collected at the Accra plains near Akwapim Hills. This gathering from near the type-locality of *Limonia? monadelpha* belongs to *Trichilia priureana* A. JUSS. Due to THONNING's excellent description of *Limonia? monadelpha* it can be decided with certainty that *T. priureana* is another species because THONNING stated: 'Filamenta decem, . . . conniventia, . . . basi in urceolum coalita'. As in *T. priureana* the filaments are completely united into a tube, this species certainly does not fit the description of *Limonia? monadelpha*.

Summarizing it can be concluded that IRVINE collected 2 *Trichilia* species in the type region of *L.? monadelpha*. One of these (no. 354) cannot be identical with *L.? monadelpha* but the other specimen (no. 2103) is *T. heudelotii* and so agrees with THONNING's *L.? monadelpha*.

THONNING's clear and detailed description of *Limonia? monadelpha* has to be identified because the name is validly published. It cannot be neglected or rejected from the fact that the type was lost or is, possibly, uncertain.

In my opinion *Limonia? monadelpha* THONNING (1827) is without the slightest doubt conspecific with *Trichilia heudelotii* PLANCH. ex OLIV. (1868). Even when the protologue was less detailed there would be no way to escape from this conclusion. It implies that the name *T. heudelotii* PLANCH. ex OLIV. must be replaced by the new combination *Trichilia monadelpha* (THONN.) J. J. DE WILDE.

The leaf-fragment from the VAHL herbarium attributed to THONNING as collector, present in Copenhagen (C) is designated as lectotype for the name *Limonia? monadelpha* THONN. and consequently for the new combination.

Notes to the synonyms. *Trichilia integrifilamenta* C. DC. (l.c., 1907) is based on ZENKER no. 837, collected near Bipindi in Cameroun. ZENKER no. 837 concerns a male specimen. The connate part of the staminal tube is slightly hairy inside, lobes at the top of the free parts of the filaments are absent, the vestigial ovary is (2-)3-locular. This, together with the dimensions of the flowers, is characteristic for *T. monadelpha*. The statement in the protologue that the leaflets are densely translucent-punctate I cannot support. Some punctuation is present but very fine and indistinct. *T. integrifilamenta* C. DC. must be regarded as a later synonym of *T. monadelpha* (THONN.) J. J. DE WILDE, an opinion already expressed by PELLEGRIN (l.c., 1940).

*Trichilia johannis* was validly published by HARMS (in Notizbl. Bot. Gart. Berlin 7 (no. 65): 231. 1917). It was based on MILDBRAED no. 8779; this holotype was lost at B. However in K is an isotype of MILDBRAED no. 8779, which I was able to examine. It represents a flowering male specimen. The vestigial ovary is 3-locular. The connate part of the staminal tube is hairy within, and the lobes

('teeth') at the top of the free part of the filament are nearly absent. These and all other characters fit perfectly in *T. monadelpha*.

*Trichilia acutifoliola* A.CHEV., Expl. Bot. Afr. Occ. Franç. 1 : 112. 1920, was based on a number of syntypes, some of which appeared to belong to *Trichilia ornithothena* and the others to *T. monadelpha*. CHEVALIER no. 16112 is designated here as the lectotype for the name *T. acutifoliola* A.CHEV. (see also under *T. ornithothena*). CHEVALIER no. 16112 (P) represents a vegetative specimen. All characters correspond with those of *T. monadelpha*. *T. acutifoliola* A.CHEV. is synonymous to *T. monadelpha*.

*Trichilia candollei* was published as a *nomen subnudum* by A. CHEVALIER (l.c., 1909). Erroneously the generic name was printed as '*Tachilia*', but no doubt *Trichilia* was meant, as the name '*Tachilia*' is arranged among *Trichilia*'s. No generic name '*Tachilia*' is known. From the context of CHEVALIER's work it appears that in 1909 the author merely intended a provisional name, as CHEVALIER in a note stated: 'Espèce non encore décrite'. The French 'description' gives no adequate information. CHEVALIER no. 16262 was cited to represent this name. *T. candollei* was published again in CHEVALIER's Expl. Bot. Afr. Occ. Franç. 1 : 113. 1920. Only little information was added to the protologue but now the name must be regarded as validly published. It is based on a number of syntypes from which I chose CHEVALIER no. 16262 (P) as the lectotype. CHEVALIER no. 16262 was collected in Ivory Coast near Mbasso on the Comoé River. It concerns a male specimen. Both flowering and vegetative characters are in accordance with those of *T. monadelpha*. *Trichilia candollei* A.CHEV. (l.c., 1920) must be regarded as a later synonym of *Trichilia monadelpha*. PELLEGRIN (l.c., 1940) and KEAY (in Fl. W. Trop. Afr. 2nd ed. 1958) were already of the same opinion.

'*Trichilia oddoni* DE WILD.' sensu PELLEGRIN (l.c., 1940), judging from the cited specimens, consists of a mixture of *Trichilia ornithothena* J. J. DE WILDE and *Trichilia welwitschii* C.DC. However, in the synonymy PELLEGRIN also cited the name *Trichilia acutifoliolata*, referring it to A.CHEV. (in Vég. util. Afr. trop. Franç. 5 : 213. 1909). Certainly he intended to refer to *Trichilia acutifoliolata* A.CHEV. (l.c., 1909), based on CHEVALIER no. 16112.

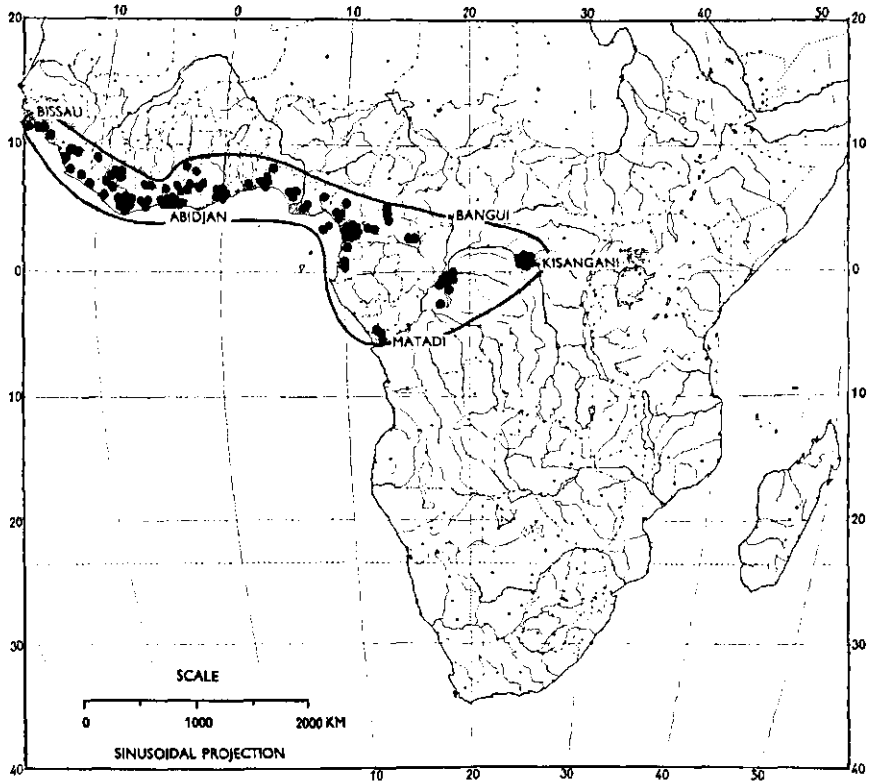
CHEVALIER no. 16112 doubtless belongs in *T. monadelpha* and was designated here as lectotype for *Trichilia acutifoliolata* A.CHEV. (see also under *T. ornithothena* J. J. DE WILDE). Accordingly the name *Trichilia oddoni* sensu PELLEGRIN must be placed in the synonymy of *T. monadelpha* as far as the name *T. 'acutifoliolata' (acutifoliolata)* A.CHEV. is concerned (see also below).

'*Trichilia zenkeri* HARMS' sensu STANER in Bull. Jard. Bot. Brux. 16(2-3) : 165, tab. 6. 1941, according to the description, figure, and cited material is conspecific with *Trichilia monadelpha*. This already was rectified by STANER and GILBERT in Fl. Cong. Belg. (l.c., 1958; synonymy of *Trichilia heudelotii* PLANCH. ex OLIV.).

*Trichilia acutifoliolata* was published as a *nomen subnudum* by A.CHEVALIER (in Veg. util. Afr. trop. Franç. 5 : 213. 1909). As in *T. candollei*, the French protologue gave no adequate information and CHEVALIER himself remarked: 'Espè-

ce non encore décrite'. The name was based on CHEVALIER no. 16112, collected near Bouroukrou in Ivory Coast. As CHEVALIER no. 16112 belongs to *T. monadelpha*, the name *T. acutifoliata* A.CHEV. is a synonym to *T. monadelpha* (see also notes on *T. acutifoliata* A.CHEV. and on *T. ornithothesa* J.J. DE WILDE).

Distribution. Port. Guinea, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Dahomey, Nigeria, Cameroun, Fernando Póo, Río Muni, Gabon, Congo, Angola (Cabinda).



MAP 10. Distribution of 10. *Trichilia monadelpha* (THONN.) J. J. DE WILDE.

Ecology. A common species of secondary forests and of river banks in the evergreen and semi-deciduous forest zone (occasionally also in riverine forest and on moist places in the deciduous forest zone). AUBRÉVILLE (l.c., 1959) stated that in Ivory Coast in very old secondary forest, showing the physiognomy of primary forest, the species may also occur abundantly in the lower storey. A similar habitat is reported by BRENNAN, who found it frequently growing in S. Nigeria in high forest where undergrowth had been artificially cleared away (BRENNAN no. 9036, BM). The species seems to be confined to the lowland.



VOORHOEVE (no. 1093, WAG) found it in Liberia in the West Nimba National Forest, ca. 30 km N.E. of Ganta, at an altitude of ca. 450 m. BINUYO collected it in Nigeria at the Olla Hills in Ogbomosho District at the same altitude (BINUYO in FHI no. 36905, WAG). However, BRETELER reports it from Cameroun at altitudes of 600–650 m (BRETELER nos. 1696 and 1836, both at WAG). At higher altitudes in the western part of its distributional area the species is replaced by *Trichilia djalensis* A. CHEV. (see there). The flowers are greenish-yellow and very fragrant, often busily visited by bees and other insects. Flowering often goes together with development of the terminal bud and forming of a new shoot (DE WILDE no. 3168, WAG). The mature fruits, displaying black seeds with red arillodium do attract birds.

Vernacular names. Sierra Leone: *ekwinsu*.

Ivory Coast: *banaye* (dial. Abé), *tenauba* (Dabou), *kouadlibé* (dial. Ébrié), *ténigba* (dial. Agni), *dala* (dial. Gouro), *oua* (dial. Yacoba), *tato* (dial. Kroumen). Ghana: *tendru* or *otendru* (dial. Ashanti), *tenuro* or *otenuro* (dial. Ashanti), *opam* (dial. Twi), *teneba* or *temuba* (dial. Nzima).

Dahomey: *loudou*.

Cameroun: *ebegbemvaoswé* (Yaoundé), *houdale* (dial. Bassa).

Congo: *pangi-ya-soko* (dial. Kiumbe), *bolumbe-likolo* (dial. Turumbu), *lilosso* (dial. Lokundu), *bofopardje* (dial. Turumbu), *esausau* (dial. Bolia), *elankoloyindu* (dial. Pama).

Note: Especially in Congo many vernacular names are the same as those used for *Trichilia welwitschii* C. DC. (see there). It may be concluded that local inhabitants often do not distinguish between both species.

Uses. Many parts of this tree are in common domestic and medicinal use among the local people. The wood is used in housebuilding, especially for piles, which constitute a very important part of the local dwellings. In Liberia the wood is said to be preferred for devil masks, etc., because it is easy to carve and does not crack (DALZIEL, l.c., 1955). According to IRVINE (l.c., 1961) the bark is rather rich in tannins and furnishes a reddish-brown dye, used for dyeing cloth and hides. The same author states that a decoction of the leaves is used for heart troubles (teste IRVINE no. 505, GC). From my own experience I know that in Ivory Coast (surroundings of Dabou and Abidjan) the bark is often stripped from the lower part of the stems (DE WILDE no. 3196, WAG). This bark is boiled in water and the decoction drunk for lumbago and intestinal pains. A decoction of the roots is drunk for stomach-ache. In addition to this, IRVINE (l.c., 1961) states that in Ivory Coast the powdered bark is used for sores and ulcers, while a decoction of the bark is also used as an abortive and aphrodisiac, and for gonorrhoea and general oedemas. See also KERHARO and BOUQUET, *Plantes méd. et tox. de la Côte d'Ivoire-Haute Volta*: 159. 1950.

Specimens examined: Port. Guinea: near Cacine (young fr. Aug.) ESPIRITO SANTO 609 (COI, LISJC); Formoza, Mato de Amedi (♂ fl. April) ESPIRITO SANTO 1974 (COI, LISC, LISJC); Catió (♂ fl. June) ESPIRITO SANTO 2100 (COI, K, LISC, LISJC).

Guinea: Kissi (probably Kissidougou?) Distr., between Diromandou and Koundian (♂ fl. Febr.) CHEVALIER 20736 (K); Karkandy (♀ fl. April) HEUDELOT 842 (FHO, G, OXF, iso-lectotypes of *T. heudelotii* PLANCH. ex OLIV.; lectotype in K); Tondon (♂ fl. April) ROBERTY 17516 (G); Nimba Mountains area (veget. April) SCHNELL 5319 (IFAN).

Sierra Leone: near Njala (♀ fl. May) DEIGHTON 2996 (K); Fintonia (♂ fl. June) DEIGHTON 4793 (K); Rokupr, Magbema Chiefdom, Kambia Distr. (♀ fl. and very young fr. March) JORDAN 775 (K); sin. loc. (very young fr.) MORSON in Herb. BROWN s.n. (K, P, paratype of *T. heudelotii* PLANCH. ex OLIV.); near Mofari, Digisinn (fr. Jan.) SCOTT ELLIOT 4396 (BM, K); near Sasseni, Scarcies R. (♂ fl. Jan.) SCOTT ELLIOT 4542 (BM, K); Gola Forest (♂ fl. March) SMALL 541 (K); *ibid.*, Pewa (immature fr. June) SMALL 736 (K, MO); Kamalu (♀ fl. May) THOMAS 367 (BM); Bumba (fr. Sept.) THOMAS 1919 (S); sin. loc. (♂ fl.) THOMAS 10489 (W).

Liberia: Eastern Prov., Webo Distr., Mnanulu (immature fr. June) BALDWIN 6031 (K); *ibid.*, Jabroke (mature fr. July) BALDWIN 6453 (K); Grand Bassa, Ba, on Little Kola R. (♂ fl. March) BALDWIN 11192 (K); near Monrovia, along Dukwai R. (immature fr. May) COOPER 424 (BM, FHO, K, NY); Central Prov., ca. 4 km N.E. of Suakoko, Gbarnga (mature fr. July) DANIEL and BARKER 200 (MO); Eastern Prov., Putu Distr., near Kanweake, ca. 70 km S. of Tchien (Zwedru) (♂ fl. March) DE WILDE and VOORHOEVE 3642 (WAG); *ibid.*, ca. 80 km S. of Tchien (Zwedru) (♂ fl. March) DE WILDE and VOORHOEVE 3683 (WAG); sin. loc. (♂ fl. Dec.) HARLEY 364 (WAG); Ganta (♂ fl. April) HARLEY 1135 (K, WAG); Gio Nat. For. (immature fr. July) VOORHOEVE 340 (WAG); Sanokole, ca. 30 km N.E. of Ganta, West Nimba Nat. For. (♀ fl.) VOORHOEVE 1093 (WAG).

Ivory Coast: near Abidjan (♂ fl. June) AUBRÉVILLE 20 (IFAN, K); Bouroukrou (veget.) CHEVALIER 16112 (P, lectotype of *T. acutifoliola* A. CHEV.; base of *T. acutifoliola* A. CHEV., *nomen subnudum*); Mbasso on the Comoé R. (♂ fl. March) CHEVALIER 16262 (P, lectotype of *T. candollei* A. CHEV., duplicates in G and K); Anyama, Poïou lagoon (♂ fl. buds Febr.) CHEVALIER 20110 (P, paratype of *T. candollei* A. CHEV.); near Yapo (veg.) CHEVALIER B-22310 (COI, paratype of *T. acutifoliola* A. CHEV.); near Bingerville (♀ fl. June) COURTET in Herb. D'ALLEIZETTE s.n. (L); Adiopodoumé, 17 km W. of Abidjan (immature fr. July) DE WILDE 29 (WAG); *ibid.* (♂ fl. Oct.) DE WILDE 751 (FHO, WAG); *ibid.* (♂ fl. Oct.) DE WILDE 3168 (WAG); *ibid.* (seedlings Oct.) DE WILDE 3179 (WAG); Banco For. Res., ca. 5 km W. of Abidjan (mature fr. Oct.) DE WILDE 3196 (WAG); Adiopodoumé, 17 km W. of Abidjan (seedlings Dec.) DE WILDE 3415 (WAG, in spirit coll.); *ibid.* (veget. Dec.) DE WILDE 3424 (WAG); *ibid.* (young fr. Febr.) DE WILDE and LEEUWENBERG 3430 (WAG); *ibid.* (♂ fl. Febr.) DE WILDE and LEEUWENBERG 3431 (WAG, with fl. in spirit coll.); road Abidjan-Dabou, at km 34, ca. 6 km to the North (♀ fl. and young fr. Febr.) DE WILDE and LEEUWENBERG 3453 (S, WAG, also in spirit coll.); *ibid.* (♂ fl. Febr.) DE WILDE and LEEUWENBERG 3455 (WAG); Noulou R. (affluent of Cavalry R.), ca. 32 km S.S.E. of Tai (♂ fl. March) DE WILDE and LEEUWENBERG 3545 (WAG, also in spirit coll.); *ibid.* (♀ fl. March) DE WILDE and LEEUWENBERG 3568 (WAG, also in spirit coll.); Audouin For., littoral belt (mature fr. Aug.) DE WIT sub no. 826 (WAG); Adiopodoumé, 17 km W. of Abidjan (♂ fl. Nov.) LEEUWENBERG 2093 (K, MO, WAG); 18 km N.W. of Sassandra (young fl. buds Febr.) LEEUWENBERG 2886 (FHO, K, UC, WAG); *ibid.* (♀ fl. Febr.) LEEUWENBERG 2906 (FHO, UC, WAG); Adiopodoumé, 17 km W. of Abidjan (young fr. April) LEEUWENBERG 3155 (FHO, WAG); Anguédédou For., ca. 23 km W.N.W. of Abidjan (♂ fl. April) LEEUWENBERG 3840 (WAG, with fl. in spirit coll.); 5 km E. of Krinjabo, road to Eboué (immature fr. June) LEEUWENBERG 4490 (WAG, also in spirit coll.); near Adiopodoumé, 17 km W. of Abidjan (seedlings July) LEEUWENBERG 4579 (WAG); Banco For. Res. (mature fr.) MARTINEAU 262 (IFAN, K); Mbasso (mature fr. July) OLDEMAN 197 (WAG); S. of Bouaké (immature fr. Jan.) ROBERTY 6865 (G); Dabou (♂ fl. Febr.) ROBERTY 13619 (G); 18 km E. of Sinfra (♂ fl. March) ROBERTY 14171 (G); Zagoréta (♂ fl. March) ROBERTY 14180 (G, MO).

Ghana: Abuai (?) Hills (♂ fl. Febr.) AKPABLA 97 (GC); Abetifi (fr. July) AKPABLA 170 (GC); Ashanti, near Kumasi (veget.) BOWDICH and TEDLIE s.n. (BM); Aburi (♂ fl. Febr.) BROWN 932 (GC, K); Boaso, W. Ashanti (♂ fl. March) CHIPP 136 (BOL, K); 'Bursu Plant' (mature fr. May) GOODALL 15754 (GC); sin. loc. (♀ fl.) IRVINE 360 (FHO, GC); Ashanti (♂ fl. April) IRVINE 505 (FHO, GC); Assuantsi (♂ fl. March) IRVINE 1560 (E, GC, K); Berekusu,

Akwapim Hills (veget. Dec.) IRVINE 2103 (GC); Central Prov., near Ataku on the railroad (young fr. May) KRUKOFF 43 (NY, UC); Bunso (immature fr. April) MORTON A-519 (GC); Techiman-Berekum road (♂ fl. March) MORTON 8574 (GC); Aburi (♂ fl. Febr.) NANI HODANU s.n. (GC); *ibid.* (♂ fl.) PATTERSON s.n. (BM); Aquapim (Akwapim), ca. 50 km N. of Accra (veget.) THONNING in Herb. VAHL s.n. (C, lectotype of *Limonia? monadelpha* THONN., lectotype of *Trichilia monadelpha* (THONN.) J. J. DE WILDE), also as Kew negative no. 2595, Dec. 1955 (K); Kumasi (fl. March) VIGNE 1640 (K).

Togo: sin. loc. (♂ fl. April) RUDIER 18 (P).

Dahomey: near Allada (♂ fl. March) CHEVALIER 23409 (K).

Nigeria: Ogbomosho Distr., Olla Hills For. Res. (♂ fl. March) BINUYO FHI-36905 (K, WAG); Ogoja Prov., Obubra Distr., Iyamoyong For. Res. (♂ fl. April) BINUYO FHI-41208 (FHO, WAG); Benin Prov., Okomu For. Res. (♂ fl. Febr.) BRENNAN 9036 (BM, K); near Ede (♂ fl. April) DUNDAS 1933/24 (BM, PRE); Oyo Prov., Ibadan Distr., Ibadan For. Res. (mature fr. July) EJIOPOR in FHI-15145 (K); Sapoba (♂ fl. May) KENNEDY 653 (K); S. Nigeria (♂ fl.) KENNEDY 1621 (BM); Sapoba (♂ fl. buds) KENNEDY 1936 (BM, K, PRE); Ijebu Ode Prov., Shasha For. Res., Baba-Eku (♂ fl. Febr.) ROSS 47 (BM, MO, NY, S); Degema Distr. (♂ fl.) TALBOT s.n. (BM); *ibid.* (♀ fl.) TALBOT s.n. (BM); Ibadan Prov., Gambari For. Res. (veget. Dec.) WHITE 8031 (FHO); Benin Prov., Sapoba For. Res. (veget. Dec.) WHITE 8043 (FHO); Ibadan Prov., Ibadan (♀ fl. March) WHITE 8684 (FHO).

Cameroon: Yaoundé, Bitey (♂ fl.) BATES 1075 (BM, MO); subdiv. Mfou (♂ fl. Oct.) BENOÏT SRFK-1755 (P); Southern Bakundu, Kumba Distr. (♂ fl. Febr.) BINUYO and DARAMOLA FHI-35544 (WAG); 5 km N.E. of Doumé, road to Bertoua (immature fr. July) BRETELER 1696 (WAG, with spirit coll.); Bertoua, 16 km on road to Dengdeng (immature fr. Sept.) BRETELER 1836 (WAG, with spirit coll.); Bamiléké region (mature fr. Dec.) DE WIT sub no. 339 (WAG); Boumba R., 36 km on road Yokadouma-Moloundou, near Maséa (♂ fl. July) LEEUWENBERG 6195 (WAG); Victoria (veget.) LUDWIGS 463 (M); near Dengdeng ca. 250 km N.E. of Yaoundé (♂ fl. March) MILDBRAED 8779 (K, lectotype of *T. johannis* HARMS); Moloundou region, between Yokadouma and Assobam, 3°24' N.-14°36' E. (♂ fl. April) MILDBRAED 5027 (HBG); Johann-Albrechtshöhe (♂ fl.) STAUDT 592 (COI, G, K, S); Bipindi (♂ fl.) ZENKER 95 (G, probably this sheet was erroneously numbered '95', as ZENKER no. 95 in other herbaria belongs to *T. priureana* A. JUSS., see there); *ibid.* (♂ fl. April) ZENKER 549 (BOL, C, G, NY, WAG); *ibid.* (♂ fl.) ZENKER 837 (G, holotype of *T. integriflamenta* C.DC., isotypes in BM, E, GOET, K, L, M, S, W, WRSL); *ibid.* (young fr.) ZENKER 927 (BM, mounted on a sheet together with ZENKER no. 837); E, G, GOET, K, L, M, MO, S, W, WRSL); *ibid.* (immature fr.) ZENKER 1855 (BM, COI, E, G, GOET, H, K, L, M, MO, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 1907 (BM, COI, E, G, GOET, H, K, L, M, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 3420 (COI, E, G, GOET, K, L, MO, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 3659 (BM, COI, E, G, GOET, K, L, M, MO, S, WRSL); *ibid.* (♂ fl.) ZENKER 4474 (BM, E, G, GOET, K, L, M, MO, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 4579 (BM, COI, E, G, GOET, K, L, MO, S, W, WRSL).

Fernando Póo: sin. loc. (fruits) BARTER s.n. (K); sin. loc. (♂ fl.) MANN 163 (partly) (K, paratype of *T. heudelotii* PLANCH. ex OLIV.).

Rio Muni: sin. loc. (♂ fl.) TESSMANN 907 (K).

Gabon: sin. loc. (♂ and ♀ fl. Oct.) KLAINE 107-bis (E, FHO, IFAN, K, UC; this gathering is a mixture of at least two individuals as the sheets in E, IFAN, and K concern ♀ flowers, while those in FHO and UC are ♂); sin. loc. (♂ fl.) KLAINE 122 (IFAN); near Libreville (mature fr.) KLAINE 122 in Herb. PIERRE (K, P); *ibid.* (♀ fl.) KLAINE s.n. (E).

Congo: Équateur: Bikoro, on road to Lac Léopold II (young fl. buds April) EVRARD 6159 (K, WAG); Eala (♂ fl. buds) LEEMANS 463 (K); Bikoro, near Lac Tumba (♂ fl. Sept.) LÉONARD 710 (BR, WAG); near Eala, between Bantaie and Boyeka (♂ fl. May) LOUIS 2038 (C, K, MO, NY; aberrant by constant 2-locular ovary); Gombe (♂ fl. April) TOKA 50 (BR); between Lukolela and Mompoto (♂ fl. July) TOKA 203 (BR); Eala (young fl. buds May) VERMOESEN 2187 (BR, S).

Orientale: Yangambi (fruits galled by insect attack Febr.) DONIS 3542 (BR); *ibid.* (♂ fl., sterile vestige of ovary expanded by insect attack, Dec.) LOUIS 6901 (BM, K, MO); *ibid.* (♂ fl. Aug.) LOUIS 10958 (C, K); *ibid.* (♂ fl. Dec.) LOUIS 12854 (MO, NY, PRE; aberrant specimen

by nearly glabrous connate part of the staminal tube, inside); *ibid.* (♂ fl. Febr.) LOUIS 13587 (K, MO); *ibid.* (♂ fl. May) LOUIS 14762 (FI).

Léopoldville: near Ganda Sundi (veget.) COMP. SUCRIÈRE MISSION FOREST. NANNAN 274 (BR); Luki, valley of the Kinkoko R. (immature fr. Febr.) DONIS 2383 (BR); near Nioki (veget.) FLAMIGNI 7125 (BR).

Angola: Cabinda: Maiombe, Luango R. (immature fr. Jan.) GOSSWEILER 6201 (BM, COI, K, LISJC, LISU).

**11. *Trichilia ornithothesa* J. J. DE WILDE, *sp. nov.***

**Fig. 11; 20a; Map 11**

Type: LEEUWENBERG no. 4888 (Liberia: near Yoma, left bank Mahe R., 12 km N.E. of Bomi Hills, holotype in WAG; isotypes, B, BR, K, P, NY).

Synonyms: *Trichilia heudelotii* var. *zenkeri* AUBRÉV. in Fl. For. Côt. Iv. 1st ed. 2: 154, tab. 186-b. 1936 (French descr. only); HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2): 704. 1958 (name only, synonym to *T. heudelotii* PLANCH. ex OLIV.). Types: AUBRÉVILLE no. 115 (Ivory Coast: near Abidjan, lectotype, P; duplicates at IFAN and K); AUBRÉVILLE no. 213 (Ivory Coast: near Abidjan, paratype, IFAN); FOREST SERVICE IVORY COAST no. 1658 (Ivory Coast: sin. loc., paratype, P); MARTINEAU no. 281 (Ivory Coast: near Abidjan, paratype, IFAN).

Nomen nudum: *Trichilia velutina* A. CHEV., Expl. Bot. Afr. Occ. Franç. 1: 115. 1920, non C.DC. in MART., Fl. Bras. 11(1): 208. 1878; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2): 493. 1928, *nomen*; PELLEGRIN in Not. Syst. 9(1): 24. 1940, pro parte, *nomen*, pro syn.; HARMS in Nat. Pflanzenfam. 2nd ed. 19BI: 110. 1940, *nomen*; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2): 704. 1958 (as a synonym to *Trichilia heudelotii* PLANCH. ex OLIV.). Based on: CHEVALIER no. 19290 (Ivory Coast: primary forest between middle Sassandra R. and middle Cavally R., P).

Emended author's cit.: *Trichilia heudelotii* var. *zenkeri* (HARMS) AUBRÉV., Fl. For. Côt. Iv. 2nd ed. 2: 186, tab. 196-b. 1959.

Arbor parva dioecia sempervirens. Folia imparipinnata (4-)8-9(-10)-jugata, foliolis oppositis vel suboppositis anguste obovatis vel oblongis basi cuneatis vel obtusis, apice longiuscule abrupte acuminatis, supra glabris sed costa impressa dense pubescente, subtus puberulis, minute punctatis glandulis minimis translucentibus. Pili saepe angustissime tubulosi, interne materia resinacea repleti. Inflorescentiae axillares vel supra-axillares, saepe congestae apicem ramorum versus, (5-)10-30(-50) cm longae. Calyx cupularis ultra medio 5-lobatus, lobis late ovatis. Petala 5 anguste oblonga. Filamenta vix ad media in tubum connata (tubo extus et intus glabro), majore parte libera, intus dense barbata extus glabra, apice emarginulata. Antherae 10, oblongae vel ovatae, apice distincte mucronulatae, scabrae. Antherae in floribus femineis indehiscentes polline

carentes. Ovarium in floribus masculis ovula abortiva continens sed semper quam ovaria fertilia angustius. Ovarium in floribus femineis globosum vel ovoideum, 2(-3)-loculare. Capsula 2 (vel interdum 3)-locularis, distincte stipitata, ficiformis vel pyriformis.

**Etymology:** Gr. *ornis* (*ornithos*): bird; Gr. *thera*: trap; Gr. *ornithothera*: a birdtrap, birds being attracted by the mature seeds are caught in this tree by local inhabitants by means of lime-twigs.

**Description.** Small evergreen tree, (5-)10-15(-20) m tall, bole usually cylindrical, sometimes with low buttresses, 15-30 cm d.b.h.; bark thin, ca. 0.5 cm thick; rhytidoma outside smooth, greyish-green or brown; slash creamy-white, soon discolouring to pale brown, emitting a 'cedar-wood' fragrance, latex absent (?); sapwood pale yellowish.

Young twigs terete or flattened, in vigorous young shoots sometimes angular, grey-brown, brown or reddish-brown, very shortly and densely pubescent; lenticels scarce or absent, small, round, brown, ca. 0.5 mm diam.; older twigs terete, brown, very shortly and densely pubescent, indumentum gradually disappearing with age, longitudinally slightly wrinkled; outer bark thin, not peeling off, greyish-brown, inner bark thin, brown, often with a very thin dark brown or nearly black outer layer; wood yellowish-white, not very hard.

Leaves imparipinnate, rather often the terminal leaflet missing and the leaves paripinnate, (19-)30-75(-95) cm long; petiole terete, somewhat flattened or narrowly sulcate on the upper surface, especially in the upper part, shortly and densely pubescent, smooth or wrinkled lengthwise, (4.5-)7-14(-19) cm long, pulvinus slightly swollen and contracted at the insertion; rachis (4.5-)11-28(-39) cm long, flattened or broadly sulcate on the upper surface, especially near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), otherwise similar to the petiole; petiolules terete, slightly sulcate on the upper surface, the raised edges of the petiolular furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see above), pubescent, longitudinally wrinkled, petiolule of terminal leaflet (7-)10-15(-16) mm, the others 3-7(-10) mm long.

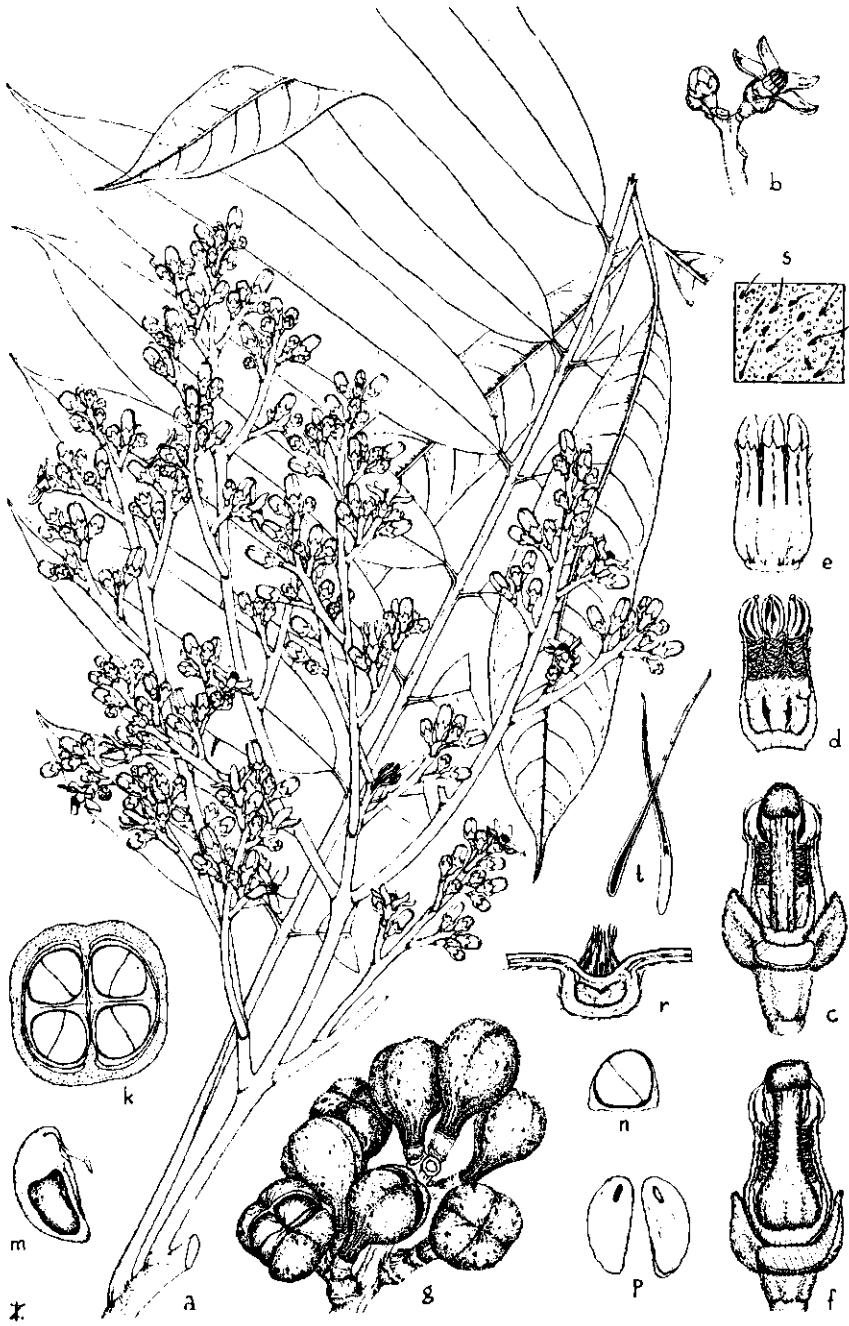
Leaflets (4-)8-9(-10)-jugate, opposite or subopposite (occasionally especially the distal leaflets are more or less alternate), finely but distinctly punctate with minute translucent glands, (3.5-)6-25(-28.5) by (1.8-)2.5-6(-6.6) cm, distal leaflets largest, narrowly obovate, proximal leaflets smaller, narrowly ovate to ovate, intermediate leaflets oblong; apex rather long, more or less abruptly acuminate, often mucronulate, base cuneate or obtuse; margin often revolute. Upper surface glabrous except for a dense, woolly, pale brown indumentum exerted from the furrow formed by the impressed midrib and from the bases of the impressed side-nerves, nerves (10-)13-24(-28) on either side of midrib, opposite or not, straight (or slightly arched) but curving and anastomosing before reaching the margin, veins mostly indistinct. Lower surface puberulous, the hairs often with a brownish resinous central canal which extends up to the

middle or sometimes higher; midrib and nerves prominent, veins distinct, finely and rather closely reticulate.

Inflorescences rather lax, paniculately arranged, axillary or supra-axillary, often crowded near the top of the branches, (5-)10-30(-48) cm long; main axes flattened or angular, almost smooth or wrinkled lengthwise, densely but very shortly puberulous, two or three times branching, branches up to 20 cm long. Bracts very early deciduous, broadly ovate, ca. 1.5-2.0 mm long, slightly longer than wide, acute to obtuse, abaxial densely and shortly pubescent, adaxial puberulous.

Male flowers: Pedicels 0.2-2.0 mm long, densely pubescent, longitudinally wrinkled; bracteoles 2 (often one or both absent), very early deciduous, 0.8-1.1 by 0.6-0.9 mm, broadly ovate or broadly triangular, acute or obtuse, margin ciliate, indumentum similar to that of the bracts. Receptacle cylindrical, tapering to the base, (0.7-)1.5-2.0(-3.0) mm long, longitudinally wrinkled, densely pubescent, jointed to the pedicel (in spirit material the receptacle often somewhat darker in colour than the pedicel). Calyx cup-shaped, 2.0-3.0 mm high by 3.8-6.0 mm wide, deeply 5-lobed, lobes imbricate in bud, 1.0-2.5 by 1.8-3.1 mm, broadly ovate, obtuse at apex, thick and fleshy, often thinner to the margin, outside pubescent, irregularly wrinkled, inside smooth and glabrous, margin ciliate. Petals 5, free, imbricate in bud, reflexed during anthesis, fleshy, ca. (6.0-)7.0-9.0(-10.0) by 1.8-3.0 mm, narrowly oblong, often slightly incurved at the obtuse apex, inside glabrous or somewhat rough, outside puberulous. Staminal tube ca. 4.0-5.5(-6.3) mm long (including the anthers), 10-fid, incisions to about 3/5 of its length, free parts of the filaments 1.4-2.6 mm long, glabrous outside, bearded inside, connate part of the staminal tube (1.3-)1.5-2.0(-2.4) mm long, glabrous and fleshy inside (the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into small wedge-shaped raised issues, the tops of the wedges alternating with the bases of the free parts of the filaments), outside glabrous; anthers dorsifix, attached near the base by a very short stalk, inserted in the apical sinus of the free part of the filament, between two narrowly triangular, rough or slightly hairy lobes of 0.1-0.8 mm long, 1.2-1.9 by 0.5-0.8 mm, narrowly oblong to oblong or narrowly ovate to ovate, distinctly mucronulate, rough, (not hairy), opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, shortly pubescent, vestigial ovules present; style ca. 3.5-4.5 mm long, 0.6-1.0 mm wide, more or

FIG. 11. *Trichilia ornithothena* J. J. DE WILDE, *sp. nov.* - *a*: fl. branch, ♂ ( $\times \frac{1}{2}$ ); *b*: part of inflorescence, ♂ ( $\times 1$ ); *c*: section of ♂ fl., petals removed ( $\times 4$ ); *d*: part of staminal tube, inside, ♂ ( $\times 4$ ); *e*: id., outside ( $\times 4$ ); *f*: section of ♀ fl., petals removed ( $\times 4$ ); *g*: infructescence ( $\times \frac{1}{2}$ ); *k*: transverse section of fr. ( $\times 1$ ); *m*: seed ( $\times 1$ ); *n*: transv. sect. of seed ( $\times 1$ ); *p*: cotyledons ( $\times 1$ ); *r*: transv. sect. of the midrib of a leaflet ( $\times 10$ ); *s*: portion of leaflet, beneath ( $\times 20$ ); *t*: hairs of furrow (impressed midrib) of leaflet ( $\times 40$ ). - *a*, *r-t*: LEEUWENBERG 4888; *b-e*: LEEUWENBERG 4503 (from spirit mat.); *f*: LEEUWENBERG 4480 (spirit mat.); *g-p*: DE WILDE 3414 (spirit mat.).



less appressed pubescent; stigma globular or conical, 1.0–1.3 mm wide, outside longitudinally slightly furrowed, clothed with a dense velvety tissue of very minute hairs, and there often adherent to the anthers, flattened and glabrous at the slightly 2–4-lobed apex, which is depressed or shallowly grooved in the centre.

Female flowers: Similar to male flower, but anthers not dehiscing, not producing pollen. Ovary well developed, more or less globular or ovoid, longitudinally shallowly grooved, 1.8–2.5 mm wide, appressed pubescent, 2(–3)-celled; ovules 2 in each cell, axile, collateral; style slightly shorter than in male flower, 2.8–3.3 mm long, appressed pubescent, stigma as in male flower.

Fruit a 2 (rarely 3)-chambered, markedly stipitate capsule, more or less fig-shaped or pear-shaped, ca. 15–22 mm diam. (stipe excluded), (stipe 2–15 mm long, up to 6 mm thick, sometimes tapering to the base, wrinkled lengthwise), densely covered with a mealy indumentum of very short trichomes, otherwise shortly tomentose or puberulous, mucronulate (style remnant), pinkish-grey or violaceous, loculicidally dehiscent, 2-valved; dry valves thick leathery or slightly woody, more or less reniform, transversely wrinkled.

Seeds 2 in each chamber, collateral. Mature seed 13–18 by 9–11 mm, arillose, plano-convex, flat on the adjacent sides; testa for the largest part developed into a soft and fleshy arilodium (sarcotesta), arilodium orange-red without, whitish within, ca. 0.5 mm thick, locally up to 2 mm thick, occupying the surface of the seed for about 4/5, leaving a dorsal spot of ca. 7–10 by 6–8 mm of leathery, very dark brown or blackish testa; cotyledons firm, fleshy, pale brown, plano-convex, 11.5–13.5 by 5.5–7.0 mm, radicle narrowly ellipsoid, longitudinally slightly flattened, 2.5–3.5 by 1.0 mm, between the cotyledons at about 2 mm beneath the apex.

Seedling: Germination epigeal. Tap root. Hypocotyl ca. 4–5 cm long, puberulous. Cotyledons sub-opposite, sessile, fleshy, not developing, falling about 3 months after germination. Epicotyl 4–6 cm long, densely puberulous. First two leaves opposite, simple, petiolate, 6–9 by 2.5–4.0 cm, obovate or elliptic, broadly cuneate to obtuse at the base, acuminate, glabrous above except for the hairy impressed midrib, glabrescent beneath, minutely glandular-punctate. Petiole 4–6 mm, pubescent. Following leaves alternate, simple, similar to the above-described or slightly larger and with petioles up to 3 cm long. The sixth leaf after the cotyledons may be compound and is found to be three-foliolate on a ca. 7 months old seedling.

Notes. The new species described above was first discovered by AUBRÉVILLE. In the 1st ed. of the Fl. For. Côt. Iv. 2 : 154, tab. 186-b. 1936 he stated: 'Il existe une deuxième variété de *Banaye* (= vern. name for *T. monadelpha* (THONN.) J.J. DE WILDE), que les indigènes ne séparent d'ailleurs pas, qui est peut-être une espèce distincte, mais très voisine de la précédente (= *T. monadelpha*). Nous la considérons provisoirement comme une simple variété, jusqu'à ce que l'on ait pu reconnaître avec certitude entre de nombreux échantillons de ces formes, la permanence de caractères spécifiques distincts. En



raison de ces affinités avec l'espèce *T. zenkeri* HARMS, nous l'appellerons *T. heudelotii* var. *zenkeri*.

This statement is followed by a short description in French, with special reference how to distinguish this taxon from *T. heudelotii* PLANCH. ex OLIV. (= *T. monadelpha*), which in his opinion is very closely related. Four specimens are cited by AUBRÉVILLE, viz. AUBRÉVILLE nos. 115 and 213, MARTINEAU no. 281 and FOREST SERVICE IVORY COAST no. 1658. These specimens all belong to *T. ornithothena* J.J. DE WILDE. AUBRÉVILLE no. 115 (in P) is designated as the lectotype for the name *T. heudelotii* var. *zenkeri* AUBRÉV.

It appears from AUBRÉVILLE's text that *T. zenkeri* HARMS is closely related, but not conspecific, to *T. heudelotii* var. *zenkeri* AUBRÉV.

According to the Code the name *T. heudelotii* var. *zenkeri* AUBRÉV. was not validly published as a Latin diagnosis is missing (in 1936) and therefore the name is illegitimate.

A. CHEVALIER (Expl. Bot. 1 : 112. 1920) validly published *Trichilia acutifoliola* A. CHEV. He based *T. acutifoliola* on a number of specimens, which appear to belong either in *T. monadelpha* (THONN.) J.J. DE WILDE or in *T. ornithothena*. One of these syntypes of *T. acutifoliola*, viz. CHEVALIER no. 16112, had been used previously by A. CHEVALIER as the base for *Trichilia acutifoliata* A. CHEV. (in Les Végétaux utiles de l'Afr. trop. Franç. 5 : 213. 1909). The name *T. acutifoliata* A. CHEV. happens to be a *nomen subnudum*, as the French description gives no adequate information. Moreover, Chevalier himself stated: 'Espèce non encore décrite'. CHEVALIER no. 16112 doubtless belongs in *T. monadelpha* (THONN.) J.J. DE WILDE. In order to avoid further confusion (cf. PRAIN in Index Kew. Suppl. 4 : 239. 1913, where *T. acutifoliata* is erroneously cited as *T. acutifolia* A. CHEV.) I here designate CHEVALIER no. 16112 as the lectotype for *T. acutifoliola* A. CHEV. This means that the name *T. acutifoliola* A. CHEV. must be placed in the synonymy of *T. monadelpha* (THONN.) J.J. DE WILDE (see there). At the same time it implies that whether or not the name *T. acutifoliata* A. CHEV. is considered to be legitimate, it must be placed in the synonymy of *T. monadelpha* (THONN.) J.J. DE WILDE. Strictly according to the Code, both *T. acutifoliola* A. CHEV. and *T. acutifoliata* A. CHEV. disappear from available nomenclature.

In 1920 CHEVALIER published the name *Trichilia velutina* A. CHEV. (Expl. Bot. 1 : 115. 1920). The protologue only states: 'Côte d'Ivoire. Dans la forêt vierge entre la Moyenne-Sassandra et le Moyen-Cavally, 4-5 Juillet 1907, CHEVALIER no. 19290.'

CHEVALIER no. 19290 doubtless belongs in *T. ornithothena*. However, *T. velutina* A. CHEV. being a *nomen nudum*, is illegitimate and it is also a later homonym of *Trichilia velutina* C. DC. (in MART., Fl. Bras. 11(1) : 208. 1878). The name *T. velutina* A. CHEV. must be rejected.

In the second (revised) edition of the Fl. For. Côt. Iv. 2 : 186, tab. 196-b. 1959, AUBRÉV. mentioned the name *Trichilia heudelotii* var. *zenkeri* (HARMS) AUBRÉVILLE, while otherwise the text is unchanged from the previously published protologue to *T. heudelotii* var. *zenkeri* AUBRÉV. (l.c., 1936). The specimens cited in 1936 are cited in 1959 again. This might indicate that AUBRÉVILLE changed

his mind, having arrived in 1959 at the decision that *Trichilia heudelotii* var. *zenkeri* AUBRÉV. is identical with *Trichilia zenkeri* HARMS. In that case AUBRÉVILLE reduced *T. zenkeri* HARMS to a variety of *Trichilia heudelotii* PLANCH. ex OLIV. in 1959. In citing 'HARMS' between parentheses he based *T. heudelotii* var. *zenkeri* (HARMS) AUBRÉV. on *T. zenkeri* HARMS.

*Trichilia zenkeri* was described by HARMS (in ENGL., Bot. Jahrb. 23 : 161. 1896). It is based on ZENKER no. 765. In the protologue is cited as type locality and as date: 'Kamerun: Yaunde-Station, im Urwald, 25-2-1895.' The holotype most probably was destroyed in Berlin. Isotypes proved to be preserved in BM, COI, GOET, M, NY, and WRSL). These specimens are all labeled: 'ZENKER et STAUDT, 1890-1894' and carry the number '765'. Now, in the original description by HARMS a three-locular ovary is mentioned, but in the isotypes cited above the ovary is distinctly and constantly two-locular. It seems doubtful whether the specimens are genuine isotypes, because the description of the ovary does not match. HARMS only cited 'ZENKER' as the collector and not 'ZENKER et STAUDT', and finally the supposed isotypes had as collecting date 1890-1894, and not 25-2-1895. However, MILDBRAED (in Notizbl. Bot. Gart. Berlin 8(no. 74) : 322. 1923), giving a short biography of GEORG AUGUST ZENKER, stated that ZENKER himself collected in Jaunde the numbers 1-820 (except no. 646) and that ZENKER and STAUDT together made another collection numbered 1-680. It must be concluded that HARMS, in describing *T. zenkeri*, cited correctly: 'ZENKER no. 765, 25-2-1895', but that all isotypes are erroneously labeled: 'ZENKER et STAUDT, 1890-1894', the correct date being 1895 and the collector ZENKER. The only discrepancy is in the number of ovarial chambers, which may be an error of observation or a printer's error.

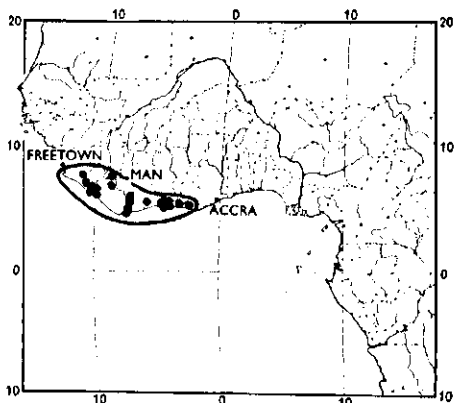
A similar line of thought applies to ZENKER no. 728, the type of *T. gilgiana* HARMS (see there), where the same error in labeling the isotypes appears to have occurred.

An examination of ZENKER no. 765 made it clear that this specimen certainly not belongs in *T. ornithohera*. The impressed midrib on the upper surface of the leaflets is nearly glabrous, the anthers are hairy on the dorsal side, while the connate part of the staminal tube is slightly but distinctly hairy inside, and there are (3-)4-6 pairs of leaflets only. These characters agree with *T. welwitschii* C.DC. For these reasons I consider ZENKER no. 765 a glabrescent form of *T. welwitschii*, the name *T. zenkeri* HARMS being a later synonym of *T. welwitschii* C.DC. (see there).

Summarizing it follows that the name *T. heudelotii* var. *zenkeri* (HARMS) AUBRÉV. (l.c., 1959) was misapplied. In addition the name is illegitimate because it is a later homonym of *T. heudelotii* var. *zenkeri* AUBRÉV., this last name being based on other type material. No valid name being available for the taxon first discovered by AUBRÉVILLE, it was here fully described and named *T. ornithohera*.

Distribution. Sierra Leone, Liberia, Ivory Coast and Ghana.

MAP 11.  
Distribution of 11. *Trichilia ornithothena*  
J.J. DE WILDE



**Ecology.** *T. ornithothena* is restricted to a rather small area in tropical West Africa, where it is confined to evergreen and moist semi-deciduous forests of the dryland type. The easternmost locality where it was found till now is Tarkwa in Ghana (VIGNE no. 201, FHO). Most records are from lowland-forest in the coastal regions, but LEEUWENBERG also found it on Mount Nimba, in Liberia, at an altitude of 400 m (LEEUWENBERG no. 4708, WAG). The westernmost known locality is in the S.E. Province of Sierra Leone, where it was collected by KING (no. 285, K), near Kambui in the Kenema District.

From fieldnotes it appears that the species is especially found in older secondary forests and on those places where the primary forest is locally disturbed or interrupted (road-sides, creek-banks etc.). In this habitat it favours the wet places, as is repeatedly stated in collectors' notes (KING no. 285 and VIGNE no. 201).

Flowering season seems restricted to June–September, and mature fruits are found from December till February.

**Vernacular names.** Ivory Coast: *banaye-pubescent*. *T. monadelpha* is called 'banaye' in Abé dialect. (The greater hairiness of *T. ornithothena*, the best character to distinguish both species in the field, must have led French speaking people to call the latter 'Banaye-pubescent').

Liberia: *wahgon* or *uwahgon* (dial. Gio), *djawohi* (dial. Mende).

**Uses.** Botanists formerly usually failed to distinguish between *T. ornithothena* and *T. monadelpha*, and even the local treefinders do not differentiate between these two species (AUBRÉVILLE, l.c., 1936). It is not possible to decide, therefore, which data found in literature refer to *T. monadelpha*, and which to *T. ornithothena*. Collectors' notes of checked material belonging to *T. ornithothena* give no information about uses. Probably they are about the same as for *T. monadelpha* and I may refer to that species. Mr. VOORHOEVE informed me (verbal communication) that in Liberia, when the trees are bearing mature fruit, the local inhabitants put up lime-twigs to catch birds attracted by the seeds, which are made conspicuous by a bright red arillodium. (See also etymology).

Specimens examined: Sierra Leone: Kambui, South Kenema (veget. Oct.) KING 285 (K).

Liberia: Mount Nimba (fl. buds July) LEEUWENBERG 4708 (WAG); near Yoma, left bank Mahe R., 12 km N.E. of Bomi Hills (♂ fl. Aug.) LEEUWENBERG 4888 (WAG, holotype, with fl. in spirit coll., isotypes in B, BR, K, P, NY); Firestone Plantation, Du R. (♂ fl. Aug.) LINDER 230 (K); 'Devilbush' between Paynesville and Duport (♂ fl. Aug.) VAN HARIEN 38 (WAG); North Gio Nat. Forest, 28 km N. of Tapeta (mature fr. Febr.) VOORHOEVE 163 (WAG); 'Devilbush' between Paynesville and Duport, 17 km E.S.E. of Monrovia (♂ fl. July) VOORHOEVE 370 (WAG); Mount Coffee area, 48 km N.E. of Monrovia (♂ fl. Sept.) VOORHOEVE 475 (WAG); 'Devilbush' between Paynesville and Duport, 17 km E.S.E. of Monrovia (immature fr. Nov.) VOORHOEVE 611 (WAG); *ibid.* (♂ fl. Aug.) VOORHOEVE 1192 (WAG).

Ivory Coast: near Abidjan (♀ fl.) AUBRÉVILLE 115 (IFAN, K, iso-lectotypes; P, lectotype of *T. heudelotii* var. *zenkeri* AUBRÉV.); *ibid.* (veget.) AUBRÉVILLE 213 (IFAN, paratype of *T. heudelotii* var. *zenkeri* AUBRÉV.); primary forest between middle Sassandra R. and middle Cavally R. (very young fl. buds July) CHEVALIER 19290 (P, base of *T. velutina* A. CHEV. non C.DC. 1878); Basin of the Cavally R., country of the Tépous, Toula, near Grabo (♂ fl. July) CHEVALIER 19565 (G, P, segregated paratype of *T. acutifoliola* A. CHEV.); *ibid.*, Grabo (♂ fl. July) CHEVALIER 19641 (P, segregated paratype of *T. acutifoliola* A. CHEV.); along road Abidjan-Dabou, Banco For. Res. (♂ fl. July) DE WILDE 127 (FHO, WAG); near Sassandra, km 64 on road Sassandra-Gagnoa (♂ fl. Aug.) DE WILDE 378 (WAG); Anguédédou forest, ca. 15 km N.W. of Abidjan (immature fr. Oct.) DE WILDE 3183 (WAG); Banco For. Res., near Abidjan (immature fr. Nov.) DE WILDE 3207 (WAG); *ibid.* (immature fr. Nov.) DE WILDE 3244 (WAG); Anguédédou forest, ca. 21 km N.W. of Abidjan (mature fr. Dec.) DE WILDE 3414 (WAG, with fr. in spirit coll.); 3 km N. of crossing Hana R. with road Taï-Tabou (veget. March) DE WILDE and LEEUWENBERG 3532 (WAG); Anguédédou forest, ca. 21 km N.W. of Abidjan (seedlings March) DE WILDE 3620 (WAG, with seedlings in spirit coll.); Banco For. Res., near Abidjan (♂ fl. July) W. J. DE WILDE 395 (WAG); *sin. loc.* (immature fr.) FOREST SERVICE IVORY COAST 1658 (P, paratype of *T. heudelotii* var. *zenkeri* AUBRÉV.); Anguédédou for., 22 km N.W. of Abidjan (♀ fl. June) LEEUWENBERG 4480 (WAG, with fl. in spirit coll.); 14 km S.W. of Aboisso (♂ fl. June) LEEUWENBERG 4503 (WAG, with fl. in spirit coll.); near Adiopodoumé, 17 km W. of Abidjan (seedlings July) LEEUWENBERG 4580 (WAG); Banco For. Res., near Abidjan (veget.) MARTINEAU 281 (IFAN, paratype of *T. heudelotii* var. *zenkeri* AUBRÉV.).

Ghana: Tarquah (presently: Tarkwa) (♂ fl. Aug.) VIGNE 201 (FHO).

## 12. *Trichilia prieureana* A. JUSS.

## Fig. 12A, 12B, 12C; Map 12

*Trichilia prieureana* A. JUSS. in Bull. Sc. Nat. et de Géologie 23 : 238. Nov. 1830; HOLLAND, The Useful Pl. of Nigeria, in Kew Bull., Add. Ser. 9(1) : 148. 1908; CHEVALIER, Expl. Bot. Afr. Occ. Franç. 1 : 114. 1920; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; AUBRÉVILLE, Fl. For. Côt. Iv. 1st ed. 2 : 152, pl. 186 (1-4). 1936; HARMS in Nat. Pflanzenf. 2nd ed. 19BI : 113. 1940; PELLEGRIN in Not. Syst. 9(1) : 17 and 19, fig. 1, C (7, 8, 9, 10). 1940; AUBRÉVILLE, Fl. For. Soudano-Guinéenne : 377. 1950; KERHARO and BOUQUET, Plantes méd. et tox. de la Côte d'Ivoire-Haute Volta : 160. 1950; ANDREWS, Fl. Pl. Anglo-Egyp. Sudan 2 : 331. 1952; EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed. : 197. 1952; DALZIEL, Useful Pl. W. Trop. Afr. 2nd reprint : 329. 1955; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 704. 1958; AUBRÉVILLE, Fl. For. Côt. Iv. 2nd ed. 2 : 184, pl. 196 (1-4). 1959; IRVINE, Woody Pl.

of Ghana: 529. 1961; WHITE in KEAY, ONOCHIE and STANFIELD, Nigerian Trees 2: 272. 1964. (See other references under the subspecies).

Typification: See under subsp. *prieureana*.

Notes. 1. In the introduction to the publication of ADRIEN DE JUSSIEU's 'Mémoire sur le groupe des *Meliacées*', in Bulletin des Sciences Naturelles et de Géologie (l.c., 1830), it was stated that the publication of this 'Mémoire' in the Mém. Mus. Hist. Nat. de Paris was delayed. For this reason an abstract of DE JUSSIEU's 'Mémoire' was now given in the 'Bulletin'. Most probably, this abstract was actually published before the unabridged version of DE JUSSIEU's 'Mémoire' became available. The abstract in the 'Bulletin' is signed 'G', probably standing for GUILLEMIN, one of the editors of the 'Bulletin'. The text concerning *Trichilia prieureana* in the 'Bulletin' is literally identical to DE JUSSIEU's diagnosis of this taxon in Mém. Mus. Hist. Nat. de Paris. I, therefore, cite DE JUSSIEU as publishing author (and not A. JUSS. ex GUILL.).

2. A. DE JUSSIEU's original spelling of the epithet is '*prieureana*', this must be retained. (The much used spelling '*prieuriana*' is erroneous).

Diagnostic and differential characters. Trees or shrubs, evergreen, 3–30 m tall. Bole usually conspicuously fluted. Leaflets (1–)2–4(–5)-jugate, acuminate at apex, especially in proximal leaflets with oblique (unequal-sided) base, glabrous on both surfaces. Midrib flat or slightly prominent on upper surface of leaflet. Inflorescences often fascicled, with 2–10 together. Staminal tube entire (not lacinate); anthers sessile on the rim. Disk distinct, free, cupuliform, around the ovary. Ovary 2 or 3-celled. Fruit 2 or 3-chambered, 15–25 mm diam. Seed arillodiate.

Description. Evergreen trees or shrubs, 3–20(–30) m tall, bole usually conspicuously fluted, crown often dense, foliage dark. Bark thin, longitudinally shallowly fissured, scaling in thin flakes or rectangular strips, stringy; slash thin, pale yellow or pinkish, becoming brown, not exuding latex; wood hard, pale brown or cream-coloured.

Young twigs terete or slightly flattened and angular, thin, ca. 3–5 mm diam., glabrous or glabrescent, smooth, lenticels few or absent; older twigs terete, pale grey, greyish-brown, reddish-brown or brown, often lenticellate (lenticels small, round or elongate, ca. 0.5 mm or less), scars of fallen leaves rather conspicuous, very broadly obovate or obdeltate with rounded edges, often more or less flattened or depressed at top (horseshoe-shaped), and with a scar of a fallen inflorescence above it; wood whitish, cream-coloured or pale brown, not very hard.

Leaves imparipinnate, sometimes paripinnate, 10–37(–46) cm long; petiole terete, glabrous, longitudinally finely wrinkled, (1.5–)3–9(–10) cm long, slightly contracted at the insertion; rachis (absent in the rare case of a 1-jugate leaf) (1–)4–15(–19.5) cm long, flattened on the upper surface near and between the

insertion of the leaflets, otherwise similar to the petiole; petiolules more or less narrowly sulcate on the upper surface, glabrous, petiolule of terminal leaflet (3-)5-20(-25) mm, the others (1-)2-8(-10) mm long.

Leaflets (1-)2-4(-5)-jugate, opposite or subopposite, not or very minutely and indistinctly glandular-punctate, variable in shape and size, (3-)6-18(22.5) by (1.5-)2-7(-10) cm, distal leaflets largest, narrowly obovate to obovate, narrowly elliptic to elliptic or narrowly ovate, proximal leaflets smaller, ovate or elliptic, more rarely narrowly ovate or narrowly elliptic; distinctly acuminate at apex (rarely acute or obtuse), cuneate or in terminal leaflets even attenuate at base, especially in proximal leaflets very often with distinct oblique (unequal-sided) base; drying glaucous or greenish (in subspp. *prieureana* and *orientalis*) or brown or greenish-brown (in subsp. *vermoesenii*). Glabrous on both surfaces (young leaflets sometimes with very few hairs on midrib and nerves), midrib flat or slightly prominent on upper surface, sometimes with a narrow, minute rim, running centrally and starting above the base of the leaflet (in subspp. *vermoesenii* and *orientalis*), with 6-13 inconspicuous lateral nerves on either side, opposite or not, straight or arched but curving and anastomosing before reaching the margin, veins indistinct; midrib and nerves prominent on lower surface, veins widely reticulate, often not very distinct.

Inflorescences single or fascicled with 2-10 together, often rather short, paniculately arranged, in the leaf-axils near the top of the branches or also on the older, often leafless twigs (cauliflory in subsp. *vermoesenii*), ca. 1-10(-13) cm long; main axes often flattened or slightly angular, wrinkled lengthwise, short greyish-pubescent or puberulous, one, two or three times branching before the pedicel, branches short, up to 4 cm long, mostly much shorter. Bracts rather soon deciduous, ovate to broadly ovate or triangular to broadly triangular, rarely narrowly triangular, often boat-shaped, 0.5-2.5 by 0.5-1.1 mm, slightly acuminate or acute at apex, abaxially pubescent, adaxially glabrous, glabrescent or rarely puberulous, margin ciliate.

Male flowers: On up to 2 mm long, pubescent pedicels (pedicels often almost absent); bracteoles 2, sometimes only 1 or absent, rather early deciduous, 0.4-1.0 by 0.3-0.8 mm, ovate to very broadly ovate or triangular to broadly triangular, slightly acuminate or acute at apex, abaxially pubescent, adaxially glabrous or glabrescent, margin ciliate, hairs often with a dark brownish resinous content in a central canal. Receptacle cylindrical, slightly tapering to the base, 0.2-1.7 mm long, longitudinally slightly furrowed, shortly pubescent, jointed to the pedicel. Calyx cup-shaped, 1.0-2.7 mm high by 2-3.5 mm wide, usually in all parts with rather distinct whitish strands, containing a milky substance (also found in the receptacle), deeply (4-)5(-6)-lobed, lobes imbricate in bud, 0.7-2.0 by 0.5-1.8 mm, more or less broadly ovate or broadly triangular or deltate, acute or slightly obtuse, outside puberulous or pubescent, inside glabrous, margin ciliate, hairs often with brownish resinous content. Petals (4-)5(-6), free (imbricate in bud, spreading and often reflexed during anthesis), 4.5-8.0 by 1.4-2.8 mm, narrowly obovate to obovate or narrowly oblong, often somewhat incurved at the acute to slightly obtuse apex, puberulous both sides. Staminal

tube 3–6 mm long (anthers excluded), entire (not lacinate), more or less crenellated at apex, puberulous outside, thinly covered with rather long, weak, spreading hairs inside; anthers (8–)10(–12), sessile on the rim of the staminal tube, in turn inserted on and between the crenelles, basifix, attached by a very short stalk of ca. 0.1 mm long, 0.6–1.1 by 0.3–0.7 mm, ovate, rough, glabrous but often with some hairs and sometimes even ciliate on the lateral margins of the dorsal side, opening laterally, lengthwise, pollen well developed. Disk well developed, cupuliform or cushion-shaped, undulate in circumference, glabrous (subsp. *prieureana* and *vermoesenii*) or distinctly puberulous (subsp. *orientalis*), 0.2–0.5 mm high by 0.8–1.7 mm wide, surrounding the vestigial ovary. Pistillode scarcely or not expanded at the base; ovary sterile, minute, glabrous (subsp. *prieureana* and *vermoesenii*) or puberulous (subsp. *orientalis*), vestigial ovules very small but present; style 2–4 mm long, 0.2–0.6 mm wide, glabrous or puberulous; stigma subglobular to ovoid, 0.4–1.0 mm diam. (distinctly lobed in subsp. *prieureana*), densely velutinous by very minute trichomes, basal part often with adherent pollen.

Female flowers: Similar to male flower, but anthers usually not dehiscing, anyhow not producing pollen. Disk often not very distinct, adnate to the ovary. Ovary well developed, ovoid, obovoid or subglobular, 1–2 mm diam., glabrous (subsp. *prieureana* and *vermoesenii*) or shortly pubescent (subsp. *orientalis*), 2–3(–4)-celled; ovules 2 in each cell, axile, collateral; style shorter than in male flowers, 0.7–3.0 mm long; stigma as in male flower.

Infructescences up to 9 cm long, mostly shorter; fruit a complete (subsp. *prieureana*) or incomplete (subsp. *vermoesenii* and *orientalis*) 2–3(–4)-chambered capsule, (often one or two chambers not developing, containing abortive seeds), ovoid to subglobose, 15–25 mm diam., glabrous (thinly puberulous in subsp. *orientalis*), loculicidally dehiscent, 2–3(–4)-valved; dry valves leathery, very broadly obovate, acute or obtuse at apex, transversely wrinkled.

Seeds 2 in each chamber, often one or both not or only partially developed, collateral; funicle attached near the apex of the seed, running downwards alongside the seed and inserted near the base of the axillary placenta. Mature seeds 10–17 by 7–12 mm, arillodiate, flat on the adjacent sides; testa laterally and especially near the apex developed into a fleshy arillodium (sarcotesta); arillodium orange-red without, whitish within, at the apex cushion-like and up to 8 mm thick, occupying the surface of the seed for about 1/4–2/5, leaving a large, glossy, very dark brown spot of thin leathery testa; cotyledons firm, hard-fleshy, pale brown, plano-convex, 8–13 by 5–7 mm; radicle obovoid, 1.5–2.0 by 0.8–1.0 mm, longitudinally slightly flattened, between the cotyledons at 0.2–1.0 mm beneath the apex.

### Key to the subspecies

1. Style glabrous. Stigma crowned by (2-)3(-4) distinct, free, erect lobes. Ovary (2-)3(-4)-celled. Fruit completely (2-)3(-4)-chambered.  
Disk and ovary glabrous. Leaflets (1-)2-3(-4)-jugate, drying glaucous or greenish (rarely pale brown). Forest-Savanna Mosaic and relatively moist Woodland types from Senegal to Nigeria . . . **a. subsp. priureana**
1. Style puberulous (very rarely glabrous). Stigma subglobular, more or less obscurely 2(-3)-lobed at apex. Ovary 2(-3)-celled. Fruit incompletely 2(-3)-chambered.
  2. Disk and ovary glabrous. Leaflets (1-)3-4(-5)-jugate, drying brown or greenish-brown. Moist Forest at low and medium altitudes in the Guineo-Congolian rain forest region . . . . . **b. subsp. vermoesenii**
  2. Disk and ovary puberulous. Leaflets 2-4-jugate, drying glaucous or greenish (rarely brown). Forest-Savanna Mosaic and relatively moist Woodland types in Central and East Africa . . . . . **c. subsp. orientalis**

#### a. subsp. priureana

Fig. 12A; Map 12

Literature referring to *T. priureana* subsp. *priureana*: A. JUSS. in l.c., Nov. 1830; A. JUSS. in Mém. Mus. Hist. Nat. Paris 19 : 236 and 276. 1830; GUILLEMIN and PERROTTET in Fl. Seneg. Tent. 1(4) : 125, tab. 30. Sept. 1831; OLIVER, Fl. Trop. Afr. 1 : 334. 1868; C.DC. in A. and C.DC., Mon. Phan. 1 : 678. 1878; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306. 1896.

Syntypes: PERROTTET s.n., April 1829 (Senegal: Casamance River; lectotype, P); PERROTTET s.n., March 1829 (Senegal: Casamance R.; paratype, G, P); PERROTTET no. 134 (Senegal: paratype, BM, G, P); DOLLINGER s.n. (Senegal: Fasena R.; paratype, W).

Synonyms: *Trichilia senegalensis* C.DC. in Bull. Soc. Bot. France 55 (Mém. 8) : 10. 1907; CHEVALIER, Expl. Bot. Afr. Occ. Franç. 1 : 114. 1920; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928. Syntypes: CHEVALIER no. 3161 (Senegal: Floup Fedyan, lectotype in G; iso-lectotypes, K, P); CHEVALIER no. 3159 (ibid., paratype in P, not seen); CHEVALIER no. 3162 (ibid., paratype, P, not seen); CHEVALIER no. 3165 (Senegal: Bignona, paratype, P, not seen).

*Trichilia priureana* var. *senegalensis* (C.DC.) PELLEGR. in Not. Syst. 2 : 72. 1911. (Same types as *T. senegalensis* C.DC.).

Diagnostic and differential characters. Small tree or shrub, 3-15 m high. Leaflets (1-)2-3(-4)-jugate, drying glaucous or greenish (rarely pale brown). Inflorescences in leaf-axils near the top of the branches. Disk and ovary glabrous. Style glabrous. Stigma crowned by 3 distinct, free, erect lobes. Fruit completely 3-chambered, ovoid to subglobose, 15-25 mm diam., not stipitate, glabrous.



Description. Rather small tree or shrub, 3–15(–20) m tall, d.b.h. up to 55 cm, mostly smaller; often low and much branched, crown spreading, rather dense. Bark pale brown or grey-brown, thinly flaking. Young twigs pale grey-greenish, glaucous or more rarely brown; older twigs pale grey or brown.

Leaves (10–)15–37(–42) cm long; petiole (3–)5–9(–10) cm long; rachis (1.5–)4–12 cm long; petiolule of terminal leaflet (5–)10–20(–25) mm, the others (1–)2–5(–7) mm long. Leaflets (1–)2–3(–4)-jugate, (3.0–)6–16(–22.5) by (1.5–)2–6(–8.5) cm, drying glaucous or greenish (rarely pale brown).

Inflorescences more or less fascicled (or 1 inflorescence branched from the base), up to 10 together in leaf-axils near the top of the branches, each 1–6(–8.5) cm long, one, two or three times branching before the pedicel, branches short, up to 1.5 cm long.

Male flowers with cylindrical, (0.2–)0.4–1.0 mm long receptacle. Calyx cup-shaped, 1.3–2.1(–2.7) mm high by ca. 2–3 mm wide. Petals 4.5–6.5(–7.0) by 1.4–2.4 mm, narrowly obovate to narrowly oblong. Staminal tube 3–5 mm long (anthers excluded). Disk cupuliform, glabrous, 0.2–0.5 mm high by 0.9–1.5 mm wide. Ovary sterile, very minute, glabrous; style 2.0–3.0 mm long, 0.2–0.5 mm wide, glabrous; stigma consisting of a small basal part, 0.2–0.4 mm high by 0.4–0.8 mm wide, crowned by (2–)3(–4) distinct, free, glabrous (rough), erect, 0.3–0.8 mm long lobes.

Female flowers containing a well developed, glabrous (rarely glabrescent) ovary. Ovary (2–)3(–4)-celled; style glabrous, 0.7–2.0 mm long.

Infructescences up to 6 cm long, often up to 10 fruits more or less clustered together, but sometimes only 2 or 3 fruits of an infructescence developing into maturity; fruit a (2–)3(–4)-chambered, not stipitate capsule, ovoid to subglobose, 15–20 mm high by 15–25 mm wide; mature fruits slightly (2–)3(–4)-lobed in transverse section, glabrous, loculicidally dehiscent, (2–)3(–4)-valved.

Seeds near the apex attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Testa on the axial side, and especially near the apex, developed into a fleshy arillodium (sarcotesta); arillodium up to 4 mm thick, occupying the surface of the seed for about 2/5, leaving a large, more or less oval, glossy, very dark brown dorsal spot of thin leathery testa.

Seedling not seen.

Notes to the synonyms. *Trichilia senegalensis* C.DC. (l.c., 1907) is based on a number of syntypes, all collected by AUG. CHEVALIER in Senegal. Among these, CHEVALIER no. 3161 (G), is designated as the lectotype. It represents a male specimen with flower buds. Both the protologue to *T. senegalensis* C.DC., as well as the lectotype are in every respect conform to *T. priureana* subsp. *priureana*. *T. senegalensis* C.DC. is now reduced to a synonym of *T. priureana* subsp. *priureana*. Accordingly, *T. priureana* var. *senegalensis* (C.DC.) PELLEGR. (l.c., 1911), based on the same type material as *T. senegalensis* C.DC., is a synonym of *T. priureana* subsp. *priureana*.

Distribution. Senegal, Gambia, Port. Guinea, Guinea, Sierra Leone, Ivory Coast, Ghana, Togo, Dahomey (no specimens seen), Nigeria.

Ecological and biological notes. The distribution of *T. prieureana* subsp. *prieureana* in tropical West Africa almost completely coincides with the occurrence of Forest-Savanna Mosaic and Savanna-Woodlands of a relatively moist type (KEAY et al., Vegetation Map of Africa 1959). South of this area under moister conditions, it is replaced by subsp. *vermoesenii*. Accordingly, subsp. *prieureana* is not known, hitherto, from Liberia. In West Africa the limits between both vegetation types are not very sharp, and mainly due to human interference, the Forest-Savanna Mosaic and the Savanna-Woodlands show a tendency to enlarge at the cost of the Moist Forest type. No localities are known where subsp. *prieureana* and subsp. *vermoesenii* really overlap, which supports my opinion that these taxa are subspecies. If complete material is available, most specimens can be assigned to either subspecies without hesitation.

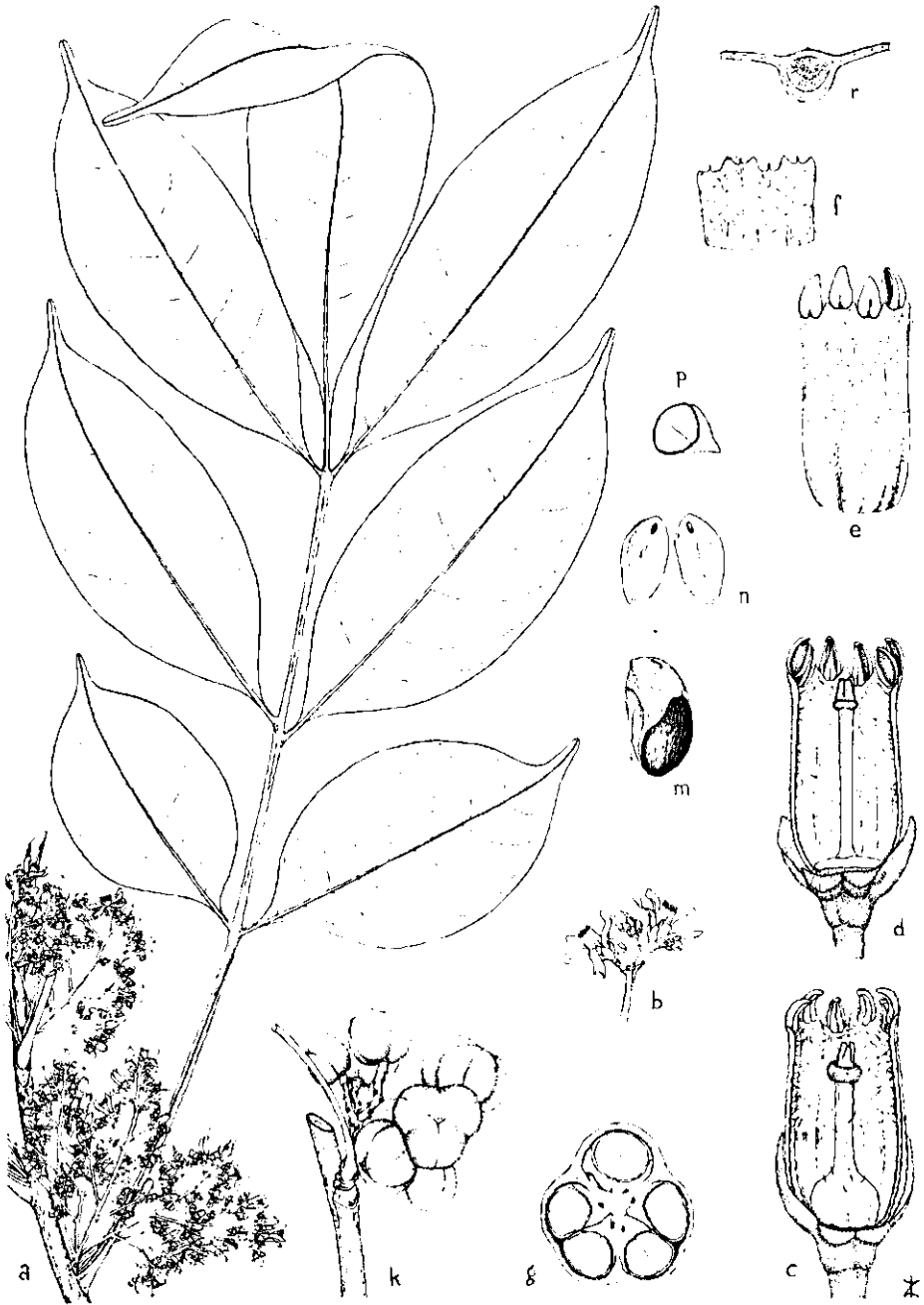
In Senegal, Gambia, Port. Guinea and Guinea only subsp. *prieureana* occurs. This renders the identification of the type material, originating from Senegal, beyond all doubt. In these countries subsp. *prieureana* seems to favour riparian forests. Dakar (Senegal) forms both the northern and westernmost limit of the distributional area.

In Sierra Leone subsp. *prieureana* is confined to Northern Province. Besides other localities it was collected here at Loma Mansa (Bintimani Mts), at ca. 750 m altitude. This represents for subsp. *prieureana* the highest altitude which came to my attention (FRITH no. 24, K). DEIGHTON (no. 5077, K), who collected it near Falaba, described the mature fruit as 'pink'.

In Ivory Coast subsp. *prieureana* occurs rather far down to the coast. LEEUWENBERG collected it near Divo, a locality which approximately seems to represent the southernmost limit in that country. He found the colour of the mature fruits pale grey (no. 3986, WAG). According to AUBRÉVILLE (Fl. For. Côte. Iv. 2nd ed. 1 : 18. 1959), the annual rainfall in this area is between 1000 and 1500 mm, and there is a dry season of 3 or 4 months.

In eastern Ghana, in Togo and in Dahomey subsp. *prieureana* penetrates in what is called the 'Dahomey gap', and reaches the coast of the Gulf of Guinea. Several collections testify its occurrence in Ghana. IRVINE collected it near Adeiso (Eastern Province) in deciduous forest (no. 2416, E, GC). ASAMANY found it in savanna forest near Kpandu (no. 148, GC). Near Kumasi it was

FIG. 12A. *Trichilia prieureana* A. Juss. subsp. *prieureana* - a: fl. branch, ♂ (× ½); b: part of inflorescence, ♂ (× 1); c: section of ¼ fl., petals removed (× 6); d: id., ♂ fl. (× 6); e: part of staminal tube, outside, ♂ (× 6); f: id., upper part, anthers removed (× 6); g: transverse section of fr. (× 1); k: branch with fr. (× ½); m: seed (× 1); n: cotyledons (× 1); p: transv. sect. of seed (× 1); r: transv. sect. of the midrib of a leaflet (× 10). - a-b, d-f: ESPRITO SANTO 1121; c: ROBERTY 7054; g-r: LEEUWENBERG 3986 (from spirit mat.).



collected in secondary forest by KRUKOFF (no. 8, K, NY, UC). The flowers are reported to be pale green (MORTON no. 9799, GC). Among others WARNECKE found it near Lomé in Togo (no. 416, BM, K, L).

The distribution of subsp. *prieureana* in Nigeria is closely linked with its occurrence in the 'Dahomey gap'. Only in the extreme western part of the country subsp. *prieureana* comes far south to the coast. More to the East it is replaced by subsp. *vermoeseni*. BRENNAN c.s. found it on the lower slopes of Carter's Peak near Idanre in Ondo Prov. It was growing there as a small tree, ca. 4.5 m high, in low forest at an altitude of ca. 500 m (BRENNAN c.s. no. 8640, BM, K). DE WIT and ONOCHIE collected it in the Gambari Forest Reserve in Ibadan District. They found it a low tree with sweet scented flowers (no. 7899, WAG).

Vernacular names. Port. Guinea: *sataga*, *djambadjalom* or *kebiri-carre* (dial. Fula), *cadaco* (dial. Felupe), *negueno* (dial. Bijagó).

Sierra Leone: *monkey apple*.

Ivory Coast: *aribanda*.

Ghana: *vuvu* (Kpando), *kakadikro* or *kakadukro* (Ashanti), *nukrowa* (dial. Twi), *sinani* (dial. Wassaw).

Uses. According to SCOTT ELLIOT (no. 5436, BM, K) the fruit (seed?) is edible; in Sierra Leone it is called '*monkey apple*'. ASAMANY (no. 148, GC) reports that in Ghana the roots and bark are used as an enema to cure piles. It also seems to cure sterility and stomach-ache. KERHARO and BOUQUET (l.c., 1950) stated that the bark-pulp is locally in Ivory Coast used as an enema for gonorrhoea.

DALZIEL (l.c., 1955) described the wood as red, hard and heavy, close-grained; the sapwood white. Collectors' notes state that the wood sinks in water. It is said to be a good fire wood that burns slowly with a great heat, and it makes excellent charcoal (VIGNE no. 868, K).

Specimens examined: Senegal: (?) Cabo Verde, Bocandé (vel potius e Guinea proxima) (very young fl. buds) BOLLE s.n. (S); Casamance R., Floup Fedyan (♂ fl. buds Jan.) CHEVALIER 3161 (G, lectotype of *Trichilia senegalensis* C.DC.; iso-lectotypes in K and P); Senegambia, Fasena R. (fl. buds) DOLLINGER s.n. (W, paratype of *T. prieureana* subsp. *prieureana*); Casamance R. (♂ fl. April 1829) PERROTTET s.n. (P, lectotype of *T. prieureana* subsp. *prieureana*); *ibid.* (♂ fl. 1830) PERROTTET s.n. (P); *sin. loc.* (♂ and ♀ fl. on different specimens) PERROTTET 134 (BM, G, W); Casamance R. (♂ fl. March 1829) PERROTTET s.n. (G, P, paratype of *T. prieureana* subsp. *prieureana*); *ibid.* (♂ fl. 1831(?)) PERROTTET s.n. (G); near Dakar (♂ fl. May) VIGNERON in Herb. D' ALLEIZETTE s.n. (L).

Gambia: Abuko Waterworks (fl. buds Jan.) DALZIEL 8128 (K).

Port. Guinea: Cantanhez (♂ fl. buds Febr.) D'OREY 285 (LISC, LISJC, LISU); *ibid.* (♂ fl. April) D'OREY (Brigada de Estudos Fl.) 389 (LISJC); near Bafata-Boma (♂ fl. and young fr. Febr.) ESPIRITO SANTO 13 (LISJC, mixed gathering of a male and a female individual); Bissau, Pussubé (♂ fl. Febr.) ESPIRITO SANTO 1121 (COI, LISC, LISJC); Povoação de Varela, Suzana (mature fr. Aug.) ESPIRITO SANTO 1254 (COI, LISC, LISJC); Bissau, Biombo (♂ fl. Febr.) ESPIRITO SANTO 1791 (COI, K, LISC); Bissau, Prabis (♂ fl. Febr.) ESPIRITO SANTO 1830 (COI, K, LISC); Formosa Island, Acúno (♂ fl. April) ESPIRITO SANTO 1982 (COI, LISC).

Guinea: Timbo (♂ fl. Febr.) BOUÉ in Herb. PITARD 79 (G); near Conakry (♂ fl. March) DEBEAUX 178 (BM); sin. loc. (♂ fl.) HEUDELOT 775 (TCD, G, IFAN, K, P).

Sierra Leone: sin. loc. (♂ fl.) AFZELIUS s.n. (H, S); Jawe (Tunkia) (very young fl. buds March) DEIGHTON 4092 (K); Musaia (fl. Febr.) DEIGHTON 4176 (K); Falaba (mature fr. May) DEIGHTON 5077 (K); Loma Mansa (Bintimani Mts) (fr. April) FRITH 24 (K); Kofiu Mt. Scarcies (young fl. buds Jan.) SCOTT ELLIOT 4620 (BM, K); near Falaba (immature fr. April) SCOTT ELLIOT 5436 (BM, K).

Ivory Coast: sin. loc. (♂ fl.) AUBRÉVILLE 2125 (IFAN); Bouroukrou (♂ fl. Jan.) CHEVALIER 16985 (G); 5 km N.W. of Duékoué, on road to Man (veget. April) LEEUWENBERG 3881 (WAG); 10 km E. of Divo, road to N'Douci (mature fr. April) LEEUWENBERG 3986 (WAG, fruits in spirit!); near Bouaké (♀ fl. Jan.) ROBERTY 6777 (G); road Yamoussoukro to Bouaké (♂ fl. Jan.) ROBERTY 6813 (G); near Vavoua (♀ fl. Febr.) ROBERTY 7054 (G).

Ghana: Ashanti, Agogo (fr. April) ADAMS 2621 (GC); Kpandu region (fr. April) ASAMANY 148 (GC); Amozima (veget. Sept.) HALL 1097 (GC); Bana Hill, Krobo, W. of Akuse (♂ fl. Jan.) IRVINE 1924 (GC); Eastern Prov., Adeiso (immature fr. March) IRVINE 2416 (E, GC); sin. loc. (♂ fl. Jan.) JOHNSON 540 (GC); Ashanti, Akumadai (mature fr. April) KITSON s.n. (BM); near Kumasi (veget. April) KRUKOFF 8 (K, NY, UC); sin. loc. (♂ fl. buds) LYON 2645 (UC); Ejura (♂ fl. Dec.) MORTON 9799 (GC); Eastern Prov., Peki (very young fr. March) PLUMTRE 112 (GC); sin. loc. (♂ fl. July) VIGNE 232 (GC); Sraha Upper Wassaw Reserve (♂ fl. Febr.) VIGNE 280 (BM, NY); Adeambra (immature fr. April) VIGNE 868 (or 1?) (K); sin. loc. (veget.) VIGNE 2602 (BM).

Togo: sin. loc. (mature fr.) KERSTING A-158 (BM); Afam, Alran Bonji (fl. buds) KERSTING 566 (W); road Sokodé to Bassari (♀ fl.) KERSTING A-720 (BM, K); near Lomé (♂ fl.) WARNECKE 416 (BM, K, L).

Nigeria: Lagos (♂ fl.) BARTER 2146 (GOET, K, S); Ondo Prov., Idanre, on lower slopes of Carter's Peak (♂ fl. Jan.) BRENNAN c.s. 8640 (BM, K); Ibadan Distr., Gambari Forest Res. (♂ fl. and immature fr. Jan.) DE WIT and ONOCHIE 7899 (WAG, mixed gathering of two individuals); Benin Div., Urhuhue (♂ fl. Dec.) OLORUNFEMI in FHI no. 31924 (K, MO).

**b. subsp. *vermoesonii* J. J. DE WILDE, *subsp. nov.***

**Fig. 12B, 19a; Map 12**

Type: VERMOESEN no. 1829 (Congo: Léopoldville Prov., Bas Congo, Temvo, holotype in BR, isotypes: K, NY).

Nomen gallice tantum descriptum: *Trichilia prieureana* var. *vermoesonii* PELLEGR. in Not. Syst. 9(1): 18. 1940. Based on: ZENKER nos. 1582, 2641, 3601; FLEURY nos. 26137 and 33561; KLAINE nos. 2499, 2713, 2780, 3238, 3290, 3295; LE TESTU nos. 1727, 2025, 5013, 8011, 8068; VERMOESEN no. 1829.

Note. PELLEGRIN (l.c., 1940) only supplied a description in French. He referred to VERMOESEN's description (l.c., 1922) prepared from the Congolese material, which exclusively concerned the taxon segregated by PELLEGRIN (viz. var. *vermoesonii* PELLEGR.), but unfortunately VERMOESEN's description also was in French only. This is contrary to the Code (art. 36). Accordingly the name *T. prieureana* var. *vermoesonii* PELLEGR. was not validly published, and must be rejected.

Literature referring to *T. prieureana* subsp. *vermoesonii*: VERMOESEN in Rev. Zool. Afr. 10(1): B46. 1922; EXELL c.s. in Journ. of Bot., Br. and Foreign 65 (Suppl. 1): 63. 1927; KENNEDY, For. Fl. S. Nig.: 163. 1936; GOSSWEILER and

MENDONÇA, Carta Fitogeogr. Angol.: 54. 1939; STANER in Bull. Jard. Bot. Brux. 16(2-3): 143, fig. 7 (A,B). 1941 (partly); EXELL and MENDONÇA in Consp. Fl. Angol. 1(2): 312. 1951 (as regards cited specimens); STANER and GILBERT in Fl. Cong. Belg. 7: 164. 1958 (partly).

A typo differt foliis (1-)3-4(-5)-jugis, foliolis siccis brunneis vel viride-brunneis, stylo puberulo (rarissime glabro), stigmatate subgloboso apice obscure tantum 2(-3)-lobato, ovario 2(-3)-loculari et capsula imperfecte 2(-3)-loculari.

Description. Medium-sized tree, (8-)10-20(-30) m tall, d.b.h. up to 100 cm but usually only 20-40 cm, sometimes with small, low buttresses, crown variously shaped, whether deep and spreading, or small and spherical, often dense. Bark pale grey-brown or greyish-green, scaling; slash fibrous. Young twigs greenish-brown, brown or dark brown; older twigs pale brown, reddish-brown or dark brown.

Leaves (10-)15-37(-57) cm long; petiole (1.5-)3.5-8.5(-18) cm long; rachis (1-)4.5-15(-19.5) cm long; petiolule of terminal leaflet (5-)7-14(-30) mm, the others (2-)4-8(-10) mm long. Leaflets (1-)3-4(-5)-jugate, (3-)6-18 (-37.5) by 2-7(-13.5) cm, drying brown or greenish-brown.

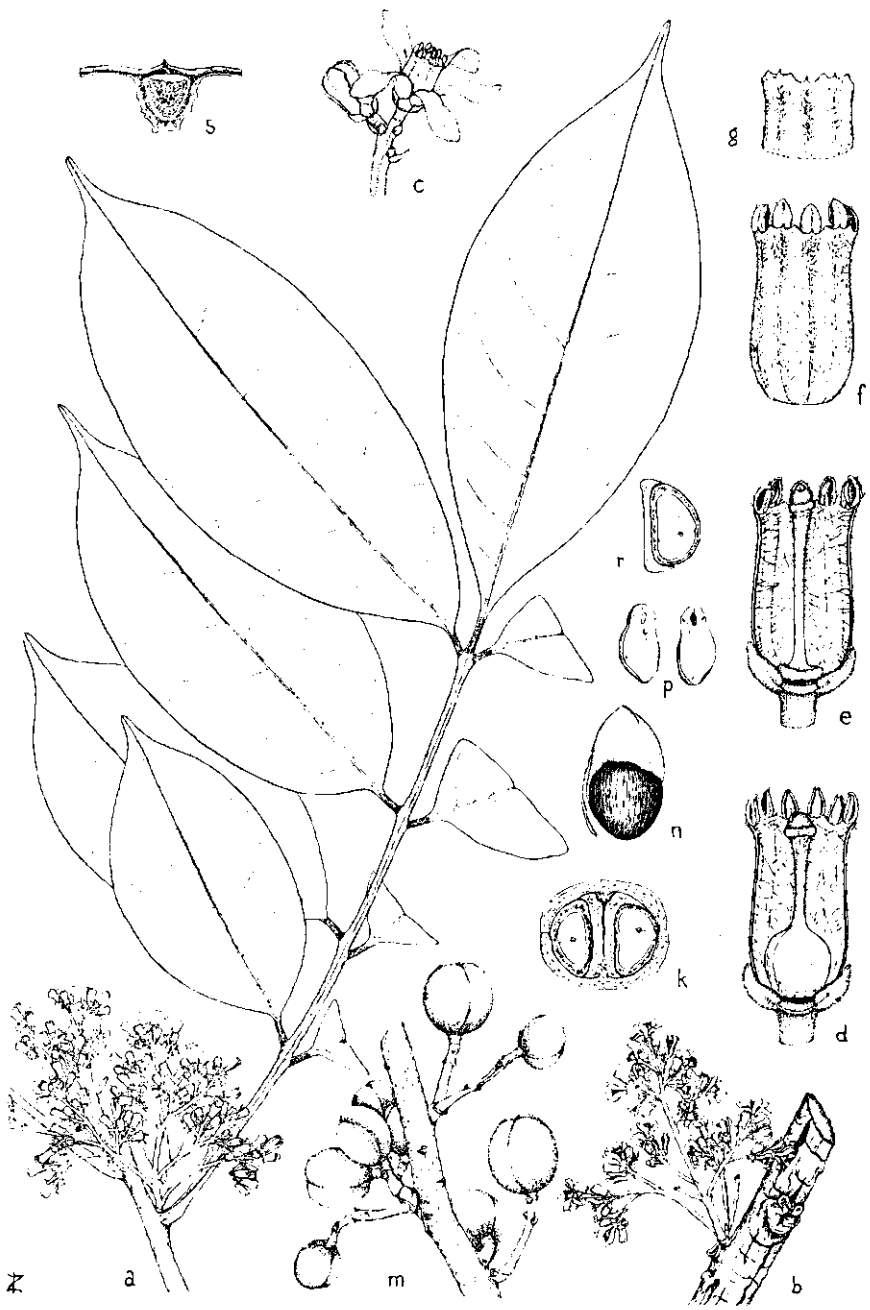
Inflorescences more or less fascicled (or 1 inflorescence branched from the base), up to 10 together, both in the leaf-axils and on the older, often leafless twigs (cauliflory), each 1.5-10(-13) cm long, one, two or three times branching before the pedicel, branches up to 5 cm long, mostly much shorter.

Male flowers with cylindrical, (0.4-)0.5-1.5(-1.7) mm long receptacle. Calyx cup-shaped, 1.0-1.3(-1.5) mm high by 2.0-2.5(-3.0) mm wide. Petals 4.5-6.0 (-6.5) by 1.5-2.0 mm, narrowly obovate to obovate. Staminal tube 3.5-5.0 mm long (anthers excluded). Disk cupuliform, glabrous, 0.2-0.5 mm high by 0.8-1.5 mm wide. Ovary sterile, very minute, glabrous; style 3.0-4.0 mm long, 0.3-0.6 mm wide, puberulous; stigma more or less capitate or subglobular, 0.4-0.8 mm high by 0.5-1.0 mm wide, basal part paler in colour, often with adherent pollen, apical part more dark, brownish, obscurely 2(-3)-lobed at apex, and there often with a depression in the centre.

Female flowers with well developed, glabrous (rarely glabrescent) ovary. Ovary 2(-3)-celled; style puberulous, 1.5-2.0 mm long.

Infructescences up to 9 cm long, mostly shorter, often only one or two fruits of an infructescence developing into maturity; fruit an incompletely 2(-3)-

FIG. 12B. *Trichilia prieureana* A. Juss. subsp. *vermoesonii* J. J. DE WILDE, subsp. nov. - a: fl. branch, ♂ (× ½); b: branch with inflorescence, ♀ (× ½); c: part of inflorescence, ♂ (× 2); d: section of ♀ fl., petals removed (× 6); e: id., ♂ (× 6); f: part of staminal tube, outside, ♂ (× 6); g: id., upper part, anthers removed (× 6); k: transverse section immature fr. (× 1); m: branch with fr. (× ½); n: seed (× 1); p: cotyledons (× 1); r: transv. sect. of seed (× 1); s: transv. sect. of the midrib of a leaflet (× 10). - a, c, s: LIBEN 2754; b and d: LEBRUN 4606; e-g: MILD BRAED 4471; k-r: LEFUWENBERG 5056 (from spirit mat.).



chambered, not (or very shortly) stipitate, subglobose, laterally often slightly compressed capsule, 15–25 mm diam.; septa only present as ledges on the median of the carpels; mature fruit glabrous, loculicidally dehiscent, 2(–3)-valved.

Seeds near the apex attached to the funicle, funicle running down along the lateral side of the seed which is turned to the septum, and inserted near the base of the septum (the septum being only developed as a small parietal ledge, the placentation seems parietal or basal). Testa on the lateral side (turned to the septum), and especially near the apex, developed into a fleshy cushionlike arillodium (sarcotesta); arillodium locally up to 8 mm thick, occupying the surface of the seed for about 1/3–1/4, leaving a large, glossy, very dark brown spot of thin leathery testa.

Seedling: Germination epigeal. Tap root. Hypocotyl ca. 4 cm long, puberulous. Cotyledons sub-opposite, sessile, green, fleshy, not developing, falling about 3 months after germination. Epicotyl 2.5–3 cm long, puberulous. First two leaves opposite, simple, shortly petiolate, ca. 7–8 by 3–4 cm, ovate, cuneate at base, gradually acuminate at apex, glabrous both sides. Petiole 1–2 mm long, puberulous. Following leaves alternate, simple, similar to the above-described or slightly larger and with petioles up to 5 mm long. The fifth or sixth leaf after the cotyledons may be compound and is found to be two-foliolate on a ca. 9 months old seedling.

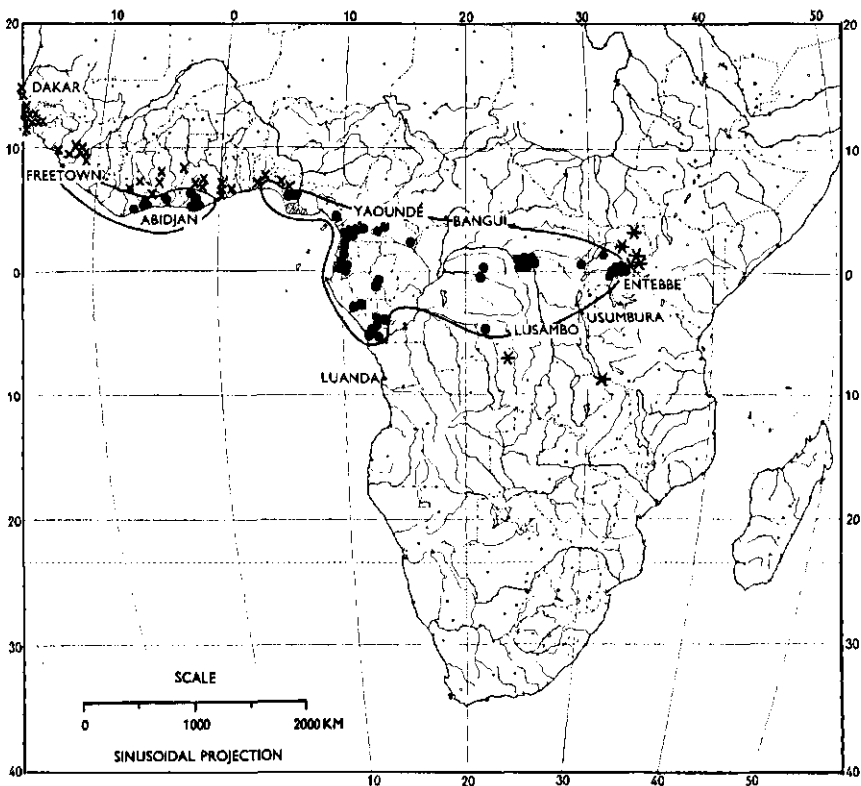
Distribution. ? Sierra Leone and Liberia (no specimens seen), Ivory Coast, Ghana, Nigeria, Cameroun, Rio Muni, Gabon, Congo (Brazzaville), Congo, Angola (Cabinda), Sudan, and Uganda.

Ecological, biological, and distributional notes. *T. priureana* subsp. *vermoesenii* occurs throughout the Guineo-Congolian rain forest region (cf. KEAY et al., Vegetation Map of Africa 1959), in particular in the 'Moist Forest at low and medium altitudes'. Under drier conditions it is in the Guinea forest region replaced by subsp. *priureana*, while in the eastern, Congolian part of its distributional area under drier conditions subsp. *orientalis* may be found. Although I did not see specimens from southern Sierra Leone nor from Liberia, I am convinced that material of *T. priureana* found in the wetter parts of this area belongs to subsp. *vermoesenii*.

In Ivory Coast it was collected frequently. Among others, LEEUWENBERG found it in rain forest 35 km S.W. of Guéyo. It was a tree, 16 m tall, with ca. 7.5 m long fluted trunk, and with very small buttresses at the base (no. 3769, WAG). OLDEMAN collected it on the coast near Néro-Mer, ca. 3 km E. of Bérébi, in littoral forest. He reports it a tree, ca. 15 m high, with small buttresses (no. 549, WAG).

In Ghana it is only found in the wet S.W. corner of the country, roughly S.W. of the line Accra-Kumasi. OLDEMAN collected it there in old secondary forest ca. 90 km W.S.W. of Kumasi, in the Abonyere For. Res. It was a ca. 15 m tall tree with ascending branches (no. 789, WAG). VIGNE found it near Dunkwa growing as a small tree, ca. 11 m tall, with deep spreading crown (no. 160, GC). East of Accra it is replaced by subsp. *priureana* (see there).





MAP 12. Distribution of 12. *Trichilia prieureana* A. JUSS.

×: localities where subsp. *prieureana* was found.

★: localities where subsp. *orientalis* J. J. DE WILDE was found.

●: localities where subsp. *vermoesonii* J. J. DE WILDE was found.

Continuous lines demarcate the disjunct distribution of subsp. *vermoesonii*; the interval is the dry Dahomey gap.

The occurrence in Nigeria forms part of the distribution in the Congolian rain forest region. Subsp. *vermoesonii* is in Nigeria confined to the southern part of the country. In Benin Prov. it was collected several times (JONES no. 9106, BM; KENNEDY no. 1616, BM, K, PRE).

Very frequently it was collected in Cameroun. DUNLAP found it near Tiko (no. 181, K). ZENKER made rich and widely distributed collections near Bipindi (ZENKER nos. 95, 1582, 2641, 3382, 3601).

Interesting is the occurrence of an aberrant population near Bertoua, at the northernmost limit of the distributional area of subsp. *vermoesonii* in Cameroun. Trees collected in this area reach a diameter on breast-high of 100 cm. This population shows features of both subsp. *prieureana* and subsp. *vermoesonii*. The style is glabrous (at best rough), the stigma is crowned by two distinct erect

lobes. Fruits are not known. On behalf of the two-lobed stigma and the two-locular ovary, characters which are very constant in this population, I consider this material to belong to subsp. *vermoesenii*. However, further material (especially fruit) is needed to make clear what exactly the situation is. The possibility of an (isolated?) bastard population between subsp. *prieureana* and subsp. *vermoesenii* seems not excluded (BRETHER no. 2201, WAG; BRETHER c.s. no. 2413, WAG, and LETOUZEY no. 2641, P, WAG).

In Rio Muni and Gabon only subsp. *vermoesenii* is found. Among others KLAINE collected it several times near Libreville (nos. 2499, 2713, 2780 and 3238).

Subsp. *vermoesenii* is widely distributed in Congo. In Orientale Prov., in the extreme eastern part of the country, LEBRUN (no. 4606, BR, K, NY) collected it near Beni at an altitude of 1190 m. This locality represents for Congo the highest altitude on record. In Equateur Prov. EVRARD found it near Befale. He reports it a tree, 15 m tall, 30 cm in diam., with white flowers. The type material of subsp. *vermoesenii* (VERMOESEN no. 1892, BR, K, NY) was collected in Bas-Congo, near Temvo. In E. and S.E. Congo subsp. *vermoesenii* is on drier places (Forest-Savanna Mosaic) replaced by subsp. *orientalis*.

The Angola occurrence is confined to Cabinda, where it was collected by GOSSWEILER. It is reported to be a common understorey tree near Buco Zau, 10 to 20 m tall, with shortly branched crown. The flowers are greenish-white, fragrant.

In Uganda subsp. *vermoesenii* seems to be confined to some rather restricted areas with higher rainfall, often corresponding to considerable altitude. Detailed fieldnotes are supplied by STYLES. He collected it in the Bugoma For. Res., Bunyoro Distr., between 1050–1200 m in moist semi-deciduous rainforest dominated by *Cynometra alexandri* C.H. WRIGHT. According to STYLES the annual rainfall amounts there to 1250–1500 mm. He found it a tree, ca. 21 m tall, with strongly fluted bole, and shaggy, grey-brown bark, peeling in fine strips (STYLES no. 132, FHO). In the same habitat *Trichilia dregeana* SOND. (see there) is found. In E. Mengo Distr., Buganda, STYLES observed it in the Mabira For. Res. in mixed deciduous forest with *Celtis* spp. and *Holoptelea grandis* MILDBR. The annual rainfall amounts there to 1250 mm. STYLES reports that he found it there one of the commonest trees in the understorey. The largest specimen seen reached 22.5 m high and 57 cm d.b.h. (STYLES no. 226, FHO). Young leaves were found purplish-red tinged. Flowering was mainly cauliflorous. Interesting is the statement that STYLES, in a detailed search for a female tree, failed to yield success even after 48 trees of this (sub)species had been examined in the immediate neighbourhood (STYLES no. 219, FHO).

Flowering material of *T. prieureana* originating from Sudan came not at my disposal. Most probably the Sudan material belongs to subsp. *vermoesenii*. The information given by ANDREWS (l.c., 1952) is insufficient to take a decision; (subsp. *orientalis* may also occur in Sudan).

Vernacular names. Ivory Coast: *asamoiaké* (Agboville region), *aribanda* (Sassandra).

Ghana: *kakadikro* (Ashanti).

Cameroun: *nom-owé* (Yaoundé), *akakmikongo* (Yaoundé), *minkakminkak* (dial. Bassa).

Río Muni: *ngat*.

Uganda: *sesambya* (dial. Luganda).

Uses. In earlier literature usually no subspecific taxa were distinguished in *T. priureana*. For this reason it is often difficult, if not impossible, to decide which of the subspecies is referred to in older literature. Concerning uses I therefore refer to the statements made under subsp. *priureana* (see above), which, in general, will also hold for subsp. *vermoesonii*. STANER (l.c.: 145, 1941) reports that in Congo, in the Yangambi region, people of the Turumbu tribe use a fresh infusion of the bark as an enema (a similar use of the bark of subsp. *priureana* was reported from Ghana, see above). In Uganda, it is considered a weed tree, poisoned locally by the Forest Department (STYLES no. 132, FHO). The wood is said to be surprisingly hard, the timber often splits when the tree is felled (STYLES no. 219, FHO).

Specimens examined: Ivory Coast: sin. loc. (♂ fl. Febr.) AUBRÉVILLE 92 (P); Rasso For. Res., N. of Agboville (veget.) AUBRÉVILLE 139 (IFAN); cultivated tree in Banco Arboretum, near Abidjan (veget. Oct.) J. J. DE WILDE 3116 (WAG); *ibid.* (♂ fl. buds Nov.) J. J. DE WILDE 3211 (WAG); 35 km S.W. of Guéyo (mature fr. March) LEEUWENBERG 3769 (WAG, fruits in spirit coll.); 56 km N. of Sassandra, E. of Béyo, 6 2'W.-5 18' N. (veget. April) LEEUWENBERG 3997 (WAG); 25 km S.W. of Guéyo (mature fr. May) LEEUWENBERG 4112 (WAG, fruits in spirit coll.); Néro-Mer, ca. 3 km E. of Bérébi (♂ fl. Nov.) OLDEMAN 549 (WAG, flowers in spirit).

Ghana: Dunkwa (? fl.) CONSERVATOR OF FORESTS 384 (BM, MO); Bunsu Bungalow (♂ fl. Dec.) GREEN 4 (GC); ca. 90 km W.S.W. of Kumasi, Abonyere For. Res. (young fr. Dec.) OLDEMAN 789 (WAG); Dunkwa (? fl. Oct.) VIGNE 160 (GC); Tarkwa Distr., near Aboso (fl. Aug.) VIGNE 983 (K).

Nigeria: Benin Prov., Benin Div., Okomu For. Res. (fr. Febr.) JONES 9106 (BM); Benin Prov., Sapoba (♂ fl.) KENNEDY 1616 (BM, K, PRE); South Nigeria (fr.) KENNEDY 2114 (BM, K); *ibid.* (fr.) KENNEDY 2125 (BM, MO).

Cameroun: 14 km N.E. of Doumé, road to Dimako (♂ fl. buds Dec.) BRETÉLER 727 (WAG); 17 km on road from Bertoua to Dengdeng (♂ fl. Dec.) BRETÉLER 2201 (WAG, aberrant specimen); 17 km N. of Bertoua, along road to Dengdeng (♂ fl. Jan.) BRETÉLER c.s. 2413 (WAG, aberrant specimen); near Tikò (fl. Jan.) DUNLAP 181 (K); 60 km S.W. of Eséka, S. of Nyong R. (nearly mature fr. March) LEEUWENBERG 5056 (WAG, with fruits in spirit coll.); Bertoua region, Kombite (? fl. Jan.) LETOUZEY 2641 (P, WAG, aberrant specimen); Akonolinga region, 20 km E. of Somalomo on the Dja R. (♂ fl. Febr.) LETOUZEY 4441 (P, WAG); Mofoundou region, confluence Bange R. and Boumba R., 15 4' E.-3 1' N. (♂ fl. Febr.) MILDBRAED 4471 (HBG); near Mfou, S.S.E. of Yaoundé (♂ fl. buds Nov.) MPOM BENOIT 78 (P); Bipindi (♂ fl.) ZENKER 95 (BOL, C, UC, WAG); *ibid.* (♂ fl.) ZENKER 1582 (BM, COI, E, G, GOET, H, IFAN, K, L, M, MO, NY, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 2641 (BM, COI, E, G, GOET, K, L, MO, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 3382 (BM, E, G, GOET, K, L, M, W, WRSL); *ibid.* (♂ fl.) ZENKER 3601 (BM, COI, E, G, GOET, K, L, M, MO, S, WRSL).

Río Muni: Nkolentangan, Nschabot (♂ fl. Jan.) TESSMANN 208 (K); sin. loc. (♂ fl.) TESSMANN 849 (K).

Gabon: near Libreville (veget.) KLAINE 2499 (IFAN); *ibid.* (♂ fl. Jan.) KLAINE 2713 (C,

FI, G); *ibid.* (♂ fl. March) KLAINE 2780 (E); *ibid.* (♂ fl. Febr.) KLAINE 3238 (G); *ibid.* (♂ fl. Jan.) KLAINE s.n. (G); Tchibanga (♂ fl. Febr.) LE TESTU 2029 (BM); upper course of Ngounyé (presently N'Goumé?) River (veget.) LE TESTU 5013 (IFAN); Lastoursville region, upper course of Ogooué R., near Malengué (♀ fl. April) LE TESTU 8011 (BM, NY, S, UC); upper course of Ogooué R., near Miçoungangui (♂ fl. May) LE TESTU 8068 (BM).

Congo (Brazzaville): Mayombe-bayaka forest region, S.E. of Sibiti? (♀ fl.) LE TESTU 1727 (E); *ibid.* (♂ fl.) LE TESTU 2025 (BM, E).

Congo: Équateur: near Befale (♂ fl. Febr.) EVRARD 3537 (SRGH); Boende Terr., Ebangalakata (immature fr. Febr.) EVRARD 5637 (WAG).

Orientale: Yangambi (veget.) HOMÈS 255 (WAG); Beni (♀ fl.) LEBRUN 4606 (K, NY); 8 km N.E. of Yangambi, table-land of Lusambila R. (mature fr. March) LOUIS 1428 (MO, PRE); Yangambi (♂ fl. Nov.) LOUIS 2866 (F1); *ibid.* (♂ fl. Dec.) LOUIS 2900 (BM, C, K); *ibid.* (♀ fl. Nov.) LOUIS 6542 (K, MO); *ibid.* (♂ fl. Dec.) LOUIS 13026 (C, K, M); near Stanleyville (veget. March) VAN DER MEIREN 73 (C, MO).

Léopoldville: Bas Congo, Temvo (young fl. buds March) VERMOESEN 1829 (BR, holotype of *T. prieureana* subsp. *vermoesenii*; K, NY, isotypes).

Kasai: Mweka (♂ fl. April) LIBEN 2754 (BR).

Angola: Cabinda: Bucu Zau (mature fr. July) GOSSWEILER 6500 (BM, LISJC, LISU); *ibid.* (♂ fl. Sept.) GOSSWEILER 6654 (BM, COI, LISJC, LISU); *ibid.* (♂ fl. Oct.) GOSSWEILER 6753 (BM, COI, LISJC, LISU).

Uganda: cultivated in Botanic Gardens, Entebbe (♂ fl. Nov.) DAWKINS 670 (ENT); between Kipayo and Kiwafu, ca. 0 14'N.-32 47'E. (♂ fl. Nov.) DÜMMER 1223 (BM, MO); W. of Bajo (♂ fl. buds Oct.) DÜMMER 3274 (BM); Buganda, Mabira Forest (immature fr. March) KIGUNDU 55 (ENT); Bukakata (♂ fl. Oct.) KIGUNDU 103 (ENT); Botanic Gardens, Entebbe (♂ fl. Jan.) SNOWDEN 1900 (BM, MO); W. Prov., Bunyoro Distr., Bugatiya County, Bugoma For. Res. (veget. Oct.) STYLES 132 (FHO); E. Mengo Distr., Buganda, Mabira For. Res. (♂ fl. Nov.) STYLES 219 (FHO); *ibid.* (♂ fl. Nov.) STYLES 226 (FHO).

Sudan: near Meride, Azza Forest (veget. May) ANDREWS 1404 (K).

**c. subsp. *orientalis* J. J. DE WILDE, subsp. nov.**

**Fig. 12C; Map 12**

Type: DAWKINS no. 310 (Uganda: Paimol, Acholi, holotype in K).

Literature referring to *T. prieureana* subsp. *orientalis*: STANER in Bull. Jard. Bot. Brux. 16(2-3): 143. 1941 (partly); STANER and GILBERT in Fl. Cong. Belg. 7: 164. 1958 (partly); WHITE, For. Fl. N. Rhodesia: 181. 1962; WHITE and STYLES in Fl. Zamb. 2(1): 304, tab. 58 (C). 1963 (as regards description, cited specimen and figure).

A typo differt stylo breviter pubescenti (vel raro fere glabro), stigmatate subglobooso vel ovoideo apice obsolete 2(-3)-lobato, disco conspicue puberulo, ovario puberulo 2(-3)-loculari et capsula puberula imperfecte 2(-3)-loculari.

Description. Small or medium-sized understorey tree, 7.5-15(-20) m tall, crown often widely branched (branches sometimes drooping nearly to the ground). Bark brown or dark brown, soft, rough, longitudinally minutely flaking.

Young twigs greenish or brown, glabrous or thinly puberulous; older twigs greyish-brown or brown.

Leaves 10–37 cm long; petiole (1.5–)3–8 cm long; rachis 2–12 (–15) cm long; petiolule of terminal leaflet (3–)5–15 mm, the others 2–5 (–6) mm long. Leaflets 2–4-jugate, 4.5–15.5 by 2–5 cm, more or less abruptly and bluntly acuminate at apex (sometimes gradually acuminate or acute), drying glaucous or greenish, more rarely pale brown.

Inflorescences single or fascicled with 2 or 3 together (or 1 inflorescence branched from the base), in leaf-axils near the top of the branches, ca. 1.5–5 cm long, once or two times branching before the pedicel, branches short, up to 2 cm long.

Male flowers with cylindrical, 0.3–1.0 mm long receptacle. Calyx cup-shaped, 1.5–2.0 mm high by 2.8–3.5 mm wide. Petals 5.5–8.0 by 1.8–2.8 mm, narrowly obovate. Staminal tube 3.5–6.0 mm long (anthers excluded). Disk cupuliform or cushion-shaped, distinctly puberulous, 0.2–0.5 mm high by 0.9–1.7 mm wide. Ovary sterile, minute, puberulous; style 3–4 mm long, 0.4–0.5 mm wide, puberulous, rarely glabrescent; stigma subglobular to ovoid, 0.6–1.0 mm diam., basal part often with adherent pollen, apical part slightly 2(–3)-lobed.

Female flowers with well developed, shortly pubescent, subglobular ovary. Ovary 2(–3)-celled, 1.5–2.0 mm diam.; style shortly pubescent, 2–3 mm long.

Infructescences up to 6 cm long, often shorter, fruit an incompletely 2(–3)-chambered, subglobose, puberulous, shortly stipitate capsule (stipe up to 2 mm

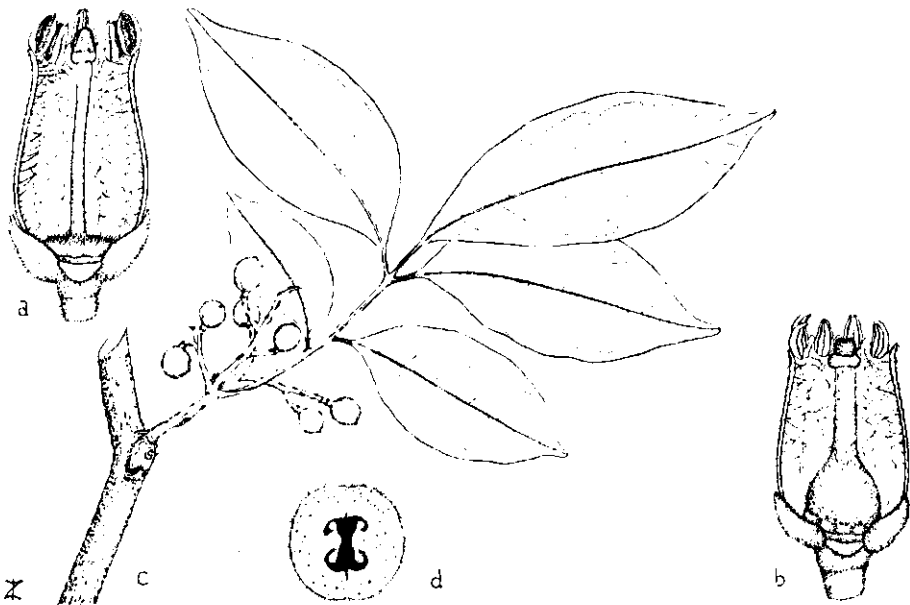


FIG. 12C. *Trichilia prieureana* A. Juss. subsp. *orientalis* J. J. DE WILDE, subsp. nov. – a: section of ♂ fl., petals removed ( $\times 6$ ); b: id., ♀ fl. ( $\times 6$ ); c: branch with young fr. ( $\times \frac{1}{2}$ ); d: transverse section of young fr. ( $\times 4$ ). – a: DAWKINS 310; b: CHANDLER 1099; c-d: LIBEN 3945.

long). Septa only present as ledges on the median of the carpels. Mature fruit not seen.

Seeds near the apex attached to the funicle, funicle running down along the lateral side of the seed which is turned to the septum, and inserted near the base of the septum (the septum being only developed as a parietal ledge, the placentation seems parietal or basal). Mature seed not seen.

Seedling not seen.

Distribution. Congo, Uganda, Zambia.

Ecological, biological, and distributional notes. In Forest-Savanna Mosaic and in Woodlands of a relatively moist type, situated E. and S. of the distributional area of subsp. *vermoesonii*, subsp. *orientalis* is found. Ecologically subsp. *orientalis* is closely related to its West African counterpart subsp. *prieureana*. How far subsp. *vermoesonii* and subsp. *orientalis* are strictly separated is not known. In Uganda the distributional areas of both subspecies seem to touch, not to overlap.

Most of the material I examined originated from Uganda. CHANDLER found *T. prieureana* subsp. *orientalis* near Serere in Teso, at an altitude of ca. 1100 m. It was a solitary tree, 15–18 m tall, with greenish, slightly fragrant flowers (CHANDLER no. 1099, K, MO). The holotype (DAWKINS no. 310, K) was collected near Paimol in Northern Prov., at an altitude of 1200 m. It was growing there as a dark foliaged understorey tree, ca. 7.5 m high, near a dry water-course in a forested gully. In the immediate vicinity occurred: *Albizia coriaria* WELW., *Vangueria apiculata* K. SCHUM., *Allophylus africanus* P. BEAUV., *Harrisonia abyssinica* OLIV., and *Zizyphus abyssinica* HOCHST. ex A. RICH., all shrubs or small trees.

It was collected repeatedly in Northern Prov., Abercorn Distr., Zambia, the southernmost limit of the distributional area hitherto known. Probably future collections will link this seemingly isolated population to the remainder of the area of distribution. HOYLE (no. 1101, FHO) found it between Abercorn and Kalambo Falls in the understorey of a small patch of 'evergreen' forest with *Aningeria* sp. and *Cordia abyssinica* R. BR., at an altitude of ca. 1500 m. It was a straight tree, ca. 9 m tall, with deeply fluted bole and drooping branches. RICHARDS (no. 6206, K, SRGH), who collected it in the same locality, stated: 'In dense undergrowth of primeval forest. Calyx and petals green.'

In Congo subsp. *orientalis* is collected only scantily. LIBEN (no. 3945, BR) found it in gallery forest near Mwene Ditu in Kasai Prov. The locality of a specimen secured by QUARRÉ (no. 2572, MO), on the Grelco R., I could not trace with certainty. Possibly it is in Katanga Prov. Doubtless subsp. *orientalis* has a much wider distribution in Congo than is now known.

Vernacular names. Uganda: *sesambya* (dial. Luganda). Note: Local people in Uganda probably do not distinguish between subsp. *vermoesonii* and *orientalis*. For both subspecies the name '*sesambya*' is used (see under subsp. *vermoesonii*).

Uses. No particular uses came to my attention.

Specimens examined: Congo: Kasai: Mwene Ditu (young fr. Nov.) LIBEN 3945 (BR). Katanga (?): Greco R. (♂ fl. July) QUARRÉ 2572 (MO).

Uganda: Teso, Serere (♀ fl. Febr.) CHANDLER 1099 (K, MO); near Budumba, 33 50'E.-0 50'N. (♂ fl. buds Sept.) DALE U-44 (FI, K); Acholi, Paimol, N.W. flank of Paimol, near Ilibi needle (♂ fl. Dec.) DAWKINS 310 (K, holotype of *T. pricureana* subsp. *orientalis*); Lango Distr., Kibuji, Maruzi (♂ fl. buds Sept.) EGGELING 1768 (BR); Luganda, Gangu forest (♂ fl. Dec.) PHILIP 35 (ENT).

Zambia: Northern Prov., Abercorn Distr., between Abercorn and Kalambo Falls (♂ fl. July) HOYLE 1101 (FHO); *ibid.* (♂ fl. Sept.) RICHARDS 6206 (K. SRGH); Abercorn Distr., Seziye Forest (fl. buds Sept.) RICHARDS 11438 (K).

### 13. *Trichilia quadrivalvis* C.DC.

Fig. 13; Map 1

*Trichilia quadrivalvis* C.DC. in Bull. Herb. Boiss. 3 : 402. 1895; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306. 1896; TH. and HÉL. DURAND, Syll. Fl. Cong. : 93. 1909; *id.* in Bull. Jard. Bot. Brux. 2 : 93. 1910; EXELL c.s. in Journ. of Bot., Br. and Foreign 65 (Suppl. 1) : 63. 1927; HARMS in Notizbl. Bot. Gart. Berlin 11 (105) : 402. 1932; GOSSWEILER and MENDONÇA, Cart. Fitogeogr. Angol. : 135 and 136. 1939; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 111. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 178, pl. 8. 1941; EXELL and MENDONÇA in Consp. Fl. Angol. 1(2) : 313. 1951; STANER and GILBERT in Fl. Cong. Belg. 7 : 172, pl. 19. 1958; CASIER in Bull. Agr. Cong. Belg. 49(5) : 1301. 1958; WHITE, For. Fl. North. Rhod. : 181. 1962; WHITE and STYLES in Fl. Zamb. 2(1) : 302, tab. 58 (A, 1, 2, 3). 1963.

Type: VON MECHOW no. 588 (Angola: Quango (also often spelled 'Cuango') R., near Chamasango, holotype, Z).

Note: STANER (*l.c.* : 180. 1941) was in doubt whether the type was collected in Angola or in Congo. However, MENDONÇA (in Comp. R. 4e Réunion A.E.T.F.A.T. 1960 : 118. 1962) pointed out that ALEXANDER VON MECHOW'S expedition to the Cuango River mainly remained in Angolan territory. According to MENDONÇA, VON MECHOW entered once more Angola (after a visit to Congo) early in January 1881. VON MECHOW no. 588 was collected in January 1881, and therefore it seems best to cite Angola for the collecting locality of the type of *T. quadrivalvis*. It is to be noted that in the adjacent part of Congo, *viz.* Kwango, in Léopoldville Prov., the species was also collected (e.g. VANDERYST no. 16708, BR).

Diagnostic and differential characters. Rhizomatous shrublet up to 40 cm high, often forming clumps. Leaflets 1-2-jugate, or the leaf unifoliolate. Inflorescences usually only 1-5-flowered, very short, up to 1.5 cm long. Fruit 3(-4)-chambered, obovoid to globose, very shortly stipitate, ca. 13-22 mm diam., dull crimson. Seed up to 16 × 22 mm, testa entirely developed into an

orange-red fleshy arillodium. Confined to 'myombo' woodland on Kalahari Sands.

**Description.** Rhizomatous suffrutex, 10–40 cm high, often growing in spreading clumps, with long flexible rhizomes just below or on the surface of the ground. Stems terete, longitudinally wrinkled, 2–3 mm in diam., brown, pubescent, indumentum grey or greyish-brown, gradually diminishing on the older parts; lenticels absent on the erect stems, often present on the rhizomatous parts, small and inconspicuous, pale brown; outer bark comparatively thick, soft, dark brown, rarely peeling off in small longitudinal flakes, inner bark paler, often more reddish-brown; wood whitish, sometimes pale pink, not very hard.

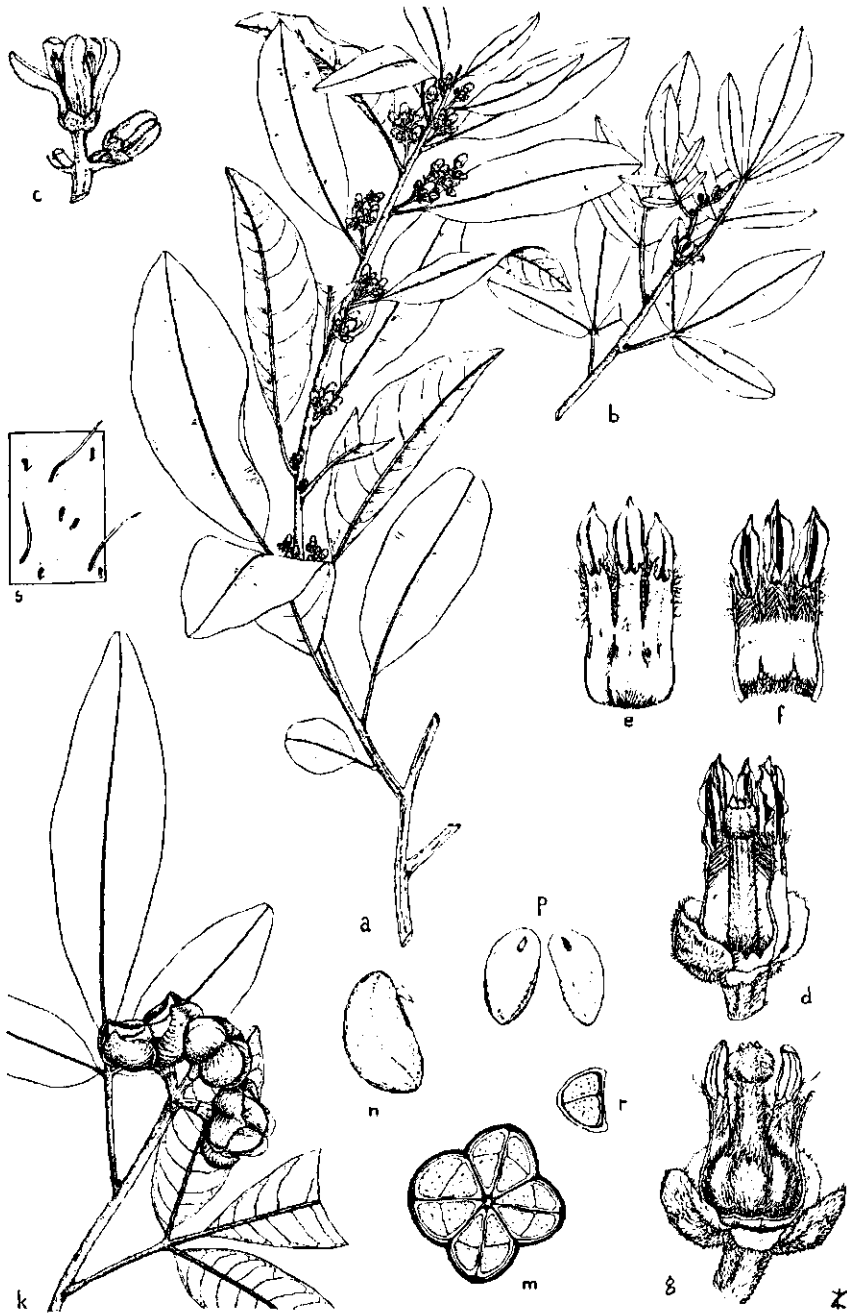
Leaves imparipinnate, (3–)5–13(–15.5) cm long; petiole terete, flattened or slightly sulcate on the upper surface, 0.8–3.5 cm long, pubescent or densely puberulous, wrinkled lengthwise; rachis up to 1.3 cm long (absent in case the leaf is unifoliolate), similar to the petiole; petiolule of terminal leaflet terete, flattened or slightly sulcate on the upper surface, 1–10 mm long, lateral leaflets more or less sessile.

Leaflets 1–2-jugate, or the leaf unifoliolate, opposite, subsessile, not or very indistinctly glandular dashed and dotted, firm, leathery, (1.2–)3–9(–11.2) by (0.6–)1–2.5(–3.4) cm, very variable in shape and size, distal leaflets largest, proximal leaflets smaller, narrowly elliptic to elliptic or narrowly oblong, or narrowly ovate to ovate, sometimes narrowly obovate to obovate, apex acute to obtuse, sometimes slightly retuse, often mucronulate by midrib, base cuneate or obtuse, margin narrowly revolute. Upper surface glabrous except for some hairiness on midrib and nerves, midrib sulcate, nerves indistinct, (5–)8–14 (–20) on either side, opposite or not, curving and anastomosing just before reaching the margin, veins indistinct. Lower surface with a more or less dense indumentum, composed of rather long white or brownish sericeous hairs and of scattered reddish-brown or blackish, very minute, glandular trichomes; midrib prominent, wrinkled lengthwise, often slightly thickened at the mucro, nerves prominent, veins laxly reticulate.

Inflorescences cymose, contracted, 1–5(or more)-flowered, often subsessile, short, up to 1.5 cm long, axillary, main axis terete or angular, wrinkled lengthwise, densely pubescent. Bracts ca. 1.5–2.5 by 0.7–1.1 mm, triangular, with a sericeous indumentum of rather long white hairs, and especially on the margin

FIG. 13. *Trichilia quadrivalvis* C. DC. – *a*: fl. branch, ♂ (× ½); *b*: id., ♀ (× ½); *c*: part of inflorescence, ♂ (× 2); *d*: section of ♂ fl., petals removed (× 6); *e*: part of staminal tube, outside, ♂ (× 6); *f*: id., inside (× 6); *g*: section of ♀ fl., petals removed (× 6); *k*: branch with fr. (× ½); *m*: transverse section of fr. (× 1); *n*: seed (× 1); *p*: cotyledons (× 1); *r*: transv. sect. of seed (× 1); *s*: portion of leaflet, beneath (× 20). – *a*, *c*–*f*, *s*: GILGES 129; *b*: VANDERYST 16708; *g*: OVERLAET 946; *k*, *n*–*r*: MILNE-REDHEAD 4069; *m*: RENIER 4.





and on the adaxial side with glandular trichomes, and often with a reddish-brown or blackish gland at the apex.

Male flowers on ca. 0.5–2 mm long pubescent pedicels; bracteoles 2, opposite or not, sometimes absent, 1.1–1.6 by 0.5–0.8 mm, triangular or broadly triangular, abaxial densely puberulous, adaxial glabrous, margin ciliate, often with a dark gland at apex. Receptacle cylindrical, somewhat thickened, slightly grooved, ca. 0.5–1 mm long, densely puberulous, jointed to the pedicel. Calyx cup-shaped, ca. 2–2.5 mm high by 4 mm wide, very deeply 5-lobed almost to the base, lobes imbricate in bud, 1.8–2.5 by 1.0–2.5 mm, ovate, broadly ovate, or very broadly ovate, obtuse at apex, thick and rather fleshy in the centre and near the base, inside glabrous, outside puberulous, often with some glandular trichomes, especially on the ciliate margin. Petals 5, free, imbricate in bud, more or less spreading during anthesis, 5.0–6.0 by 1.8–2.0 mm, narrowly oblong or oblong, fleshier and slightly incurved at the obtuse apex, inside glabrous or minutely puberulous, pubescent or puberulous outside. Staminal tube 3.7–5.0 mm long (including the anthers), 10-fid, cleft over about one-third of its length or more, free parts of the filaments ca. 1.0–1.5 mm long, outside puberulous, densely tomentose inside, connate part of the staminal tube 1.5–2.0 mm long, somewhat swollen and fleshier near the base, thinly puberulous inside in the upper part but densely pubescent in the thickened basal part, puberulous outside; anthers dorsifix, attached near the base, nearly sessile in the sinus between two triangular or linear, somewhat hairy lobes of 0.2–0.6 mm long, at the top of the free part of the filament, narrowly oblong, 1.7–2.0 by 0.4–0.7 mm, mucronulate at apex, rough, opening laterally, lengthwise, pollen well developed. Pistillode scarcely or not expanded at the base; ovary sterile, indistinct, often with vestigial ovules; style 2.0–3.5 mm long, 0.5–1.0 mm diam., slightly tapering towards the apex, densely sericeous all over; stigma conical or pyramidal, 0.8–1.0 mm diam., stigmatic tissue spongy, more or less depressed and obscurely 3-lobed at the apex, and there with a shallow depression in the centre.

Female flowers: Similar to male flower, but anthers smaller, not dehiscing, not producing pollen. Ovary well developed, ovoid to subglobose, slightly trigonous in transverse section, densely sericeous, ca. 2–2.5 mm diam., 3(–4)-celled; ovules 2 in each cell, axile, collateral; style short, ca. 1 mm long; stigma as in male flower.

Fruit a 3(–4)-chambered capsule, obovoid to globose, ca. 13–22 mm diam., often mucronulate at apex by style remnant, shortly stipitate (stipe up to 3 mm long), grooved between the chambers, dull crimson, densely puberulous, loculicidally dehiscent, 3(–4)-valved, valves transversely wrinkled.

Seeds 2 in each chamber (often one or both seeds not or only partially developed and then the chamber much reduced), collateral, just beneath the apex attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta (above the basal insertion the funicle is often adnate to the placenta). Mature seeds up to 16 mm long and 10 mm broad, arillodiate, more or less plano-convex, flat on the adjacent sides; testa entirely developed into a fleshy arillodium (sarcotesta); arillodium scarlet

or orange-red without, whitish within, ca. 0.5 mm thick; cotyledons firm, fleshy, greenish-yellow, plano-convex, 13–15 by 4–6 mm; radicle ovoid or ellipsoid, 2–2.5 by 1 mm, longitudinally more or less flattened, in between the cotyledons at ca. 2 mm beneath the apex, endosperm absent.

Seedling not seen.

**Distribution.** Congo, Angola and Zambia.

**Distributional, ecological, and biological notes.** The occurrence of *T. quadrivalvis* is confined to a rather small area in central and eastern Angola, extending into the adjacent part of southern Congo as well as in the extreme eastern parts of Zambia.

KEAY et al. (Vegetation Map of Africa 1959) indicated the area as part of the 'Woodlands and Savannas', more in particular as 'South-western areas principally on Kalahari Sands'. The distributional area of *T. quadrivalvis* coincides remarkably well with this kind of 'myombo' woodland on Kalahari Sands (dominated by *Brachystegia* and *Julbernardia* species which, in this area, are sometimes replaced by *Cryptosepalum pseudotaxus* BAK.F. and/or *Guihourtia coleosperma* (BENTH.) J. LÉONARD).

In Congo, for example, CALLENS (no. 3401, BM, BR) collected it in savanna country near Kizamba, Kwango District, near the border with Angola, and probably close to the type locality. He stated that it was a small shrub, ca. 30 cm tall with white flowers and red fruits. Also in Kwango District it was found near Kulindji by DUBOIS (no. 1459, BR). The collector's note states that it was a small plant, more or less forming carpets on the ground in savanna woodland, at an altitude of ca. 1200–1250 m.

In Angola MILNE-REDHEAD (no. 4069, BM, BR) found it in Moxico District in *Brachystegia-Isobertinia*-woodland on sand. He noted that it was a rhizomatous shrub with finely pubescent, dull crimson fruits. POCKOCK (nos. 558 and 612, BOL), who collected it in the upper course of the Cuito River, stated that it was forming spreading clumps, ca. 20 cm high. He noted that the flowers were white, sweet scented.

In Zambia it was frequently collected in Balovale District. Among others, WHITE collected it there near Chavuma, close to the border with Angola (no. 3483, BR, FHO, K, MO). It was a rhizomatous suffrutex, 10–30 cm high, growing in degraded *Baphia obovata-Bauhinia*-scrub on white Kalahari Sands. The flowers are reported to be dull white, the fruits red. More to the North, in Mwinilunga District, WHITE collected it also (no. 3451, BR, FHO, K, MO). He reports it a suffrutex, growing on grey Kalahari Sands.

**Vernacular names.** Congo: *kahafu* or *kafu* (dial. Kitshok), *mukesu-a-temo* (dial. Kipende).

**Uses.** The seeds are rich in fat and they seem to be edible (teste DUBOIS no. 1470, BR). CASIER (l.c., 1958) analysed the seeds, and found that they contain

ca. 52% fat. This fat is oily, viscose, pale green in colour. The cake contains 20.76% of albuminoids. No information about uses of fat and proteins is given, but the plant is regarded as an oil-producer of potential economic importance.

A decoction of the roots is used to cure stomach-ache (teste DUBOIS no. 1459, BR).

Specimens examined: Congo: Léopoldville: Kwango Distr.: Kizamba (♂ fl. Febr.) CALLENS 3401 (BM, BR); Mikoso-Kahemba (♀ fl. Nov.) DEVRED 1440 (BR); sin. loc. (mature fr. Nov.) DEVRED 1489 (BR); Panzi (veget. June) DEVRED 1993 (BR); Kulindji (mature fr. Sept.) DUBOIS 1459 (BR); Kahemba (young fr. Sept.) DUBOIS 1470 (BR); sin. loc. (♂ fl.) RENIER 2-c (BR); sin. loc. (mature fr.) RENIER 4 (BR); Kisanji (fragments of old fr. and ♂ fl. on different specimens Dec.) RENIER 68 (BR); Panzi (mature fr.) VANDERYST 15989 (BR); ibid. (♂ fl.) VANDERYST 16180 (BR); between Panzi and Gingundji (♀ fl.) VANDERYST 16708 (BR).

Katanga: Kapanga (♂ and ♀ fl. on different specimens July) OVERLAET 946 (BR).

Angola: Bié, Ganguelas region, Cuito R. (♂ fl. July) GOSSWEILER 2802 (BM, COI, LISJC); Moxico Distr., South of Lusavo Falls (mature fr. Jan.) MILNE-REDHEAD 4069 (BM, BR, K); between Kunzumbia and Quito, Menonque and Chimponpo (♂ fl. Aug.) POCKOCK 558 and 612 (BOL); Quango R., near Chamasango (fl. and fr. Jan.) VON MECHOW 588 (Z, holotype of *T. quadrivalvis*).

Zambia: Balovale Distr. (young fr. Sept.) FANSHAWE 8915 (FHO); ibid. (♂ fl. July) GILGES 129 (SRGH); ibid. (♂ fl. Aug.) GILGES 177 (K, SRGH); ibid. (fr. Oct.) GILGES 285 (K, SRGH); ibid. (fr. Dec.) GILGES 296 (K, SRGH); Mwinilunga Distr., 6 km N. of Mayowa Plains (immature fr. Oct.) WHITE 3451 (BR, FHO, K, MO); Balovale Distr., near Chavuma (♂ fl. and mature fr. on different specimens Oct.) WHITE 3483 (BR, FHO, K, MO).

#### 14. *Trichilia retusa* OLIV.

Fig. 14; Map 13

*Trichilia retusa* OLIV., Fl. Trop. Afr. 1 : 334. 1868; C.DC. in A. and C.DC., Mon. Phan. 1 : 658. 1878; GÜRKE in ENGL., Die Pflanzenw. O.-Afr. C : 232. 1895; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. 1896; DE WILDEMAN in Ann. Mus. du Congo Sér. 5 (Bot.) 1 : 51. 1903; THONNER, Blütenpfl. Afr.: tab. 77. 1908; TH. and HÉL. DURAND, Syll. Fl. Cong. : 93. 1909; id. in Bull. Jard. Bot. Brux. 2 : 93. 1910; DE WILDEMAN, Cie Kasai: 326. 1910; PELLEGRIN in Not. Syst. 2 : 72. 1911; DE WILDEMAN in Bull. Jard. Bot. Brux. 5 : 286. 1919; VERMOESEN in Rev. Zool. Afr. 10(1) : B49. 1922; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; PELLEGRIN in Not. Syst. 9(1) : 17. 1940; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 152, tab. 2 (D, E and F). 1941; TISSERANT, Cat. Fl. Oubangui-Chari : 72. 1950; ANDREWS, Fl. Pl. Anglo-Egypt. Sudan 2 : 332. 1952; STANER and GILBERT in Fl. Cong. Belg. 7 : 159. 1958; KEAY in HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958; WHITE in KEAY et al., Nigerian Trees 2 : 275. 1964.

Type: BARTER s.n. (Nigeria: Nupe by the Niger, holotype in K; isotypes (which are numbered: '1181') in P and W).

Synonym: *Trichilia retusa* OLIV. forma *pubescens* C.DC. in Bull. Soc. Bot.

France 55 (Mém. 8) : 11. 1907; PELLEGRIN in Not. Syst. 9(1) : 17. 1940, as synonym. Type: CHEVALIER no. 7026 (Central Afr. Rep.: Dar Banda oriental, Teté R., holotype in P, not seen).

**Diagnostic characters.** Evergreen small tree or shrub of fringing forests. Leaflets widely emarginate (deeply notched) at apex. Fruit stipitate, pear-shaped, ca. 25 mm diam., 2-chambered. Seed arillodiate, testa completely developed into an orange-red, fleshy arillodium (sarcotesta).

**Description.** Small tree or shrub, ca. 5–15 m high, evergreen; bole up to 60 cm d.b.h., usually much smaller, sometimes slightly fluted at base; bark rather thin, smooth or somewhat verrucose, grey or greyish-brown; slash pinkish to deep red, sharply differentiated from the white sapwood, fragrant, often exuding a bit or whitish latex from near the cambium; sapwood whitish.

Young twigs terete, brown, more or less puberulous, gradually becoming glabrescent or glabrous, sparsely lenticellate (vigorous young shoots often angular or flattened and pale greyish-green coloured); outer bark (rhytidoma) thin, longitudinally ridged, inner bark dark olive-green.

Leaves imparipinnate, sometimes paripinnate, ca. 9–27 cm long; petiole terete, somewhat flattened or sulcate on the upper surface, especially near the base, glabrous or short pubescent, wrinkled lengthwise, 1.5–7.5 cm long, pulvinus often slightly swollen, contracted at the insertion; rachis (1–)2–6.5(–8) cm long (absent in 3-foliolate leaves), flattened or sulcate on the upper surface (especially between the insertion of the leaflets), otherwise similar to the petiole; petiolules narrowly sulcate on the upper surface, glabrous or short tomentose, petiolule of terminal leaflet 5–15(–20) mm, the others (2–)5–10(–15) mm long.

Leaflets (1–)2–3(–4)-jugate, opposite or subopposite, not or very minutely and indistinctly glandular-punctate, distal leaflets largest, proximal leaflets smaller, ca. 3–15.5(–17) by 1.5–4.5(–6) cm, narrowly elliptic to elliptic or narrowly obovate to obovate; apex broadly emarginate (very rarely obtuse), often mucronulate by midrib, base cuneate, rarely obtuse, often slightly asymmetric. Upper surface glabrous (sometimes with some indumentum in the furrow of the impressed midrib), nerves 10–20 on either side, opposite or not, straight but curving and anastomosing before reaching the margin; veins indistinct. Lower surface glabrous, sometimes thinly puberulous and rather often some indumentum on the prominent midrib and nerves, veins slender but distinct, rather closely reticulate, as a rule glandular-translucent.

Inflorescences paniculately arranged, few or many-flowered, axillary, supra-axillary or pseudo-terminal, often near the top of the branches, but also in the axils of lower leaves, 2–9 cm long; main axes flattened or angular, wrinkled lengthwise, puberulous, often branching from the base, one or two times branched before the pedicel, branches short, up to 3.5 cm long; bracts very early deciduous.

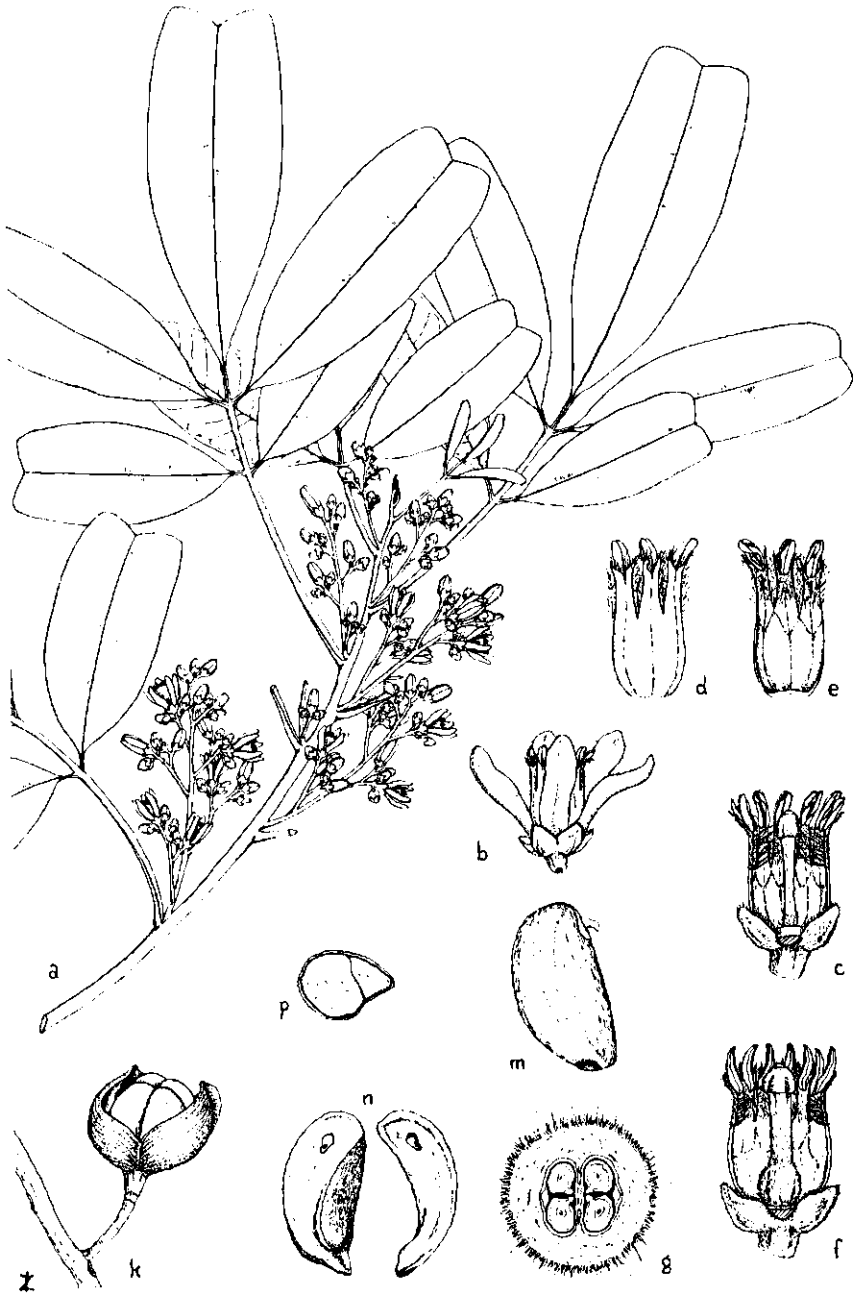
Male flowers: On up to 2 mm long, puberulous or shortly pubescent pedicels, sometimes sessile; bracteoles 1 or 2, early deciduous, 0.7–1.0 by 0.5–0.7 mm,

ovate to broadly ovate, abaxially pubescent, adaxially glabrous. Receptacle cylindrical, 1–2 mm long, pubescent, jointed to the pedicel. Calyx cup-shaped, deeply 5-lobed; lobes imbricate in bud, ca. 2–3 by 2 mm, broadly ovate, obtuse at apex, rather fleshy, outside pubescent, inside glabrous, margin ciliate. Petals 5, free (imbricate in bud, spreading and often strongly recurved during anthesis), (7.0–)8–10(–11.5) by (1.5–)2–3(–4) mm, narrowly elliptic to narrowly oblong, obtuse at apex, finely puberulous on both surfaces, at the base sometimes adhering to the staminal tube, margin ciliate. Staminal tube 5.0–8.5 mm long (including the anthers), (9–)10-fid, incisions to about 1/3 or 1/2 of its length, free parts of the filaments ca. 2–4.5 mm long, variable in length within one inflorescence, densely pubescent (tomentose) inside and on the margins, nearly glabrous or very minutely puberulous outside, connate part of the staminal tube 2.5–4.5 mm long, glabrous or glabrescent and fleshy inside (the fleshy tissue covering the inner surface of the lower part of the staminal tube produced towards the top into raised wedge-shaped issues, the tops of the wedges alternating with the bases of the free parts of the filaments), the connate part glabrescent or puberulous outside; anthers dorsifix, attached near the base by an extremely short thread-like stalk, inserted in the apical sinus of the free part of the filament, between two linear, hairy lobes of 0.5–1.0 mm long, 2.0–2.5 by 0.5–0.8 mm, narrowly elliptic, sometimes mucronulate at apex, glabrous or with some sparse hairs, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, pubescent, vestigial ovules present; style slender, ca. 3–6 mm long, glabrescent in the upper part, the lower part more or less hairy; stigma subglobular to pyramidal, ca. 1 mm diam., longitudinally furrowed, the lower (stigmatic?) part spongy, densely covered by very minute trichomes, more or less depressed or slightly 2-lobed at the glabrous apex, and there with a depression in the centre.

Female flowers: Similar to male flower, but anthers often narrower, not dehiscent, not producing mature pollen. Ovary well developed, globular, ca. 2 mm diam., densely tomentose, 2(–3)-celled; ovules 2 in each cell, axile, collateral; style slightly shorter than in male flower, 3–3.5 mm long, hairy in the lower part; stigma as in male flower.

Fruit a 2-chambered, distinctly stipitate, slightly apiculate capsule, more or less broadly obovoid (pear-shaped); dry mature fruits ca. 25 mm diam. (stipe excluded), (stipe 5–10 mm long, ca. 5–6 mm thick, slightly or not tapering to the base, wrinkled lengthwise), densely covered with an extremely short indumentum, loculicidally dehiscent, usually 2-valved; dry valves thick leathery or even slightly woody, broadly obovate, conspicuous transversely wrinkled.

FIG. 14. *Trichilia retusa* OLIV. – *a*: fl. branch, ♂ (× ½); *b*: ♂ fl. (× 2); *c*: section of ♂ fl., petals removed (× 3); *d*: part of staminal tube, outside, ♂ (× 3); *e*: id., inside (× 3); *f*: section of ♀ fl., petals removed (× 3); *g*: transverse section of ovary (× 10); *k*: fr. (× ½); *m*: seed (× 1); *n*: cotyledons (× 1); *p*: transv. sect. of seed (× 1). – *a–e*: HOYLE 362; *f–g*: BRETELER 969; *k–p*: WYLD 238.



Seeds 2 in each chamber (often one or both seeds not or only partially developed), collateral, slightly beneath the apex attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Mature seed (15–)20–25 by 10–14 mm, arillodiate, more or less plano-convex, flat on the adjacent sides; testa completely developed into a soft and fleshy arillodium (sarcotesta), arillodium orange-red without, whitish within, thin, up to 0.5 mm thick; cotyledons firm, fleshy, brownish, plano-convex, ca. 15–20 by 5–8 mm; radicle narrowly ellipsoid, longitudinally flattened, ca. 2.5–3.5 by 1–1.5 mm, in between the cotyledons at 3–4 mm beneath the apex. Seedling not seen.

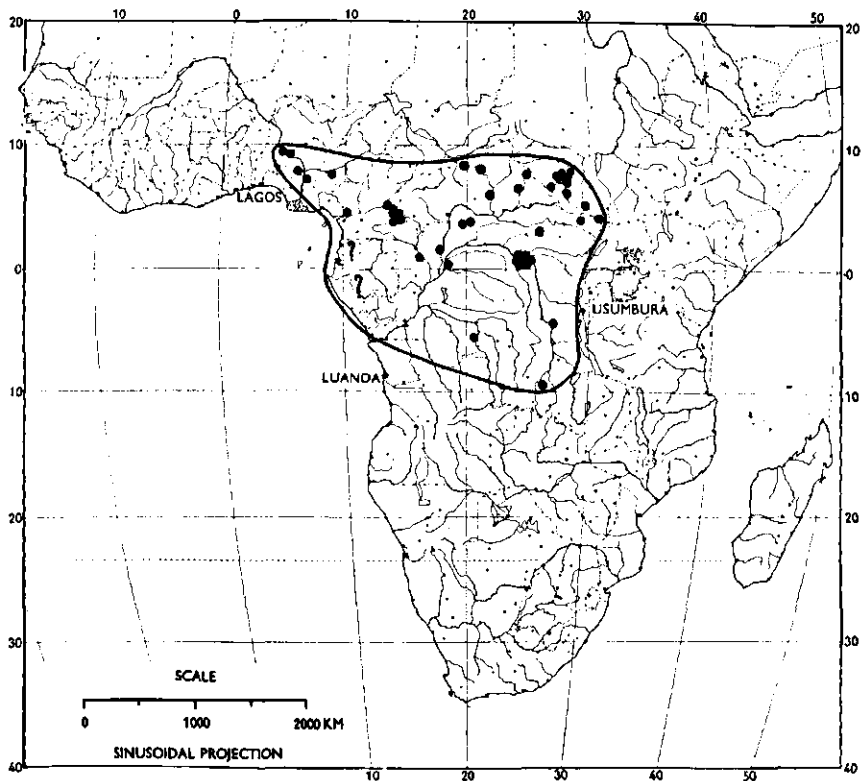
Notes to the synonym. *Trichilia retusa* f. *pubescens* C.DC. (l.c., 1907) is based on CHEVALIER no. 7026 (Central African Republic, banks of Tété River). According to DE CANDOLLE it is distinct by the pubescent petiole, rachis, and midrib on the lower surface of the leaflets. Although I did not see the type, the above-mentioned character of the indumentum is insufficient to maintain this subspecific taxon. The indumentum of the vegetative parts is widely variable in nearly all African *Trichilia*'s, including *T. retusa*. Hairy specimens were collected in Cameroun (BRETELIER nos. 969 and 2800, LEEUWENBERG no. 5872, all in WAG), and these three specimens show sufficiently the variability of the indumentum. PELLEGRIN (l.c., 1940) who examined the type (CHEVALIER no. 7026) found no reason to keep it distinct, a conclusion which is followed here.

Distribution. Nigeria, Cameroun, Central African Republic, Sudan, Gabon ? (no specimens seen), Congo (Brazzaville), Congo.

Distributional, ecological, and biological notes. Between latitudes 10°N. and S., *Trichilia retusa* is found from Nigeria eastwards to the chain of great lakes which forms approximately the eastern border of Congo. Within this vast area *T. retusa* occurs in most of the vegetation-types distinguished there by KEAY et al., Vegetation Map of Africa (1959). It was collected in Moist Forest at low and medium altitudes, in Forest-Savanna Mosaic, in the Savanna-Woodlands of a relatively moist type, and in the Savanna-Woodlands of Northern areas with abundant *Isoberlinia* species. However, in all these vegetation types *T. retusa* seems rather strictly confined to riparian vegetations, where it forms part of fringing forests. The optimum of the species may, more likely, be found in the drier vegetation types (Guinea zones) than in the moist parts of the Congolian rain forest region. Insect attack of the flowers seems to be more frequent in specimens originating from wet areas. For this reason the occurrence of *T. retusa* in Río Muni and in western Gabon is questionable.

In Nigeria *T. retusa* was collected along the Niger and the Benue River. DALZIEL (no. 865 (or s.n.?), BM, COI, K, S, W) found it common in ravines and on the bank of the Benue R. near Abinsi. HAGERUP (no. 733, C, K) found it near Jebba along the Niger. There it is said to be a tree, 10–12 m high, with whitish-yellow flowers.





MAP 13. Distribution of 14. *Trichilia retusa* OLIV.

In Cameroun it was frequently collected in riverine fringe of the Sanaga, the Doumé and the Kadeï Rivers (BRETELIER nos. 969 and 2800, WAG; LEEUWENBERG nos. 5872, 6065, WAG; MILDBRAED no. 4890, HBG). Several collectors reported that it was growing in periodically inundated habitats (LEEUWENBERG no. 5375, WAG; LETOUZEY no. 3148, P, WAG). LEEUWENBERG no. 5375 was collected on the bank of the Ouem R., near the confluence with the Sanaga R. This locality is nearest to the coast of all specimens I was able to examine.

*T. retusa* is widely distributed in Central African Republic, where it seems to be rather common along many water courses (Kotto River and its affluents, Bangoran River, etc.).

In Sudan it is confined to Equatoria and Bahr el Ghazal Provinces, where it is found as far North as Wau. HOYLE (nos. 348 and 362, BM), who collected it there on banks of the Busseri River, stated that it was characteristic of evergreen fringing belts on rivers in Wau District. He found the flowers to be cream-coloured or greenish-white, with a peculiar, rather peppery, sweet smell. WYLD (no. 238, BM) collected it on banks of the Sue River in Equatoria Province.

Both DE NÉRÉ (no. 945, WAG) and SITHA (no. 855, IEC, WAG) found it in

Congo (Brazzaville), respectively on an islet in the Oubangui River near Impfondo, and on banks of the Sangha River (an affluent of the Oubangui R.) near Ikelemba. DE NÉRÉ stated that the leaflets look like varnished above, and that there is a marked difference in colour between the upper and the lower surface of the leaflets.

In Congo it was, besides other localities, many times collected near Yangambi, especially on islands, situated in the Congo River (Tofende Island, Esali Island, Tutuku Island), at altitudes of ca. 450–500 m. According to STANER (l.c., 1941) it also occurs in Katanga, where BEQUAERT (no. 131, BR) found it near Bukama, and where DE SAEGER (no. 132, BR) collected it between Luyeye and Lukuga, in gallery forest at ca. 700 m altitude. In Kasai it is reported from the borders of the Kasai River (LUJA no. 213, BR). It seems not unlikely that *T. retusa* may be found also in the northernmost parts of Angola.

Vernacular names. Nigeria: *owo* (dial. Aguleri), *nyamenyok* (dial. Boki). Central Afr. Rep.: *seraliwa* (Banda, dial. Morouba). Sudan: *tīt* (dial. Dinka), *mbusukondo* (Equatoria Prov.). Congo: *ilolo-lowe* (dial. Turumbu), *yapabasangu* (dial. Mobenge).

Uses. Only WYLD (no. 238, BM) made a remark about usefulness. In his collector's note he stated that the timber is hard, and that in Sudan, in Equatoria Prov., it is used for pestles and mortars.

Specimens examined: Nigeria: Nupe by the Niger (♂ fl.) BARTER s.n. (no. 1181) (K, holotype of *T. retusa*; isotypes: P, W); Benue R., near Abinsi (♂ fl. Jan.) DALZIEL 865 (s.n.) (BM, COI, K, S, W); Jebba, Niger R. (fl. Dec.) HAGERUP 733 (C, K); Kabba Prov., Odah R., near Echonga (fl. Febr.) JONES FHI-634 (K); Idah (mature fr.) VOGEL 50 (K).

Cameroon: Sanaga R., Goyoum, ca. 30 km W. of Dengdeng (♂ fl. Jan.) BRETELIER 969 (WAG); Doumé R., ca. 40 km S.W. of Batouri (♂ fl. and 'gall-fruits' April) BRETELIER 2800 (WAG); Ouém R., near confluence with Sanaga R., 6 km S.W. of Masok (young fr. April) LEEUWENBERG 5375 (WAG); road Batouri–Djampiel, Kadeï R. (veget. June) LEEUWENBERG 5872 (WAG); road Batouri–Ndélélé, near Pana, Kadeï R. (♂ fl. and 'gall-fruits' July) LEEUWENBERG 6065 (WAG); Nyamtimbi, Doumé R. (♂ fl. Febr.) LETOUZEY 3148 (P, WAG); Batouri region, Kadeï R., near Dulugene (veget. April) MILDBRAED 4890 (HBG).

Central Afr. Rep.: near Yango (♂ fl. March) D'ALLEIZETTE s.n., in Herb. Lugd. Bat. sheet no. 951 54 319 (L); Bangoran R., Snoussi region (veget. Febr.) CHEVALIER 7462 (G, K); near Ndélé, Snoussi region (young fr. March) CHEVALIER 7805 (G, L); Kotto R., near Bria (♂ fl. Febr.) LE TESTU 2461 (BM, IFAN, K); upper course of Kotto R., between Yalinga and Said Bundas (♂ fl. Jan.) LE TESTU 3677 (BM).

Sudan: Bahr el Ghazal Prov., Busseri R., near Wau (mature fr. Oct.) AYLMER no. GA-27-46 (K); Jar R., near Wau (♂ fl. March) DOUGLAS SIMPSON 7642 (BM, K); Wau Distr., Wau–Yambio road, Busseri R. (young fl. buds Jan.) HOYLE 348 (BM); Wau Distr., confluence Busseri R. and Halima R. (♂ fl. Jan.) HOYLE 362 (BM); Equatoria Prov., Sue R., E. of Abu Satta Hills (fr. July) MYERS 7091 (K); near Wau (fl. April) SCHWEINFURTH 1633 (K); Bongo Land, Tidju R. (veget. Nov.) SCHWEINFURTH 2636 (K); Mittu region (♂ fl. Dec.) SCHWEINFURTH 2819 (E, K, NH, S); Yei R., Lado (young fr.) SILLITOE 277 (K); Equatoria Prov., Sue R. (mature fr. July) WYLD 238 (BM).

Congo (Brazzaville): islets in Oubangui R., near Impfondo (♂ fl. Febr.) DE NÉRÉ 945 (WAG); Sangha R., near Ikelemba (♂ fl. and 'gall-fruits' July) SITHA 855 (IEC, WAG).

Congo: Equateur: Gemena Terr., Boyawaza moke, Lua Vindu R. (young fr. April) EVRARD 776 (BR, K); Coquilhatville (♂ fl.) LEBRUN 1163 (C, K, MO, NY); Businga (veget.) LEBRUN 1982 (BR, G, K).

Orientele: Isangi Terr., Yangambi, Tofende Island (fl. buds July) BOLEMA 1216 (WAG); *ibid.* (♂ fl. Aug.) KEAY 52 (BM, K); Bas Uele, Zobia (fl.) LEBRUN 2683 (K); Yangambi, Esali Island (♂ fl. and 'gall-fruits' Dec.) LOUIS 7275 (BR, K, MO); *ibid.* (♀ fl. June) LOUIS 10144 (BR, MO, NY); Yangambi, Tofende Island (♂ fl. Aug.) LOUIS 10759 (BM, BR, C, FI, K, PRE); Yangambi (♀ fl. Nov.) LOUIS 12467 (BR, S); *ibid.* (♂ fl. Nov.) LOUIS 12587 (BM, BR, C, K, MO); Yangambi, Tutuku Island (fl. July) LOUIS 15638 (K); Dunga Terr., 32 km on road to Garamba (♂ fl. Febr.) TROUPIN 3 (BR, K, WAG).

Kivu: Maniéma, between Kasongo and Nyangwe (♂ fl.) LEBRUN 5922 (BR, G).

## 15. *Trichilia rubescens* OLIV.

Fig. 15; Map 14

*Trichilia rubescens* OLIV., Fl. Trop. Afr. 1 : 336. 1868; C.DC. in A. and C.DC., Mon. Phan. 1 : 708. 1878; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306. 1896; PELLEGRIN in Not. Syst. 2 : 72. 1911; HARMS in MILDBRAED, Wiss. Erg. Deutsch. Zentr. Afr. Exp. 1907–1908, 2(Bot.) : 434. 1912; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 822. 1915; DE WILDEMAN in Bull. Jard. Bot. Brux. 5 : 287. 1919; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B50. 1922; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; PELLEGRIN in Not. Syst. 9(1) : 20. 1940; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 112. 1940; STANER in Bull. Jard. Bot. Brux. 16(2–3) : 148, pl. 2 (A, B, and C). 1941; EGGELING and DALE, Indig. Trees Uganda Prot. 2nd ed. : 197. 1951; KEAY in HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 704. 1958; STANER and GILBERT in Fl. Cong. Belg. 7 : 169. 1958; VERDCOURT in Kew Bull. 14 : 346. 1960; WHITE in KEAY et al., Nigerian Trees 2 : 273. 1964.

Syntypes: MANN no. 20 (Cameroun: Ambas Bay, lectotype, K) and MANN no. 163 (partly) (Fernando Póo, paratype, K, P).

Synonyms: *Trichilia batesii* C.DC. in Ann. Conserv. et Jard. Bot. Genève 10 : 159. 1907; PELLEGRIN in Not. Syst. 9(1) : 20. 1940; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940. Type: BATES no. 373 (Cameroun: Efoulen, holotype in G; isotypes, E, K).

*Trichilia laurentii* DE WILD. in Ann. Mus. du Congo Sér. 5 (Bot.) 2 : 264. 1908; TH. and HÉL. DURAND, Syll. Fl. Cong. : 92. 1909; DE WILDEMAN in Bull. Jard. Bot. Brux. 5 : 284. 1919; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B43. 1922 (as syn. to *T. rubescens*); PELLEGRIN in Not. Syst. 9(1) : 20. 1940 (as syn. to *T. rubescens*); STANER in Bull. Jard. Bot. Brux. 16(2–3) : 148. 1941 (as syn. to *T. rubescens*); STANER and GILBERT in Fl. Cong. Belg. 7 : 169. 1958 (as syn. to *T. rubescens*); KEAY in HUTCH. and DALZ., Fl. W. Trop. Afr. 1(2) : 704. 1958 (as syn. to *T. rubescens*). Type: M. LAURENT no. 1939 (Congo: Mogandjo, holotype in BR).

*Trichilia derumieri* DE WILD. in Bull. Jard. Bot. Brux. 4(3) : 379. 1914; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B34. 1922 (as syn. to *T. rubescens*); PELLEGRIN in Not. Syst. 9(1) : 20. 1940 (as syn. to *T. rubescens*); STANER in Bull. Jard. Bot. Brux. 16(2-3) : 148. 1941 (as syn. to *T. rubescens*); STANER and GILBERT in Fl. Cong. Belg. 7 : 169. 1958 (as syn. to *T. rubescens*). Type: DE BRIEY no. 68 (Congo: Ganda-Sundi, holotype in BR).

*Trichilia papillosa* PIERRE ex CHEV. in Vég. util. Afr. trop. Franç. 9 : 124. 1917; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 112. 1940 (as syn. to *T. rubescens*); PELLEGRIN in Not. Syst. 9(1) : 20. 1940 (as syn. to *T. rubescens*). Syntypes: KLAINE no. 1233 (Gabon: Libreville, lectotype, in P) and KLAINE no. 1465 (Gabon: Libreville, paratype, E, P).

Diagnostic and differential characters. Shrub or small tree, evergreen. Twigs markedly lenticellate or pustular, usually hollow in the centre. Leaflets 3-7-jugate, not glandular dashed nor dotted. Flowers small, petals ca. 4.5-5.5 × 1.5-2.5 mm. Disk conspicuous, around the ovary. Fruit obovoid to subglobose, 1-2 cm diam., glabrous, not stipitate, 3-chambered. Seed 1.5 × 0.5-0.7 cm, arillodiate. Arillodium scarlet, occupying the seed for about 1/2, remaining part of testa dark brown.

Description. Evergreen shrub, treelet or small tree, (2-)4-10(-18) m tall and 6-20 cm d.b.h., rarely up to 50 cm diam., bole often crooked. In well developed specimens with dense crown and spreading branches. Bark thin, up to 1 cm thick, pale grey or brown, smooth, in old trees the rhytidoma sometimes flaking in thin strips, pinkish or beef-coloured on transverse section; slash pale pink or cream-coloured, exposed to air soon changing to ochraceous or brownish, with faint typical *Meliaceous* scent, no latex; sapwood cream-coloured to whitish.

Young twigs towards the top angular or flattened, greyish-green or brown, puberulous, markedly lenticellate with small, orange-brown lenticels; older twigs terete, greyish, reddish-brown or brown, glabrous, sometimes pustular, often hollow in the centre.

Leaves imparipinnate, rarely paripinnate, 20-70 cm long; petiole terete, flattened on the upper surface and often very narrowly winged, glabrescent or puberulous, 4-12 cm long; rachis 10-30 cm long, flattened on the upper surface, especially in the lower part and near and between the insertion of the leaflets, the slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), longitudinally slightly wrinkled, nearly glabrous or puberulous; petiolules sulcate to canaliculate on the upper surface, the raised edges of the petiolular furrow decurrent in the raised edge of the flattened side of the leaf-rachis (see above), puberulous or tomentose, petiolule of terminal leaflet 11-26 mm, the others 3-17 mm long.

Leaflets 3-7-jugate, opposite, subopposite or alternate, not glandular dashed nor dotted, distal leaflets largest, the lower pairs gradually diminishing in size,

(4-)10-25(-30) by (2-)4-7(-10) cm, narrowly elliptic to elliptic, narrowly oblong, or narrowly obovate to obovate; apex acutely acuminate, rarely acute to rounded, base obtuse or cuneate, and often slightly unequal-sided, margin sometimes narrowly revolute; usually drying reddish-brown or pale greenish-brown. Upper surface glabrous, midrib impressed, narrowly sulcate, nerves 8-23 on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin, veins indistinct. Lower surface glabrescent to puberulous, the indumentum mainly on midrib and nerves (sometimes midrib and nerves shortly tomentose on lower surface), midrib very prominent, wrinkled lengthwise, always hairy on the mucro; nerves prominent, veins distinct, laxly reticulate, contrasting with the lamina.

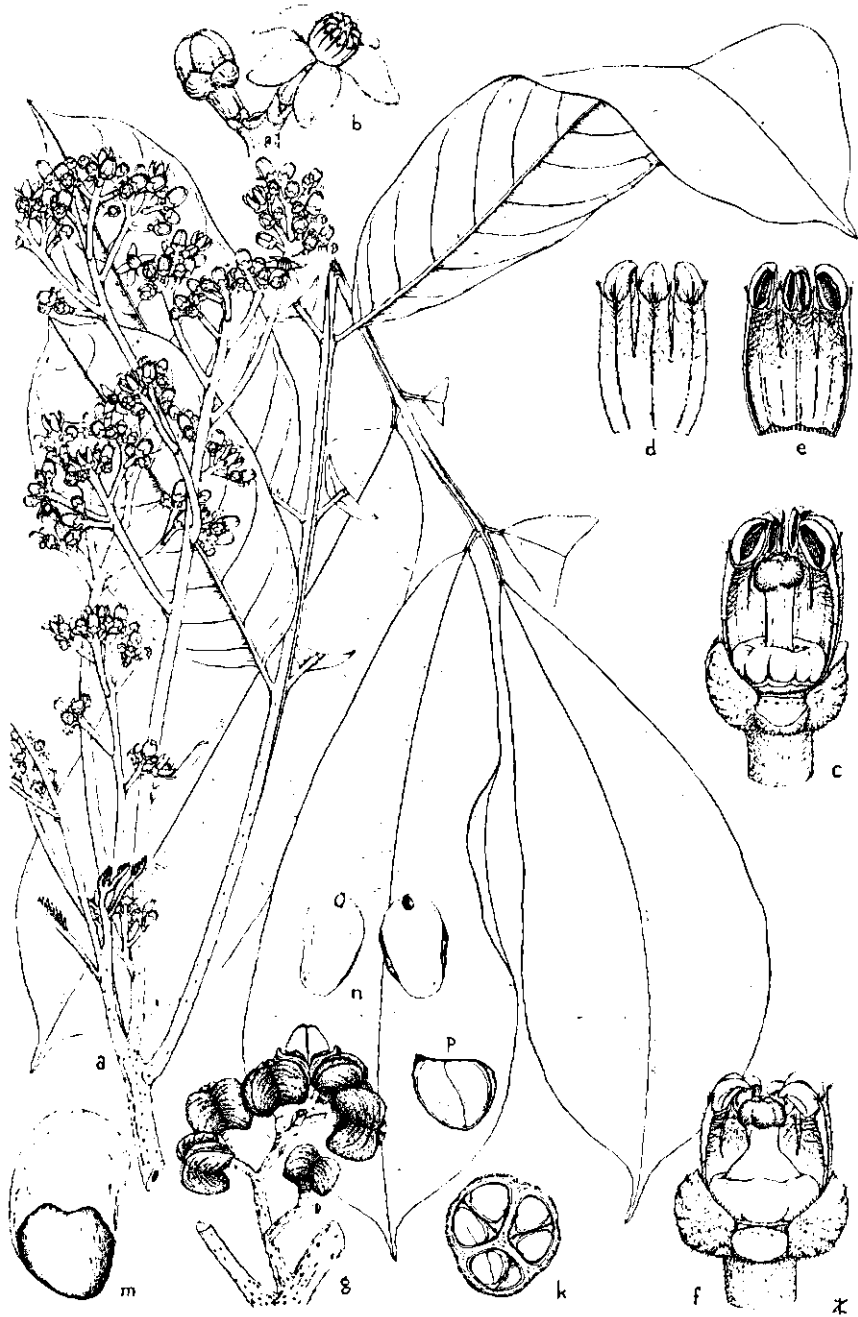
Inflorescences lax, the terminal (flowering) parts rather condensed, paniculately arranged, axillary or pseudo-terminal, assembled near the top of the branches, 3-20(-40) cm long; main axes flattened, often angular, puberulous, finely wrinkled lengthwise, two or three times branching before the pedicel; branches first order stout, up to 17 cm long, usually much shorter. Bracts early deciduous, ovate to triangular, often boat-shaped, ca. 2-3 by 1.5-2 mm, more or less acute at apex, adaxially glabrous, abaxially shortly pubescent, margin ciliate.

Male flowers: On up to 1 mm long, puberulous or pubescent pedicels; bracteoles usually 1 or 2, sometimes absent, small, very early deciduous, inserted just beneath the joint with the receptacle, ca. 1.5 by 0.5-1 mm, narrowly ovate to ovate, adaxially glabrous, abaxially pubescent, margin ciliate. Receptacle cylindrical, 1-2 mm long, pubescent, jointed to the pedicel. Calyx cup-shaped, ca. 1-2 mm high, 5-lobed, lobes imbricate in bud, 1-1.5 by 1.5-2 mm, very broadly ovate to depressed ovate, obtuse at apex, especially in the centre and near the base thickened and fleshy, outside puberulous or pubescent, inside glabrous, margin slightly ciliate. Petals 5, free (imbricate in bud, spreading during anthesis and then the upper part of the petals directed at an angle of ca. 90° to the staminal tube), 4.5-5.5 by 1.5-2.5 mm, narrowly elliptic to elliptic or narrowly obovate to obovate, obtuse, finely puberulous outside, glabrous inside. Staminal tube ca. 3-4 mm long (including the anthers), 10-fid, cleft over about two-thirds of its length or more, free parts of the filaments ca. 1.5-1.8 mm long, pubescent or thinly tomentose inside, puberulous outside, connate part of the staminal tube 0.8-1.5 mm long, glabrous or nearly so on both sides; anthers basifix, attached by a very short, thread-like stalk of ca. 0.1 mm long, inserted in the sinus between two short, linear, glabrous or slightly hairy lobes of 0.3-0.5 mm long at the top of the free part of the filament, 0.8-1.0 by 0.4-0.5 mm, ovate, glabrous or with some scarce hairs, opening laterally, lengthwise, pollen well developed. Disk ca. 0.5-1 mm high, fleshy, glabrous, annular, only at the base adherent to the vestigial ovary. Pistillode scarcely or not expanded at the base; ovary sterile, ca. 3 mm high, vestigial ovules mostly present; style short, 0.7-1 mm long, tapering from the apex towards the base, glabrous; stigma pyramidal, ca. 1 mm wide by 0.5 mm high, stigmatic tissue spongy, in a broad ring around the lower part, and there often with adhesive

(4-)10-25(-30) by (2-)4-7(-10) cm, narrowly elliptic to elliptic, narrowly oblong, or narrowly obovate to obovate; apex acutely acuminate, rarely acute to rounded, base obtuse or cuneate, and often slightly unequal-sided, margin sometimes narrowly revolute; usually drying reddish-brown or pale greenish-brown. Upper surface glabrous, midrib impressed, narrowly sulcate, nerves 8-23 on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin, veins indistinct. Lower surface glabrescent to puberulous, the indumentum mainly on midrib and nerves (sometimes midrib and nerves shortly tomentose on lower surface), midrib very prominent, wrinkled lengthwise, always hairy on the mucro; nerves prominent, veins distinct, laxly reticulate, contrasting with the lamina.

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cates' of ZENKER no. 3000-a ('isotypes' of *T. bipindeana* C.DC.) in BR, COI, GOET, L, M, MO, P, S, and W undoubtedly belong to *T. rubescens* OLIV. It is to be concluded that the material distributed as ZENKER no. 3000-a is a mixture, and PELLEGRIN (at P) probably only saw 'duplicates' of ZENKER no. 3000-a belonging to *T. rubescens* OLIV. (*T. bipindeana* C.DC. is a synonym of *T. gilgiana* HARMS; see there).

Notes to the synonyms. *Trichilia batesii* C.DC. (l.c., 1907) is based on a female, flowering specimen collected by BATES near Efulen (presently Efulen) in Cameroun (holotype, G; isotypes at E, K). The leaflets are rather hairy on the lower surface, and especially midrib and nerves are densely pubescent or tomentose. The young twigs are conspicuously lenticellate, and the twigs are hollow. These and all other characters perfectly agree with *T. rubescens* OLIV. *T. batesii* C.DC. must be considered a later, heterotypic synonym of *T. rubescens* OLIV.

*Trichilia laurentii* DE WILD. (l.c., 1908) rests on LAURENT no. 1939, a male, flowering specimen collected in Congo. All details of flowers and leaves fall within the variation of *T. rubescens* OLIV. *T. laurentii* DE WILD. is synonymous with *T. rubescens* OLIV., in accordance with the view of previous authors.

*Trichilia derumieri* DE WILD. (l.c., 1914) was described after a specimen collected by DE BRIEY (no. 68) in Congo. This male, flowering specimen is in a rather bad condition. Midrib and nerves are slightly pubescent on the lower surface of the leaflets, but this character varies throughout the distributional area of *T. rubescens* OLIV. It must be concluded that *T. derumieri* DE WILD. is a later, heterotypic synonym of *T. rubescens* OLIV.

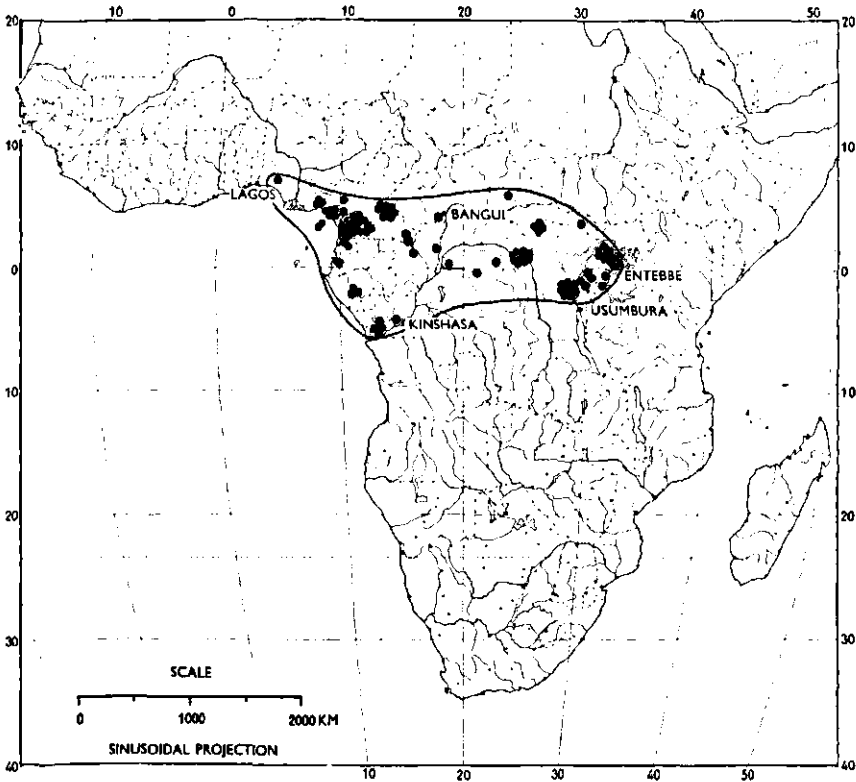
*Trichilia papillosa* PIERRE ex CHEV. (l.c., 1917) is based on two syntypes both collected by KLAINE in Gabon (nos. 1233 and 1465). KLAINE no. 1233 (P) has a label 'Herb. L. PIERRE'; on it is written: '*Trichilia? papillosa* PIERRE'. It appears that CHEVALIER, when describing *T. papillosa* PIERRE, used a manuscript name supplied by PIERRE. KLAINE no. 1233 is designated here as the lectotype of the validly published name *T. papillosa* PIERRE ex CHEV. (l.c., 1917). The lectotype is a male, flowering specimen. In every respect it comes within the limits of *T. rubescens*, and in the synonymy of *T. rubescens* OLIV.

Distribution. Nigeria, Cameroun, Fernando Póo, Río Muni, Central Afr. Rep., Gabon, Congo (Brazzaville), Congo, Uganda, Tanzania.

Distributional, ecological, and biological notes. *T. rubescens* is mainly distributed in the Moist Forest at low and medium altitudes, approximately from Benin in Nigeria eastwards to Lake Victoria. Occasionally it is also found in Forest-Savanna Mosaic connected with the Moist Forest vegetation-type. In the easternmost part of its distributional area (eastern Congo and western Uganda) it may reach considerable altitudes, ranging into Submontane Communities.

In Nigeria it is more or less restricted to the Eastern Region. The westernmost locality known is in Ondo Prov., Akure Distr. (Western Region; UJOR no. FHI-32981). It was associated with *Celtis* sp., *Bombax* sp., and *Nesogordonia*





MAP 14. Distribution of 15. *Trichilia rubescens* OLIV.

*papaverifera* (A. CHEV.) R. CAPURON, which indicates a drier, deciduous forest-type.

Numerous collectors found it in Cameroun. Most collections were made in the wet rain forest area, but BRETELER (no. 1208, WAG) collected it also 15 km N. of Bertoua, along the road to Dengdeng. He found it there in secondary forest, rich in *Triplochiton scleroxylon* K. SCHUM. and *Celtis* spp., indicating a deciduous forest-type. BRETELER nos. 2386 and 2614 (WAG) were collected near Gounté, 27 km from Bertoua along the road to Bétaré Oya. There the habitat is indicated as an island of primary forest within the Forest-Savanna Mosaic vegetation-type. The flowers are reported pale green or cream-coloured, faintly fragrant.

In contrast with these relatively dry habitats are many localities in the Moist Forest region, where it was especially found in marshy forest-types (W.J. DE WILDE c.s. nos. 1326, 1686 and 2185, WAG).

The highest altitude on record in Cameroun is Mt. Fébé, near Yaoundé, where W.J. DE WILDE c.s. collected it at ca. 850 m (no. 3793, WAG). MILD-BRAED (no. 4577, HBG) observed it very frequently near Moloundou, in the extreme South-East of Cameroun.

In Congo, EVRARD (no. 3950, BR, K, SRGH, WAG) reports it from semi-deciduous forest in Boende Terr., Equateur Prov. In Orientale Prov. it is, among other localities, very frequently collected near Yangambi, where it was found both in secondary forest and in the shrub-layer of more or less primary forest. Also in Léopoldville Prov. it is reported from secondary vegetations. COMPÈRE (no. 451, BR) collected it along the road Kingoma–Sanzala in such a vegetation rich in *Alchornea cordifolia* (SCHUM. et THONN.) MÜLL. ARG. He stated that the flowers are whitish. PIERLOT made many gatherings along the road Kavumu–Walikale, in Kivu Prov. Near Buniakiri he found *T. rubescens* at ca. 1500 m, the highest altitude known for Congo (PIERLOT no. 2386, BR). Near Lwalimba (106 km on road Kavumu–Walikale) PIERLOT collected it in evergreen forest, growing together with *Julbernardia seretii* (DE WILD.) TROUPIN, *Staudtia stipitata* WARB., *Gilbertiodendron deweyrei* (DE WILD.) J. LÉONARD, *Grossera multinervis* J. LÉONARD, *Uapaca guineensis* MÜLL. ARG., and *Anonidium mannii* (OLIV.) ENGL. et DIELS, at ca. 900 m altitude. Near the border with Uganda, on the road Rutshuru–Katwe, PIERLOT (no. 3036, BR) collected it in well developed secondary forest, composed of *Markhamia lutea* K. SCHUM., *Sapium ellipticum* (HOCHST. ex KRAUSS) PAX, *Maesopsis eminii* ENGL., *Funtumia africana* (BENTH.) STAPE, and other species, at an altitude of 1340 m.

In Uganda it is confined to Western Prov. Among others DRUMMOND and HEMSLEY (no. 4583, K) made a gathering in Masaka Distr., ca. 6 km S.S.W. of Katera. They found it growing there in the understorey of swamp forest, at an altitude of 1150 m. STYLES collected it many times in Bunyoro Distr., in the Budongo Forest Reserve, and he supplied detailed fieldnotes. He stated that it is one of the commonest species in the understorey of this forest. The bole is often crooked, and sometimes slightly fluted. The tree, which reaches here a height of 18 m and a diameter breast-high of ca. 50 cm, is poisoned locally by the Forest Department. The annual rainfall in this area amounts to 175 cm. The altitude is ca. 1200 m. (STYLES nos. 87, 330, 330–A, and 340; all in FHO).

In Tanzania it is only known from the extreme N.W. of the country, where GILLMAN found it near Kiamawa in Bukoba Distr. (GILLMAN no. 407, K). Probably it is confined there to a few isolated patches of Moist Forest, such as indicated on the Vegetation Map of Africa by KEAY et al. 1959.

Vernacular names. Not known from Nigeria.

Cameroun: *ekem* (dial. Ewondo, Yaoundé).

Rio Muni: *ekem* (Campo River region).

Congo: *boyembeyembe* (Bambesa Distr.), *elasile* or *lifundji-likikereke* (dial. Turumbu), *mutakalondo*, *tshihahi* or *tshihayi* (dial. Kitembo), *butakarondo* or *kakuse* (dial. Kirega), *mutanda* (dial. Kinyanga), *muhekabuma* (dial. Kindande). Uganda: *mugaba* (dial. Lunyoro), *omushalya* (dial. Lukiga).

Uses. According to STANER (l.c. : 152. 1941) it is reported that in Congo a decoction of the bark is used in curing bronchitis.

Specimens examined: Nigeria: Ondo Prov., Akure Distr. (young ♀ fl. buds Febr.) UJOR FHI-32981 (WAG); Eastern Region, Oban (♂ fl.) TALBOT 1370-A (BM, K); *ibid.* (♂ fl.) TALBOT 1711 (BM); *ibid.* (fl.) TALBOT s.n. (K).

Cameroun: Bule country, Efoulen (♀ fl. Sept.) BATES 373 (G, holotype of *T. batesii* C.DC.; E, K, isotypes); Bitye, ca. 60 km E.N.E. of Sangmélina (♂ fl.) BATES 705 (BM); *ibid.* (♂ fl.) BATES 1074 (BM); near Etoug Ebé 2, ca. 9 km S.W. of Yaoundé, along road to Oveng (♂ fl. Jan.) BRETELER 897 (WAG); Bertoua, 15 km on road to Dengdeng (♀ fl. and fr. March) BRETELER 1208 (WAG); ca. 50 km N.W. of Bertoua, 7 km S.E. of Ebaka (fr. May) BRETELER 1424 (WAG); near Dimako, between Bertoua and Doumé (mature fr. Aug.) BRETELER 1756 (WAG, with fruits in spirit); Nkolbisson, ca. 7 km W. of Yaoundé (immature fr. Dec.) BRETELER 2281 (WAG); near Gounté, ca. 27 km of Bertoua, along road to Bétaré Oya (♂ fl. Jan.) BRETELER c.s. 2380 (WAG); *ibid.* (♂ fl. Jan.) BRETELER c.s. 2386 (WAG); 33 km E. of Yaoundé, along road to Ayos (nearly mature fr. Jan.) BRETELER c.s. 2485 (WAG); Mt. Fèbé, 3 km N.W. of Yaoundé (veget. Jan.) BRETELER c.s. 2570 (WAG); near Gounté, ca. 27 km of Bertoua, along road to Bétaré Oya (♀ fl. Febr.) BRETELER 2614 (WAG, with flowers in spirit); near Oveng, 27 km N. of Sangmélina, along road to Yaoundé (♂ fl. March) BRETELER 2699 (WAG, with flowers in spirit); sin. loc. (♀ fl.) DEISTEL 183 (M, WRSL); Eséka (young fl. buds Nov.) W. J. DE WILDE c.s. 1326 (WAG); ca. 40 km N.W. of Eséka (♂ fl. Dec.) W. J. DE WILDE c.s. 1428 (WAG); *ibid.* (♂ fl. Dec.) W. J. DE WILDE c.s. 1428-B (WAG); ca. 50 km S.W. of Eséka, 40 km S. of Badjob, near Nyong R. (mature fr. Dec.) W. J. DE WILDE c.s. 1532 (WAG); Nkolbisson, ca. 8 km W. of Yaoundé (♂ fl. Jan.) W. J. DE WILDE c.s. 1686 (WAG); ca. 60 km N.N.W. of Eséka, passing the Kèlè R. (♂ fl. March) W. J. DE WILDE c.s. 2185 (WAG); Mt. Fèbé, near Yaoundé (♀ fl. Nov.) W. J. DE WILDE c.s. 3793 (WAG); Tiko (fl. Jan.) DUNLAP 170 (K); sin. loc. (♂ fl. June) GANDOGIER s.n. (MO); 53 km S.W. of Eséka, S. of Nyong R. (♂ fl. March) LEEUWENBERG 5093 (WAG, with flowers in spirit); 8 km W. of Masok (♀ fl. and young fr. March) LEEUWENBERG 5229 (WAG, with flowers in spirit); ca. 67 km E. of Yaoundé, along road to Ayos (young fr. May) LEEUWENBERG 5723 (WAG, also spirit material); 15 km N. of Bertoua, along road to Dengdeng (♂ fl. Febr.) LEEUWENBERG 7792 (WAG, with flowers in spirit); near Mekomo, ca. 8 km S.W. of the confluence of Dja and Lobo Rivers (♀ fl. March) LÉFOUZEY 4576 (P, WAG); Victoria Distr. (fl.) MAITLAND 406 (K); Amba Bay (♀ fl. Febr.) MANN 20 (K, lectotype of *T. rubescens* OLIV.); Moloundou Distr., confluence of Bange R. and Bumba R. (♂ fl. Febr.) MILDBRAED 4495 (HBG); Moloundou Distr., 2 50'N.-15 15'E. (veget. Febr.) MILDBRAED 4577 (HBG); near Dengdeng (immature fr. April) MILDBRAED 8824 (K); near Bafoussam (young fr. March) REROLLE 1533 (P); near Yaoundé (fr.) SERV. FOR. DU CAMEROUN 48 (IFAN); Victoria (♂ fl. buds Oct.) WINKLER 529 (G, WRSL); Johann-Albrechts-höhe (♂ fl. buds Dec.) WINKLER 1028 (WRSL); sin. loc. (♀ fl. and young fr. Febr.) WINKLER 1113 (WRSL); near Yaoundé (veget.) ZENKER 409 (COI, NY); Bipindí (♂ fl.) ZENKER 1058 (BM, E, G, GOET, K, L, M, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 2601 (BM, COI, E, G, GOET, K, L, M, S, W, WRSL); *ibid.* (young fl. buds) ZENKER 3000-a (partly) (BR, COI, GOET, L, M, MO, P, S, W; mixed with *T. gilgiana* HARMS also in; BM, E, and WRSL); near Yaoundé (♂ fl.) ZENKER and STAUDT 141 (BM, COI, K, UC); *ibid.* (young ♂ fl. buds) ZENKER and STAUDT 671 (BM, COI, K, S, WRSL).

Fernando Póo: sin. loc. (♂ fl. Jan.) MANN 163 (partly) (K, P, paratype of *T. rubescens* OLIV.); near Bahía de San Carlos (gall-fruits Oct.) MILDBRAED 7004 (HBG).

Río Muni: Mundúnga (♂ fl. April) TESSMANN 343 (K); Campo R. region, road to Sesang (♀ fl. Oct.) TESSMANN 587 (K); sin. loc. (♂ fl.) TESSMANN 920-A (K).

Central Afr. Rep.: near Yalinga (♂ fl. buds Dec.) LE TESTU 4447 (BM, IFAN, K, UC); near M'Baiki (♂ fl. Febr.) TISSERANT 3700 (P).

Gabon: Libreville (♂ fl.) KLAINE 1233 (P, lectotype of *T. papillosa* PIERRE ex CHEV.); *ibid.* (♂ fl. Sept.) KLAINE 1465 (E, P, paratype of *T. papillosa* PIERRE ex CHEV.); sin. loc. (gall-fruits) KLAINE 3264 (IFAN); upper course of N'Gounyé R. (veget.) LE TESTU 5499 (NY); *ibid.*, near Mitíngo (♂ fl. Sept.) LE TESTU 5504 (BM); *ibid.* (♂ fl.) LE TESTU 5544 (S).

Congo (Brazzaville): road to Kinkala (♂ fl. July) BOUQUET 233 (P, WAG); bush-road from M'Boumou to Bouénza R. (young fr. Nov.) BOUQUET 772 (P, WAG); Sangha R., 15 km of Ngoko R. (mature fr. July) BOUQUET 1651 (P, WAG); near Ekelimba (veget. July) BOUQUET

1676 (P, WAG); Impfondo, forest along Epéna canal (♂ fl. Jan.) BOUQUET 2048 (P, WAG).

Congo: Equateur: Befale Distr., Bomandja (♂ fl. Febr.) EVRARD 3497 (SRGH); Bolomba Distr., road Bokolongo-Djoa (♂ fl. Febr.) EVRARD 3553 (SRGH); Boende Terr. (very young fr. April) EVRARD 3950 (K, SRGH, WAG).

Orientale: Bambesa (♂ fl. March) GERARD 2290 (BR); *ibid.* (♂ fl. Nov.) GERARD 2447 (BR); near Yangambi (fr. July) GILBERT 1284 (K); Bobedi region (young fr. June) GILBERT 1547 (K); road to Bengamisa (fl. buds March) GILBERT 2173 (BM, K); Yangambi (♂ fl. buds) HOMÈS 212 (WAG); *ibid.* (veget.) HOMÈS 262 (WAG); near Mogandjof (♂ fl. March) M. LAURENT 1939 (BR, holotype of *T. laurentii* DE WILD.); Yangambi, 6 km on road to Ngazi (gall-fruits Oct.) LOUIS 425 (BR, C); Yangambi (young fl. buds Jan.) LOUIS 1175 (K, NY); 51 km on road Yangambi-Bengamisa (♀ fl. buds April) LOUIS 1608 (PRE); 8 km N.E. of Yangambi (fl. buds April) LOUIS 1773 (K); Yangambi, 8 km on road to Ngazi (♂ fl. Oct.) LOUIS 2751 (MO, NY); Yangambi (♂ fl. Febr.) LOUIS 7893 (C); *ibid.*, valley of Lusambila R. (fr. July) LOUIS 10374 (K); Uele, near Bambesa (veget.) PITTEY 606 (BR); *ibid.* (fr.) PITTEY 617 (BR); Faradje (veget. June) TATON 1439 (BR).

Léopoldville: Seke Banza Terr., road Kingoma-Sanzala (♂ fl. Sept.) COMPÈRE 451 (BR); Mayumbe, Ganda-Sundi (♂ fl.) DE BRIEY 68 (BR, holotype of *T. derumieri* DE WILD.); Gimbi (gall-fruits May) J. LAURENT 618 (BR).

Kivu: Kalehe Terr., 110 km on road Kavumu-Walikale, near Irangi (fr. Jan.) CHRISTIAENSEN 1967 (BR); *ibid.* (mature fr. Jan.) CHRISTIAENSEN 1995 (BR); Walikale Terr. (immature fr. June) GUTZWILLER 1161 (BR); Walikale Terr., Mutongo (♂ fl. April) GUTZWILLER 2620 (BR); Walikale Terr., near Binga (immature fr. Oct.) LÉONARD 1377 (K); Masisi Terr. (fr. Dec.) LÉONARD 2009 (K); between Nezelube R. and Kamuhene R. (veget. Sept.) OSMASTON 2240 (BR); 110 km on road Kavumu-Walikale, near Irangi (♂ fl. July) PIERLOT 625 (BR); Kalehe Terr., Buniakiri, Mt. Kahuhu, 68 km on road Kavumu-Walikale, ca. 2°05'S.-28°32'E. (♂ fl. Aug.) PIERLOT 2386 (BR); Kalehe Terr., 2 km on road Buniakiri-Tshigoma, ca. 2°06'S.-28°36'E. (♂ fl. May) PIERLOT 2892 (BR); Kalehe Terr., Lwalimba, 106 km on road Kavumu-Walikale (♂ fl. May) PIERLOT 2919 (BR); Rutshuru Terr., 32 km on road Rutshuru-Katwe, Kisharo Forest, ca. 1°01'S.-29°32'E. (young fr. June) PIERLOT 3036 (BR); Kalehe Terr., ca. 110 km on road Kavumu-Walikale, near Irangi (fl. Sept.) TROUPIN 2494 (K); *ibid.* (fl. buds May) TROUPIN 3360 (K); *ibid.* (fl. May) TROUPIN 3467 (K); *ibid.* (fl. May) TROUPIN 3498 (K); *ibid.* (fl. Aug.) TROUPIN 3940 (K); *ibid.* (♂ fl. Sept.) TROUPIN 4337 (K); *ibid.* (fl. Sept.) TROUPIN 4361 (K); *ibid.* (fl. Oct.) TROUPIN 4546 (K).

Uganda: Bunyoro Distr., Budongo Forest (♂ fl. Febr.) BAGSHAWE 1499 (BM); along road to Bombo (fr. Jan.) CHANDLER 2123 (BR); near Kampala, Namilyango Forest (♂ fl. Febr.) CHANDLER 2741 (BR, K); Ankole region, near Kalinzu (mature fr. Sept.) DALE U-696 (ENT, K); Masaka Distr., ca. 6 km S.S.W. of Katera, Malabigambo Forest (fl. Oct.) DRUMMOND and HEMSLEY 4583 (K); Kirerema (♀ fl. Oct.) DÜMMER 403 (MO); *sin. loc.* (♂ fl. Jan.) DÜMMER 3902 (BM); 20 km on road Kampala-Entebbe (very young fr. March) EGGELING 585 (584) (K); Budugo region (♂ fl. March) EGGELING 1141 (ENT); Ankole region, Kashoya Forest (young fl. buds Aug.) EGGELING 3214 (K); Bunyoro Distr., Budongo Forest (fl. Nov.) EGGELING 3445 (K); *ibid.* (fl. buds April) EGGELING E-3617 (K); *ibid.* (fl. March) HARRIS 635 (K); *ibid.* (very young fr. March) PHILIP MSP-351 (K); Kigezi (fl. April) PURSELOVE P-2664 (K); Mengo Distr., Mukono (♀ fl. Sept.) SNOWDEN 1753 (BM, K); Western Prov., Bunyoro Distr., Budongo For. Res. (veget. Sept.) STYLES 87 (FHO); *ibid.* (♂ fl. Jan.) STYLES 330 (FHO); *ibid.* (immature fr. Jan.) STYLES 330-A (FHO); *ibid.* (♂ fl. Jan.) STYLES 340 (FHO).

Tanzania: Bukoba Distr., Kiamawa (fl. Oct.) GILLMAN 407 (K).

*Trichilia tessmannii* HARMS in ENGL., Bot. Jahrb. 46 : 162. 1911; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1) : 822. 1915; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; PELLEGRIN in Not. Syst. 9(1) : 26. 1940.

Type: TESSMANN no. 1004 (Rio Muni: Campo R. region, Akonango, holotype not seen, destroyed in B; lectotype in K).

Synonyms: *T. lanata* A. CHEV. in Mém. Soc. Bot. France 2(8-d) : 146. 1912; id., Expl. Bot. Afr. Occ. Fr. 1 : 114. 1920; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928 (there erroneously cited as a synonym of *Trichilia priureana* A. JUSS., see also 2nd ed., note on page 705); AUBRÉVILLE, Fl. For. Côt. Iv. 1st ed. 2 : 150, pl. 184 (4-7). 1936; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; PELLEGRIN in Not. Syst. 9(1) : 26, pl. 1B. 1940; EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 313. 1951; NORMAND, Atlas des Bois Côt. Iv. 2 : 76, pl. 86. 1955; DALZIEL, Useful Pl. W. Trop. Afr. : 329. 1955; STANER and GILBERT in Fl. Cong. Belg. 7 : 162. 1958; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958; AUBRÉVILLE, l.c. 2nd ed. 2 : 182, pl. 194 (4-7). 1959; IRVINE, Woody Plants of Ghana : 528. 1961; KEAY, ONOCHIE and STANFIELD, Nigerian Trees 2 : 273. 1964. Type: CHEVALIER no. B-22382 (Ivory Coast: Agboville, holotype, P; isotypes, BR and K).

*Trichilia montchali* DE WILDEMAN in Bull. Jard. Bot. Brux. 4 : 378. 1914; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B43. 1922; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; PELLEGRIN in Not. Syst. 9(1) : 27. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 172, tab. 7, fig. C and D. 1941; STANER and GILBERT in Fl. Cong. Belg. 7 : 162. 1958; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958. Syntypes: MONTCHAL no. 152 (Congo: Equateur, Yambata, lectotype, BR), and MORTEHAN no. 296 (ibid., Dundusana, paratype, BR).

*Trichilia mildbraedii* HARMS in Notizbl. Bot. Gart. Berlin 7 (no. 65) : 232. 1917; EXELL c.s. in Journ. of Bot., Br. and Foreign 65 (Suppl. 1) : 63. 1927; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; KENNEDY, For. Fl. South. Nigeria : 164. 1936; GOSSWEILER and MENDONÇA, Carta Fitogeogr. Angol. : 54. 1939; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 172. 1941; PELLEGRIN in Not. Syst. 9(1) : 26. 1940; EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 313. 1951; DALZIEL, Useful Pl. W. Trop. Afr. : 329. 1955; HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958; IRVINE, Woody Plants of Ghana : 528. 1961; KEAY, ONOCHIE and STANFIELD, Nigerian Trees 2 : 273. 1964 (in syn. to *T. lanata*). Type: MILDBRAED no. 4789 (Cameroun: Moloundou, holotype lost, destroyed in B; no isotype seen); neotype: MILDBRAED no. 8694 (Cameroun: near Dengdeng, ca. 250 km N.E. of Yaoundé, K), see notes.

*Trichilia lancei* VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B40. 1922; EXELL c.s. in Journ. of Bot., Br. and Foreign 65 (Suppl. 1) : 63. 1927; GOSSWEILER and MENDONÇA, l.c. : 54. 1939; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 109. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 172. 1941; EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 313. 1951; STANER and GILBERT in Fl. Cong. Belg. 7 : 162. 1958. Type: VERMOESEN no. 1315 (Congo: Léopoldville, Bas Congo, Malela, holotype, BR; isotype in K).

*Trichilia le-testui* PELLEGRIN in Not. Syst. 9(1) : 20. 1940. Type: LE TESTU no. 7406 (Gabon: Lastoursville, holotype, P).

Diagnostic and differential characters. A forest tree, up to 30 m high. Older twigs with conspicuous leaf-scars and characteristic reddish-brown or greyish outer bark, peeling off in rectangular flakes. Leaflets (2-)4-7(-10)-jugate, with 12-26 pairs of lateral nerves, impressed on the upper surface; lower surface with variable indumentum, usually densely tomentose or hirsute. Petals ca. (9-)12-20(-29) by 2-3(-3.5) mm. Disk apparently absent. Fruit conspicuously stipitate, pyriform or subglobose, ca. 2-3 cm diam. (stipe excluded, stipe 0.5-1 cm long), 3-chambered, puberulous or tomentose. Seed 19-21 × 11-14 mm, arillose. Arillodium vermilion, occupying the seed for about 5/6.

Description. Tree, up to 30 m tall and a diameter on breast-high of 70 cm, usually ca. 10-20 m high and diameter ca. 40 cm; bole straight, cylindrical; crown dense; bark ca. 1 cm thick, rather smooth, pale grey with greyish-brown spots or brown, peeling off in plates of ca. 10 by 1-1.5 cm; slash creamy-pink, exuding a little sticky cream-coloured or yellowish latex from the bark, sapwood pale cream, after some time discolouring to pinkish-brown.

Young twigs terete or angular, reddish-brown, hairy, indumentum pale brown or yellowish, more or less dense, varying in type; lenticels absent or indistinct; older twigs terete, sometimes hollow in the centre, the indumentum gradually disintegrating and finally the twigs glabrescent; scars of fallen leaves mostly conspicuous, 4-11 mm high by 5-12 mm broad, very broadly obovate or depressed obovate, often with a hairy bud or separate scar of a fallen inflorescence just above it; outer bark dark reddish-brown or dusky-grey, peeling off in characteristic thin, rather large, mostly rectangular flakes; inner bark paler, brown, hard; wood greyish-white.

Leaves imparipinnate, sometimes paripinnate, (15-)25-45(-75) cm long; petiole terete, slightly flattened on the upper surface, especially near the base, (4.5-)7-14(-17.5) cm long, puberulous, tomentose or hirsute, indumentum pale brown or reddish, similar to the rachis; rachis (2.0-)7-25(-30) cm long, flattened on the upper surface and sometimes sulcate (especially between the insertion of the leaflets), the slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), longitudinally slightly wrinkled; petiolules terete, slightly sulcate on the upper surface, the raised edges

of the petiolar furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see above), tomentose or hirsute, petiולה of terminal leaflet 4–11 mm, the others 1–5 mm long.

Leaflets (2–)4–7(–10)-jugate, opposite or subopposite, variable in shape and size, (3.5–)7.0–17.0(–20.0) by 2.0–6.0(–8.0) cm, distal leaflets largest, narrowly elliptic to elliptic, narrowly ovate or narrowly obovate, proximal leaflets usually smaller; apex mostly acuminate or acute, rarely obtuse, sometimes more or less apiculate (varying within one specimen), often mucronulate by midrib, base symmetric, obtuse or slightly cordate, the terminal leaflet often cuneate; margin distinctly revolute. Upper surface glabrous, midrib impressed, in young and vigorous leaves sometimes hirsute, nerves 12–26 on either side of midrib, impressed, opposite or not, straight, parallel, curving and anastomosing before reaching the margin; veins indistinct. Lower surface densely tomentose or hirsute, indumentum rather varying in type and quantity, sometimes restricted mainly to midrib and nerves; midrib and nerves very prominent, lengthwise wrinkled; veins (if distinct) very finely reticulate.

Inflorescences lax to rather condensed, paniculately arranged, sometimes more or less racemiform, axillary, assembled near the top of the branches, (3–)9–20(–26) cm long; main axes angular or flattened, wrinkled lengthwise, tomentose or hirsute, one or two times branched before the pedicels, branches up to 6 cm long. Bracts early deciduous, ca. 5–15 by 2–4 mm, the lower ones largest, higher ones smaller, narrowly ovate to ovate, or narrowly triangular, acute at apex, abaxial tomentose, adaxial glabrescent, often boat-shaped.

Male flowers: Pedicels up to 7 mm long, sometimes nearly absent, often 2–5 mm long; bracteoles 2, mostly present, not opposite, ca. 3–5 by 1–2 mm, narrowly elliptic to elliptic, similar to the bracts. Receptacle cylindrical, ca. 1–2.5 mm long, slightly tapering to the base, more or less grooved, tomentose or hirsute, jointed to the pedicel. Calyx cup-shaped, 4–6(–9) mm high by 4.5–6.5 mm wide, more or less deeply 5-lobed, lobes imbricate in bud, 2–4 by 1.8–4 mm, broadly ovate or very broadly ovate, obtuse or acute at apex, inside glabrous, outside tomentose. Petals 5, free, imbricate in bud, reflexed during anthesis (9–)12–20(–29) by 2–3(–3.5) mm, narrowly oblong, fleshier and slightly incurved at the obtuse apex, thin and sometimes transparent near the base, inside glabrous, outside puberulous. Staminal tube (7–)12–16(–18) mm long (including the anthers), 10-fid, cleft over about one-third of its length or more, free parts of the filaments 4–6(–7) mm long, glabrous or with some scarce hairs outside, densely tomentose inside and on the margins, connate part of the staminal tube 5–8(–10) mm long, fleshy inside (the fleshy tissue produced on the inner surface ending to above in wedge-shaped raised issues, the tops of the wedges ending at the bases of the sinuses between the free parts of the filaments), glabrous both sides; anthers dorsifix, attached by an extremely short thread-like stalk, inserted in the sinus between two narrowly triangular, outside rough, inside hairy lobes of ca. 0.5–1.0 mm long, at the top of the free part of the filament, 1.3–2.0 by 0.7–1.0 mm, obovate, sometimes slightly mucronulate at apex, rough, opening laterally, lengthwise, pollen well developed. Disk absent.

Ovary sterile, scarcely or not expanded, mostly velutinous, rarely glabrous; supported by the slightly raised, apparently disklike, tissue of the torus, vestigial ovules present; style ca. 10–14 mm long, 0.2–0.8 mm diam., slender, thinly velutinous or glabrous; stigma capitate or discoid, 0.8–1.0 mm high by 1.2–1.8 mm wide, rough, flattened or with a more or less broad, shallow depression at apex.

Female flowers: Similar to male flower, but anthers slightly smaller, not dehiscing, not producing pollen. Ovary well developed, ovoid, slightly trigonous (or tetragonous), very densely velutinous, ca. 3 mm diam., 3(–4)-celled; ovules 2 in each cell, axile, collateral; style 6.5–10 mm long; stigma as in male flower.

Fruit a 3(–4)-chambered capsule, subglobose or pyriform or slightly trigonous, and often mucronulate by style remnant, ca. 2–3 cm diam. (stipe excluded), conspicuously stipitate (stipe 0.5–1.0 cm long, up to 0.8 cm thick), grooved between the chambers, puberulous, tomentose or velutinous, pinkish, purple or purplish-red, loculicidally dehiscent, 3(–4)-valved; valves transversely wrinkled.

Seeds 2 in each chamber, collateral (sometimes 1 seed reduced by abortion or only backward in development), near the apex attached to the funicle, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Mature seed 19–21 mm long by 11–14 mm broad, arillodiate, more or less plano-convex, flat on the adjacent sides; testa for the largest part developed into a fleshy arillodium (sarcotesta); arillodium orange-red, up to 2.5 mm thick, occupying the surface of the seed for about 5/6, leaving dorsally a spot of glossy, leathery, dark brown or blackish testa, which measures ca. 7–8 mm in diam.; cotyledons firm, fleshy, greenish-brown, plano-convex, ca. 13–16 by 5–7 mm; radicle narrowly elliptic, somewhat flattened, ca. 1.5–2.5 by 0.5–1.0 mm, included between the cotyledons at about 3 mm beneath the apex.

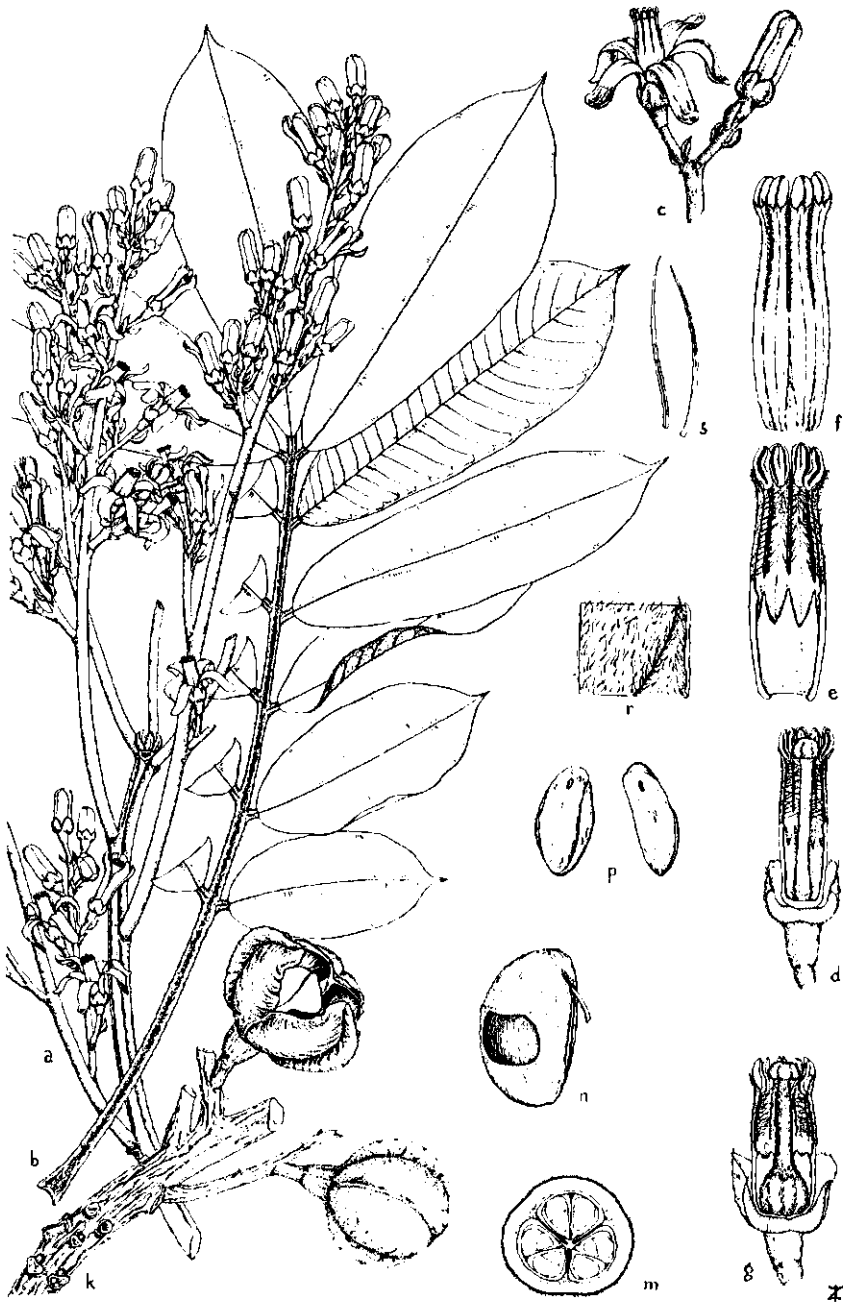
Seedling not seen.

Note 1. *Trichilia tessmannii* HARMS (l.c., 1911) is based on TESSMANN no. 1004 (Rio Muni: Campo River region). The holotype was destroyed at Berlin, but an isotype is at K. The Kew specimen was designated as the lectotype.

TESSMANN no. 1004 concerns a flowering, female specimen. The petals are 18–20 mm long. Young twigs have a pale brown, long and rather dense indumentum. Locally the outer bark is peeling off, and on those places the very dark, nearly black, living bark is exposed. The protologue of *T. tessmannii*,

FIG. 16. *Trichilia tessmannii* HARMS – a: fl. branch, ♂ (× ½); b: leaf (× ½); c: part of inflorescence, ♂ (× 1); d: section of ♂ fl., petals removed (× 2); e: part of staminal tube, inside, ♂ (× 3); f: id., outside (× 3); g: section of ♀ fl., petals removed (× 2); k: branch with fr. (× ½); m: transverse section of young fr. (× 1); n: seed (× 1); p: cotyledons (× 1); r: portion of leaflet, beneath (× 2); s: hairs (× 15). – a, c–f: J. J. DE WILDE 3419 (from spirit mat.); b, m, r–s: CHEVALIER B-22382; g: GOSSWEILER 8007; k, u–p: GERARD 2633 (spirit mat.).





supplied by HARMS (l.c., 1911), fully corresponds with TESSMANN no. 1004, the designated lectotype of *T. tessmannii* HARMS at K.

In the course of the study of this taxon it became clear that *T. tessmannii* HARMS is conspecific with *T. lanata* A. CHEV. Accordingly, on behalf of priority, the well-known name *T. lanata* A. CHEV. (l.c., 1912) must be replaced by that of the earlier, validly published, name *T. tessmannii* HARMS (l.c., 1911), *T. lanata* being a later, heterotypic synonym of *T. tessmannii* HARMS.

Note 2. *T. tessmannii* HARMS is taken here in the wide sense which was adopted previously by STANER and GILBERT (l.c., 1958) for *T. lanata* A. CHEV. These authors state that the indumentum, especially that on the petiole and rachis of the leaf as well as that on the lower surface of the leaflets, is extremely variable as regards quality, quantity, and situation. They found the extremes linked by intermediates, and they conclude that it seems not warranted to distinguish varieties.

In addition to the points stressed by STANER and GILBERT, it appears that shape and dimensions of the calyx and the petals vary. The sepals may be united only at the base and then the free lobes are comparatively long, or they may be united for more than 3/4 of their length, in which case the free parts are short. The length of the petals is varying between 9 and 29 mm.

All these characters vary independently, and no apparent correlation between them is found. The present author also agrees that it is not possible to distinguish well-marked subspecific taxa within *T. tessmannii* HARMS.

One of the best characteristics to recognize *T. tessmannii* in the field and in the herbarium is found in the reddish-brown rhytidoma of the twigs, which peels off early in thin, somewhat brittle, rectangular flakes. This character is also mentioned by some collectors, viz. LETOUZEY (no. 4462, P) and by LOUIS (no. 723, BM, BR, MO).

C. J. TAYLOR (Synecology and Silviculture in Ghana : 200. 1960) stated that in the field *T. tessmannii* (*T. lanata*) may be confused with *Guarea thompsonii* SPRAGUE and HUTCH. because of the presence of latex in the bark. The usually tomentose indumentum on the lower surface of the leaflets of *T. tessmannii*, however, readily makes segregation possible. The above given character of peeling twigs in *T. tessmannii* (a character I never found in *Guarea thompsonii*) is added here.

A possibility of hybridization is suspected. KEAY (in HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 705. 1958) mentioned a tree collected at Idanre in S. Nigeria (KEAY and ONOCHIE no. FHI-21568, not seen), that might be a hybrid between *T. lanata* (= *T. tessmannii*) and *T. heudelotii* (= *T. monadelpha*). A Congolese specimen collected by LÉONARD (no. 1785, BR) shows characters pointing in the same direction. The rhytidoma shows the characteristic peeling. The leaves, however, are aberrant in shape, and in nervation. This specimen bears well developed fruits of the type usually found in *T. tessmannii*, but they are more or less verrucose, though not suffering from insect attack, and perhaps most significant, the ovules appear to be abortive and so seeds are lacking.

Notes to the synonyms. *Trichilia lanata* A. CHEV. (l.c., 1912). See above (note 1).

*Trichilia montchali* DE WILDEMAN (l.c., 1914) is based on two syntypes collected in Congo, viz. MONTCHAL no. 152 and MORTEHAN no. 296 (both in BR). MONTCHAL no. 152 is designated here as the lectotype. It concerns a flowering, female specimen. The indumentum on the lower surface of the leaflets is especially found on midrib and nerves. Otherwise, MORTEHAN no. 296 matches in all significant details TESSMANN no. 1004, the type of *T. tessmannii*. It has been pointed out that the indumentum of *T. tessmannii* varies widely. *T. montchali* DE WILD. must be considered a later, heterotypic synonym of *T. tessmannii* HARMS.

*Trichilia mildbraedii* was described by HARMS (l.c., 1917). This description is based on MILDBRAED no. 4789 (Cameroun: Mofoundou). The type material was destroyed at Berlin, and no isotypes could be traced.

At Kew is a duplicate of MILDBRAED no. 8694, collected near Dengdeng in Cameroun. This specimen is named on the label, in the original handwriting of Harms: '*Trichilia mildbraedii* HARMS'. Notwithstanding the fact that MILDBRAED no. 8694 is a vegetative specimen, it doubtless belongs in *T. tessmannii*. As far as vegetative characters are concerned, it matches the description of *T. mildbraedii*, supplied by HARMS. MILDBRAED no. 8694 (K) is designated here as the neotype of *T. mildbraedii* HARMS.

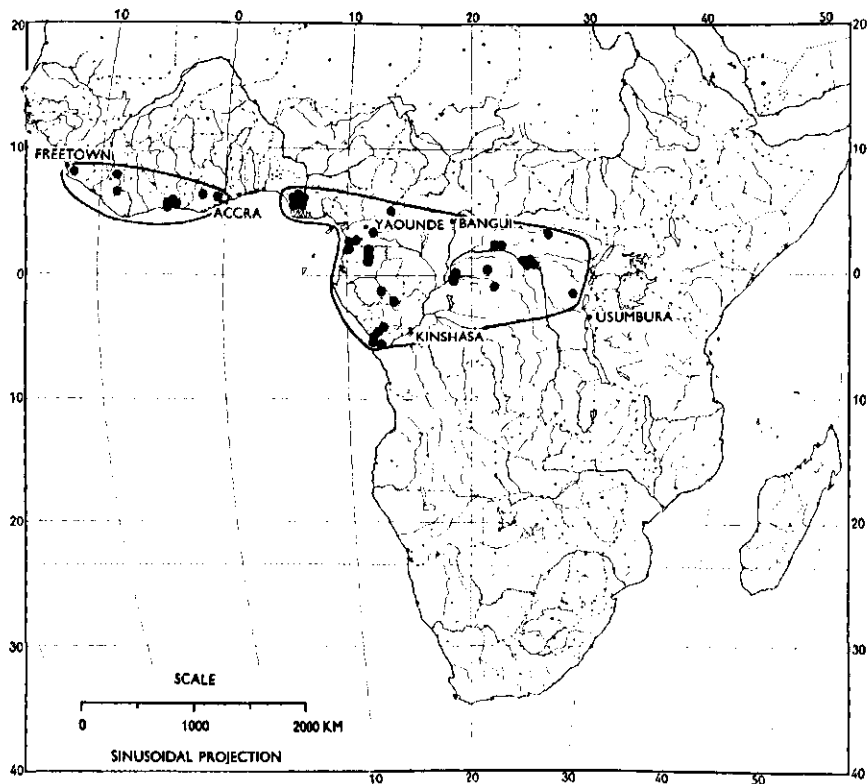
A specimen collected by JOHN GOSSWEILER (no. 8007, BM) in Cabinda, bears an annotation by A. W. EXELL stating that it was compared with the type of *T. mildbraedii* at Berlin in 1938. This specimen is composed of twigs partly bearing immature fruits, partly female flowers. It also fully agrees with HARMS's description of *T. mildbraedii*. Mainly the fact that MILDBRAED no. 8694 was collected nearer to the type locality made me prefer this as the neotype (see above). *T. mildbraedii* HARMS is a later synonym of *T. tessmannii* HARMS.

*Trichilia lancei* was published by VERMOESEN (l.c., 1922). He based it on VERMOESEN no. 1315 (Congo: Malela). It was a specimen with mature fruits. The leaflets are densely hirsute on the lower surface. There are ca. 16 nerves on either side of the midrib, both nerves and midrib are distinctly impressed on the upper surface of the leaflets. The stout twig shows the characteristic peeling of the reddish-brown rhytidoma. Those, and all other details, fall perfectly within the variation of *T. tessmannii*. *T. lancei* VERMOESEN is reduced here to a synonym of *T. tessmannii* HARMS.

*Trichilia le-testui* PELLEGRIN (l.c., 1940) is, according to the original description, distinguished by a glabrous ovary; all other characters fall well within the variation of *T. tessmannii* HARMS. An examination of the type, LE TESTU no. 7406 (P), collected in Gabon, shows that the petals are very long, viz. up to 29 mm (PELLEGRIN stated 22–23 mm). It concerns a male specimen, the ovary is much reduced, glabrous, and contains vestigial ovules. An attempt to find a correlation between a glabrous ovary and long petals failed, because other male specimens originating from Gabon (e.g. LE TESTU no. 9583) combine long petals with a thinly velutinous ovary. It may be stated that in *T. tessmannii* the

indumentum of the male, vestigial ovary, is highly varying in density, and often this indumentum is very thin. Therefore, a glabrous ovary is accepted here within the variation of *T. tessmannii*. In female flowers a glabrous ovary was never observed. It is concluded that *T. le-testui* PELLEGR. must be placed in the synonymy of *T. tessmannii* HARMS.

**Distribution.** Guinea, Sierra Leone, Liberia(?), Ivory Coast, Ghana, Dahomey (not verified), Nigeria, Cameroun, Rio Muni, Gabon, Congo, and Cabinda.



MAP 15. Distribution of 16. *Trichilia tessmannii* HARMS. Continuous lines demarcate the disjunct distribution; the interval is the dry Dahomey gap.

**Distributional and ecological notes.** *T. tessmannii* occurs in the Guineo-Congolian rain forest region in Moist Forests at low and medium altitudes (KEAY et al., Vegetation Map of Africa 1959). Especially in the western part of the distributional area it seems to be not very common, often only occurring as solitary specimens. The westernmost limit of the distributional area is reached near Freetown in Sierra Leone (near Njala, DEIGHTON no. 4730,

K). No record, so far, was known from Liberia. VOORHOEVE no. 285 (WAG), collected near Diala, in the N.E. part of Liberia, only consists of a few, loose, male flowers, picked up from the ground. It is with a slight doubt that I refer them to *T. tessmannii*.

Various collectors (viz. LETOUZEY no. 4031, GOSSWEILER nos. 6892, 7088, and 8005) noted that the crown may be spherical or hemispherical. These observations conform my own findings in Ivory Coast, where I observed a tree, standing alone, with a nearly spherical, strongly branched crown of ca. 10 m diam., the branches nearly reaching the ground, and with a straight, only 2 m long, cylindrical bole (DE WILDE no. 3419, WAG).

Judging from collector's notes (LETOUZEY no. 4462, P), and from the statement made in Fl. W. Trop. Afr. 2nd ed. 1(2) : 705, 1958, older trees may have slight buttresses.

No material from Dahomey came to my attention. However, KEAY (in Fl. W. Trop. Afr. 1958) recorded a specimen collected by POISSON, a naturalist who worked in Dahomey between 1875 and 1902. This specimen was collected E. of Hanoi. It seems acceptable to assume that formerly both parts of the disjunct distributional area of *T. tessmannii* were connected by what is known today the Dahomey gap. Even the possibility that it is still found in Dahomey seems not ruled out.

Mature fruits are reported to be bright purplish-red, carmine-pink or brown (W.J. DE WILDE c.s. no. 2871, WAG, CORBISIER-BALAND no. 816, BR, and EVRARD no. 4219, BR).

Among other collectors, EVRARD found *T. tessmannii* in Congo, near Be'ale (no. 4219, BR). It was growing there in half deciduous forest, with dominant *Scorodophloeus zenkeri* HARMS (*Caesalpiniaceae*). LOUIS (no. 723, BM, BR, MO) collected it in more or less primary forest near Yangambi, at 470 m altitude.

GOSSWEILER collected it frequently on banks of the Lufo River in Cabinda (nos. 8005 and 8007), where it seems to be rather common.

Vernacular names. Ivory Coast: *aribanda* (dial. Abé), *ndiabohia* (dial. Ebrié), *dron* (dial. Ouobé), *dandi* (dial. Yacoba).

Nigeria: *iseko* (dial. Yoruba), *ogiovalo* (Benin), *aje* (Ondo).

Cameroun: *lobonda* (pygmies near Zingui).

Congo: *bofondje* (dial. Turumbu), *habua*, *begbobaganda* (Bambesa), *bombe* (dial. Lomongo), *ewenge*, *eoma* (dial. Lokundu), *hosso* (Eala), *esao* (Yambata).

Uses. IRVINE (Woody Plants of Ghana: 528, 1961) reports that the wood seems to be termite resistant and is used in housebuilding. The sapwood is white and the heartwood brownish-red. The same data are given by DALZIEL (Useful Pl. W. Trop. Afr. 2nd reprint : 329, 1955) for *T. mildbraedii*. Both records are presumably based on a statement by UNWIN in West Afr. Forests and Forestry : 330, 1920. UNWIN mentions those data for a *Trichilia* sp. occurring in Nigeria. It seems not possible to verify the identity of this species; no material is cited.

MONTCHAL stated for Congo (Yambata) that the cooked fruits are edible (MONTCHAL no. 152, BR), while CORBISIER-BALAND (no. 1725, BR) mentioned that the bark is locally utilized as a purgative (near Eala).

KENNEDY (For. Fl. South. Nigeria : 164, 1936) stated: 'The seeds are the perquisites of and used by the wives of the Shemowe of Ondo for rattles or tambourines'.

Specimens examined: Guinea: near N'Zérékoré, Diani R. (veget. Jan.) SCHNELL 4224 (IFAN).

Sierra Leone: Njala, 8 6'N.-12 5'W. (veget. March) DEIGHTON 4730 (K).

Liberia: Gio National Forest, ca. 10 km N.N.W. of Diala (♂ fl. May) VOORHOEVE 285 (WAG).

Ivory Coast: near Abidjan (fr.) AUBRÉVILLE 45 (IFAN, K, P); *ibid.* (♂ fl.) AUBRÉVILLE 160 (IFAN, K, P); Agboville (young fr. Nov.) CHEVALIER B-22382 (P, holotype of *T. lanata* A. CHEV.; BR and K: isotypes); Banco Arboretum, near Abidjan (veget. Oct.) DE WILDE 3114 (WAG); Adiopodoumé, 17 km W. of Abidjan (♂ fl. Jan.) DE WILDE 3419 (WAG, with fl. in spirit coll.); *ibid.* (fl. July) HERB. I.D.E.R.T. 1903 (UCI); *ibid.* (veget. May) HERB. I.D.E.R.T. s.n. (UCI).

Ghana: Kumasi (young fr. Febr.) ANDOH 4852 (K); Tafo, W.A.C.R.I. (veget.) DAKO s.n. (GC); S. Formang Su For. Res. (fr. Jan.) VIGNE 2688 (FHO, GC).

Nigeria: Benin Prov., Benin Div., Okomu For. Res. (veget. Dec.) BRENNAN 8608 (K); Western region, Sapoba (♂ fl.) KENNEDY 516 (BM, K, LISJC); *ibid.* (♂ fl.) KENNEDY 1598 (E, FHO, S); *ibid.* (♂ fl.) KENNEDY 1741 (BM, K, LISJC); *ibid.* (♂ fl.) KENNEDY 1846 (BM, FHO, K, MO, NY); *ibid.* (veget.) KENNEDY 1856 (BM, FHO, K, MO, NY, PRE).

Cameroon: ca. 50 km W. of Ebolowa, along the road to Kribi via Akom II (fr. Aug.) W. J. DE WILDE c.s. 2871 (WAG); S. of Zingui, 40 km E.S.E. of Kribi (veget. Jan.) LETOUZFY 4031 (P, WAG); near Dimpam, Akonolinga Distr. (veget. March) LETOUZEY 4462 (P); near Dengdeng, ca. 250 km N.E. of Yaoundé (veget. March) MILDBRAED 8694 (K, neotype of *T. mildbraedii* HARMS).

Río Muni: Campo R. region, Akonango (♀ fl. April) TESSMANN 1004 (K, lectotype of *T. tessmannii* HARMS).

Gabon: Lastoursville Distr. (♂ fl. June) LE TESTU 7406 (P, holotype of *T. le-testui* PELLEGR.); upper Ogooué Lébagni R. (♂ fl. April) LE TESTU 8031 (BM); region of the Voleu R. and Ntem R., near Oyem (♂ fl. Dec.) LE TESTU 9409 (BM); *ibid.*, near Acouréznork (♀ fl. Dec.) LE TESTU 9437 (BM, FHO, MO, NY, P, S, UC); *ibid.*, near Elelem (♂ fl. May) LE TESTU 9583 (BM, IFAN, K, PRE).

Congo: Equateur: Eala, near Coquilhatville (veget.) CORBISIER-BALAND 816 (BR); *ibid.* (♂ fl. Febr.) CORBISIER-BALAND 1725 (BR); *ibid.* (♂ fl.) BOT. GARDENS EALA 117 (BR); Wema, 90 km E. of Bombe (♀ fl. Sept.) DUBOIS 736 (BR); source of Ikelemba R., Befale Terr. (fr. May) EVRARD 4219 (BR, K); Basankusu Terr., road Bokakata to Bolomba (fr. Sept.) EVRARD 4817 (FHO, WAG); Yambata (♀ fl. Dec.) MONTCHAL 152 (BR, lectotype of *T. montchali* DE WILD.); Dundusana, Bumba Terr. (♂ fl.) MORTEHAN 296 (BR, paratype of *T. montchali* DE WILD.).

Orientale: Yangambi (♂ fl. March) DONIS 3787 (BR); Bambesa (mature fr. Jan.) GERARD 2633 (BR); Yangambi, Isalowe Reserve (♂ fl. May) GERMAIN 347 (BR); Yangambi (veget.) HOMÈS 258 (WAG); 7 km N. of Yangambi (young fr. Nov.) LOUIS 723 (BM, BR, K, MO).

Léopoldville: Malela (mature fr. Jan.) VERMOESEN 1315 (BR, holotype of *T. lancei* VERMOESEN; K, isotype).

Kivu: Kabunga, Walikale Terr. (fr. Nov.) LÉONARD 1785 (FHO, K).

Angola: Cabinda: Maiombe, Buco Zau (♀ fl. Febr.) GOSSWEILER 6892 (BM, COI, K, LISJC, LISU); *ibid.*, near Belize (young fr. March) GOSSWEILER 7088 (BM, K, LISU); *ibid.*, Lufo R., Caio, Hombe Distr. (♀ fl. April) GOSSWEILER 8005 (BM, COI, LISJC, LISU); *ibid.* (immature fr. and ♀ fl. April) GOSSWEILER 8007 (BM, K, LISJC, LISU); *ibid.* (young fr.) GOSSWEILER s.n. (COI); *sin. loc.* (immature fr.) GOSSWEILER 5849 (LISJC).

*Trichilia welwitschii* C.DC. in A. and C.DC., Mon. Phan. 1 : 659. 1878; HIERN, Cat. Afr. Pl. collected by WELWITSCH 1853-'61 Dicot. 1 : 133. 1896, pro parte, excl. var. *grandiflora*; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 305. 1897; HARMS in MILDBRAED, Wiss. Erg. Deutsch. Zentr. Afr. Exp. 1907-1908, 2 (Bot.) : 435. 1912; EXELL c.s. in Journ. of Bot., Br. and Foreign 65(Suppl. 1) : 63. 1927; GOSSWEILER and MENDONÇA, Cart. Fitogeogr. Angol. : 80, 88 and 108. 1939; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 23. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 169, fig. 10 and tab. 7(A, B). 1941; EXELL and MENDONÇA in Conspec. Fl. Angol. 1(2) : 313. 1951; STANER and GILBERT in Fl. Cong. Belg. 7 : 161. 1958.

Type: WELWITSCH no. 1312 (Angola: Cuanza Norte: Golungo Alto, Monte de Alta Queta, holotype, BM; isotypes, COI, K, LISU, M).

Synonyms: *Trichilia zenkeri* HARMS in ENGL., Bot. Jahrb. 23 : 161. Sept. 1896; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306. June 1896 (*nomen nudum*); PELLEGRIN in Not. Syst. 2 : 73. 1911; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; PELLEGRIN in Not. Syst. 9(1) : 23. 1940 (in syn. of *T. heudelotii* PLANCH. ex OLIV.); HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; DALZIEL, Useful Pl. of W. Trop. Afr. 2nd reprint : 330. 1955 (pro parte, excl. the supposed occurrence in Ivory Coast); HUTCH. and DALZ., Fl. W. Trop. Afr. 2nd ed. 1(2) : 704. 1958 (in syn. of *T. heudelotii* PLANCH. ex OLIV.). Type: ZENKER no. 765 (Cameroun: Yaoundé, holotype not seen, destroyed in B; lectotype, GOET; iso-lectotypes: BM, COI, K, M, NY, S, WRS�).

*Trichilia pynaertii* DE WILD. in Ann. Mus. du Congo, Sér. 5 (Bot.) 2 : 265. 1908; TH. and HÉL. DURAND, Syll. Fl. Cong. : 92. 1909; id. in Bull. Jard. Bot. Brux. 2 : 92. 1910; DE WILDEMAN in Ann. Mus. du Congo, Sér. 5(Bot.) 3 : 216. 1910; DE WILDEMAN, Compagnie du Kasai : 326. 1910; PELLEGRIN in Not. Syst. 2 : 74. 1911; DE WILDEMAN in Bull. Jard. Bot. Brux. 5 : 286. 1919; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B48. 1922; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 24. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 169 and 172. 1941; STANER and GILBERT in Fl. Cong. Belg. 7 : 161. 1958. Syntypes: PYNAERT no. 1070 (Congo: Equateur, Eala, lectotype, BR) and SAPIN s.n. (Congo: Madibi, paratype, BR, not seen).

*Trichilia caloneura* PIERRE ex PELLEGR. in Not. Syst. 2 : 74. 1911; CHEVALIER, La Forêt et les Bois du Gabon, in Vég. util. Afr. trop. Franç. 9 : 125. 1917; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 24. 1940. Type: KLAINE no. 486 (Gabon: Libreville, holotype, P).

*Trichilia oddoni* DE WILD. in Bull. Jard. Bot. Brux. 4(3) : 379. 1914; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B45. 1922; HARMS in Nat. Pflanzenf. 2nd

cd. 19B1 : 110. 1940; PELLEGRIN in Not. Syst. 9(1) : 24. 1940, pro parte; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 169 and 172. 1941; STANER and GILBERT in Fl. Cong. Belg. 7 : 161. 1958. Type: ODDON in coll. GILLET no. 3552 (Congo: Léopoldville: near Sanda, holotype, BR).

*Trichilia kisoko* DE WILD. in Bull. Jard. Bot. Brux. 4(3) : 377. 1914; DE WILDEMAN, Mission Forest. et Agric. du J. DE BRIEY : 172. 1920; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B39. 1922; PELLEGRIN in Not. Syst. 9(1) : 21. 1940; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940; STANER in Bull. Jard. Bot. Brux. 16 (2-3) : 161. 1941; STANER and GILBERT in Fl. Cong. Belg. 7 : 166. 1958. Type: DE BRIEY no. 29 (Congo: Mayombe, Ganda-Sundi, holotype, BR; isotype in P).

Diagnostic and differential characters. Small or medium-sized tree, up to 30 m tall. Leaflets (3-)5-7(-8)-jugate, acuminate or cuspidate (rarely acute) at apex. Upper surface of leaflets glabrous except for some short indumentum in the furrow of the impressed midrib (indumentum not exerted from the furrow); lower surface short but dense pubescent or tomentose (more rare puberulous or glabrescent); indumentum silvery, pale brown or reddish-brown; the short matted hairs intermingled with very minute brown or blackish glandular secretions (microscope!). Petals 7-9(-9.5) mm long. Connate part of staminal tube glabrous inside. Anthers more or less hairy on dorsal side. Disk apparently absent. Ovary 2-celled. Fruit completely 2-chambered, fig-shaped or globular, laterally slightly compressed, 11-15 × 13-18 mm (stipe excluded), markedly stipitate. Stipe 3-9 mm long. Arillodium (sarcotesta) occupying the surface of the seed nearly entirely. Nigeria to Angola.

Description. Small or medium-sized tree, (5-)10-20(-30) m tall, bole usually cylindrical (9-)15-30(-60) cm d.b.h.; crown rather dense with ascending main branches. Bark thin, 0.4-0.8 cm thick; rhytidoma outside smooth or slightly rough, with small longitudinal dilatation lines, grey or brown; slash pale pinkish, soon changing to reddish-brown, odourless or with faint cedar smell, the inner bark near the cambium exuding a bit of sticky, pale cream or yellowish latex; sapwood greyish-white.

Young twigs terete or flattened, brown, shortly and densely pubescent; lenticels absent or inconspicuous; older twigs terete, brown, densely pubescent, indumentum becoming looser with age, and finally the twigs glabrous; outer bark thin, not peeling off, greyish-brown, inner bark thin, dark brown; wood cream or whitish.

Leaves imparipinnate, sometimes the terminal leaflet missing and the leaves paripinnate, (15-)30-50(-75) cm long; petiole terete, sometimes more or less flattened on the upper surface, shortly and densely pubescent, wrinkled lengthwise, pulvinus slightly swollen and contracted at the insertion, (5-)6.5-11.5 (-18) cm long; rachis (7.5-)10-25(-36) cm long, flattened or sulcate on the upper surface (especially near and between the insertion of the leaflets), the



slightly raised edge of the flattened side continued as the raised edge of the petiolular furrow (see below), otherwise similar to the petiole; petiolules terete, sulcate on the upper surface, the raised edges of the petiolular furrow decurrent in the slightly raised edge of the flattened side of the leaf-rachis (see above), pubescent, longitudinally wrinkled, petiolule of terminal leaflet (5-)10-15(-28) mm, the others (3-)4-7(-10) mm long.

Leaflets (3-)5-7(-8)-jugate, opposite or subopposite, obscurely glandular dashed and dotted if young, (4.5-)7-16(-25) by (2-)3-5(-7.5) cm, distal leaflets largest, narrowly obovate or narrowly elliptic, proximal leaflets smaller, narrowly elliptic to elliptic, narrowly oblong, or narrowly ovate to ovate, other leaflets intermediate; apex acuminate or cuspidate, sometimes acute, often the extreme apex mucronulate by the midrib, base cuneate or obtuse, margin often narrowly revolute. Upper surface glabrous except for some rather short indumentum in the furrow of the impressed midrib and near the bases of the slightly impressed nerves, nerves (10-)12-20 on either side of midrib, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin; veins indistinct. Lower surface very shortly but often densely pubescent or tomentose (sometimes puberulous or rarely even glabrescent), the indumentum silvery, pale brown or reddish-brown, consisting of short, matted, soft hairs, sometimes these hairs with a brownish glandular canal in the centre near the base, and of very minute pin-points of brown or blackish glandular secretions, only visible by microscope (in some rare cases the indumentum scarce, but glandular secretions nearly always present); midrib and nerves prominent; veins laxly reticulate or indistinct.

Inflorescences lax to rather condensed, paniculately arranged, axillary, supra-axillary or pseudo-terminal, often assembled near the top of the branches, (5-)10-20(-30) cm long; main axes flattened or angular, wrinkled lengthwise, shortly pubescent or tomentose, one, two or three times branched before the pedicels, branches up to 8 cm long. Bracts early deciduous, ca. 2.5-3.5(-5.0) by 1.5-2.5 mm, triangular, broadly triangular or ovate, often boat-shaped, acute at apex, abaxial densely pubescent or tomentose, adaxial slightly pubescent especially near the base.

Male flowers: Pedicels 0.5-2.0 mm long, densely pubescent, longitudinally wrinkled; bracteoles 2 (often 1, or bracteoles absent), very early deciduous, 1.8-3 by 1-2 mm, similar to the bracts. Receptacle cylindrical, 1-2 mm long, densely pubescent, jointed to the pedicel. Calyx cup-shaped, ca. 1.5-3 mm high by 4-5 mm wide, deeply 5-lobed, lobes imbricate in bud, 1.5-2.3 by 1.4-2.2 mm, ovate or broadly ovate, acute or obtuse at apex, rather thick and fleshy, thinner near the margin, outside pubescent, irregularly wrinkled, inside smooth and glabrous, margin ciliate. Petals 5, free, imbricate in bud, spreading during anthesis, slightly fleshy, 7.0-9.0(-9.5) by 1.7-2.3 mm, narrowly oblong, slightly incurved at the obtuse apex, inside glabrescent (minutely papillate), outside finely pubescent. Staminal tube (4.5-)5-6.5(-7) mm long (including the anthers), 10-fid, cleft over about  $\frac{3}{5}$  of its length, free parts of the filaments ca. 2-3 mm long, glabrescent or slightly pubescent outside, densely tomentose

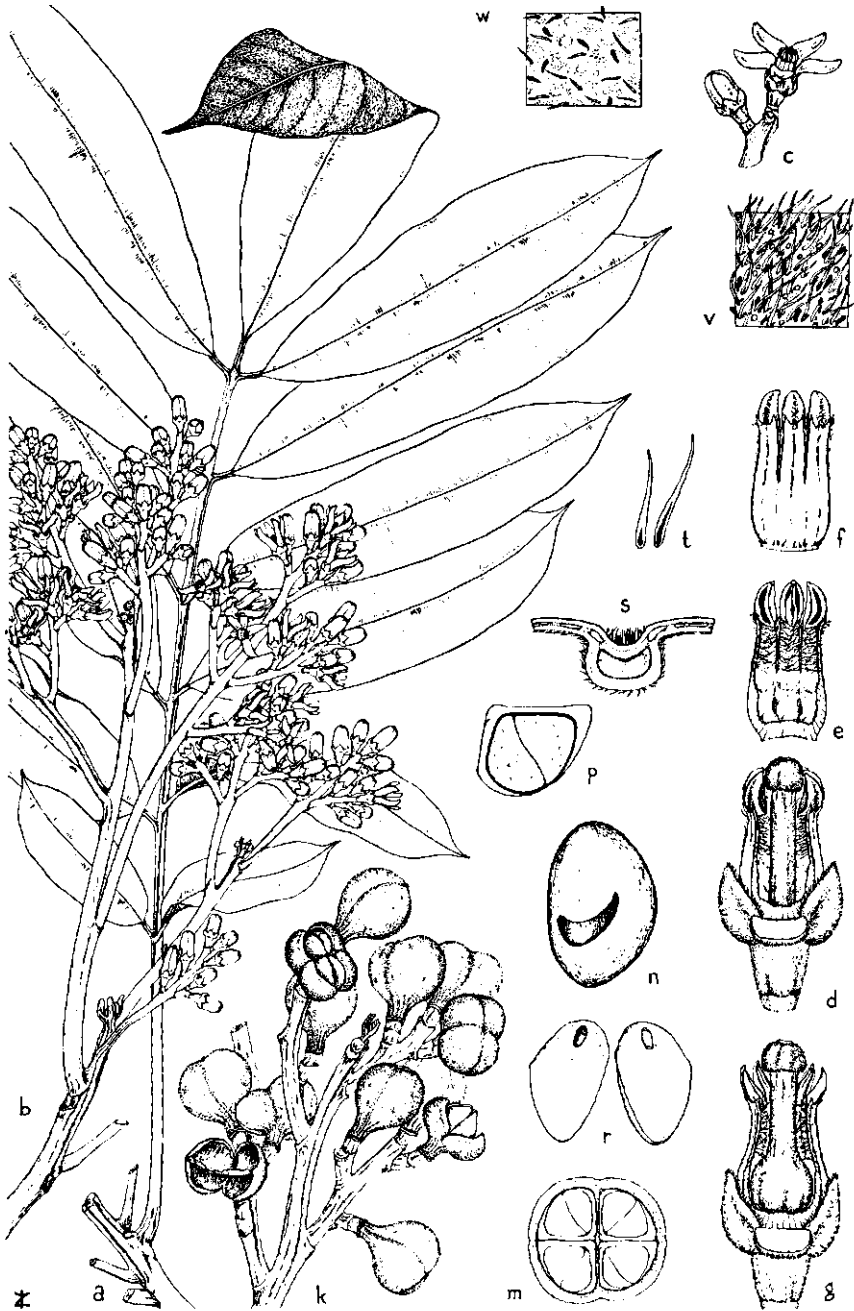
inside and on the margins, connate part of the staminal tube (1.0–)2–2.5 (–2.8) mm long, glabrous (rarely with some scarce hairs) and somewhat fleshy inside (the fleshy tissue produced on the inner surface ending to above in wedge-shaped raised issues, the tops of the wedges ending beneath the bases of the sinuses between the free parts of the filaments), outside more or less hairy or also glabrous; anthers dorsifix, attached near the base by an extremely short stalk, inserted in the sinus between two narrowly triangular, inside hairy lobes of 0.1–0.5 mm long, at the top of the free part of the filament, 1.0–2.0 by 0.3–0.6 mm, narrowly oblong or narrowly ovate, mucronulate at apex, more or less hairy on the dorsal side and especially near the insertion, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, pubescent, vestigial ovules present; style (3.5–)4–6 (–6.5) mm long, 0.4–0.8 mm diam., pubescent; stigma globular, 0.7–1.1 mm diam., outside longitudinally slightly furrowed, clothed with a velvety tissue of very minute trichomes and there often adherent to the anthers, mostly glabrous at the apex.

Female flowers: Similar to male flower, but anthers not dehiscing, not producing pollen. Ovary well developed, more or less globular, longitudinally with 6 shallow grooves, ca. 1.5–2.0 mm diam., densely and shortly sericeous, 2(–3)-celled; ovules 2 in each cell, axile, collateral; style slightly shorter than in male flower, 3–4 mm long, densely appressed pubescent; stigma as in male flower.

Fruit a completely 2-chambered, markedly stipitate capsule, more or less fig-shaped or globular, laterally slightly compressed, 2(3–4)-lobed, 11–15 mm high by 13–18 mm broad (stipe excluded), (stipe 3–9 mm long, up to 4 mm thick, tapering to the base, wrinkled lengthwise), very densely, shortly tomentose, often mucronulate by style remnant, pink or violaceous, loculicidally dehiscent, 2-valved; dry valves thick leathery or slightly woody, reniform, transversely wrinkled.

Seeds 2 in each chamber, collateral, sometimes 1 seed reduced by abortion. Mature seed ca. 11–13 by 7–9 mm, arillodiate, more or less plano-convex, flat on the adjacent sides; testa for the largest part developed into a soft and fleshy arillodium (sarcotesta); arillodium orange-red without, whitish within, up to 2 mm thick, occupying the surface of the seed nearly entirely, leaving a dark brown dorsal spot of ca. 3–6 by 2–4 mm of thin leathery testa; cotyledons

FIG. 17. *Trichilia webwitschii* C. DC. – *a*: leaf ( $\times \frac{1}{2}$ ); *b*: fl. branch, ♂ ( $\times \frac{1}{2}$ ); *c*: part of inflorescence, ♂ ( $\times 1$ ); *d*: section of ♂ fl., petals removed ( $\times 4$ ); *e*: part of staminal tube, inside, ♂ ( $\times 4$ ); *f*: id., outside ( $\times 4$ ); *g*: section of ♀ fl., petals removed ( $\times 4$ ); *k*: branch with fr. ( $\times \frac{1}{2}$ ); *m*: transverse section of fr. ( $\times 1$ ); *n*: seed ( $\times 2$ ); *p*: transv. sect. of seed ( $\times 2$ ); *r*: cotyledons ( $\times 2$ ); *s*: transv. sect. of the midrib of a leaflet ( $\times 10$ ); *t*: hairs from midrib of leaflet ( $\times 40$ ); *v*: portion of leaflet, beneath ( $\times 20$ ); *w*: id., showing variability of indumentum ( $\times 20$ ). – *a*: LOUIS 10710; *b–f*: LOUIS 13097; *g*: ODDON in coll. GILLET 3552; *k, n–r*: LOUIS 10929; *m*: GILLET s.n.; *s–v*: EVRARD 3640; *w*: ZENKER 765.



firm, fleshy, pale pinkish-brown, plano-convex, 8.0–10.5 by 4.5–6.0 mm; radicle narrowly ellipsoid, 1.5–2.0 by 0.5–0.8 mm, between the cotyledons at about 0.5–1.0 mm beneath the apex. Endosperm absent.

Seedling not seen.

Notes to the synonyms. *T. zenkeri* HARMS (l.c., 1896) is based on ZENKER no. 765, collected in Cameroun. The holotype was probably destroyed at Berlin. A duplicate present at GOET is designated as the lectotype. All isotypes are erroneously labeled: 'Zenker et Staudt, 1890–1894'; this must be read as 'ZENKER, 25 Febr. 1895' (see under *T. ornithohera* J.J. DE WILDE, pag. 128).

HARMS, in the protologue to *T. zenkeri*, declared that the ovary is 3-locular. The material of the isotypes shows a constantly 2-locular ovary. Most probably HARMS's statement is due to an error of observation or to a printer's error. All other characters of ZENKER no. 765 match perfectly the diagnosis supplied by HARMS.

ZENKER no. 765 shows the following characters. Leaflets obscurely glandular-punctate, thinly appressed puberulous on the lower surface, hairs often with a brownish glandular canal near the base, in between the hairs very minute brownish or blackish glandular trichomes or resinous secretions. It concerns a male, flowering specimen. Petals are 7.3–8.2 by 1.8–2.2 mm. Anthers hairy on dorsal side. Connate part of staminal tube 2.2–2.8 mm long, slightly hairy inside. Ovary distinctly and constantly 2-locular.

All these, and other characters, fall well within the variation of *T. welwitschii*. The connate part of the staminal tube of *T. welwitschii* is mostly glabrous inside, but some hairs may occur.

For these reasons ZENKER no. 765 is considered here a glabrescent form of *T. welwitschii*, the name *T. zenkeri* HARMS being a later heterotypic synonym of *T. welwitschii* C.DC.

*T. pynaertii* DE WILD. (l.c., 1908) is based on two syntypes, viz. PYN'AERT no. 1070 and SAPIN s.n., both collected in Congo. PYN'AERT no. 1070 is designated here as the lectotype. It concerns a male specimen. Already DE WILDEMAN, in a note accompanying the original description of *T. pynaertii*, stated that the main difference which distinguishes this species from *T. welwitschii* is found in a variation of the indumentum, which is less abundant in *T. pynaertii*. The present author found within the natural distributional range of *T. welwitschii* a tendency of the indumentum to become poorer from South to North. However, the main characteristic of the indumentum, the extremely small, resinous secretions, are also very distinct in PYN'AERT no. 1070. For this reason, together with the fact that also otherwise the plant falls perfectly within the variation of *T. welwitschii*, the opinion of recent authors (STANER and GILBERT, l.c. 1958) that *T. pynaertii* must be placed in the synonymy of *T. welwitschii* is followed here.

*T. caloneura* PIERRE ex PELLEGR. was validly published by PELLEGRIN (l.c., 1911). He used for this purpose a manuscript name used by PIERRE for a plant collected by KLAINE (no. 486) in Gabon. The holotype (on loan from P) lacks flowers or fruits. The lower surface of the leaflets is only puberulous. But also

here, as on other vegetative parts, the characteristic indumentum is present. Already PELLEGRIN himself in a later publication (l.c., 1940) concluded that the plant must be identical with *T. welwitschii*. He placed *T. caloneura* in the synonymy of *T. welwitschii*, which proved to be correct.

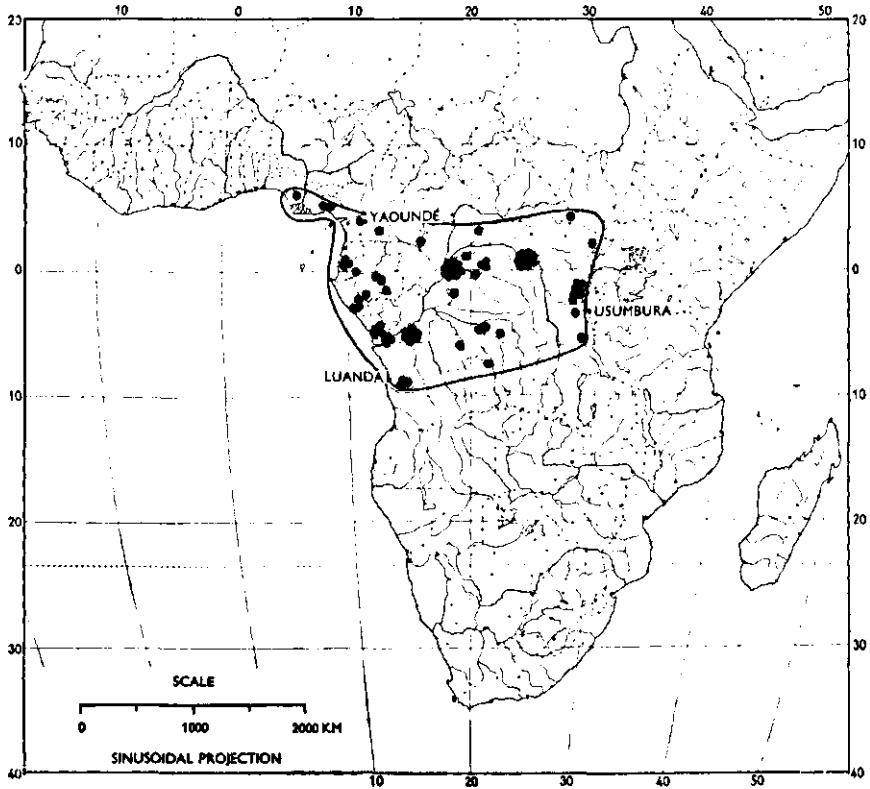
*T. oddoni* DE WILD. (l.c., 1914) was described after a specimen collected by ODDON in Congo (in herb. GILLET, no. 3552). This material represents a female specimen. The indumentum of the leaflets is rather thin and resembles that of the type of *T. caloneura* PIERRE ex PELLEGR. All significant details of flowers and foliage come within the variation of *T. welwitschii*. *T. oddoni* is a later synonym, an opinion already expressed by STANER and GILBERT (l.c., 1958).

*T. kisoko* DE WILD. (l.c., 1914) is based on a specimen collected by DE BRIEY (no. 29) in Bas Congo. It concerns a female specimen. Previous authors, viz. STANER (l.c., 1941) and STANER and GILBERT (l.c., 1958), placed *T. kisoko* in the synonymy of *T. gilgiana* HARMS, without giving a reason. DE BRIEY no. 29 shows the following features: 1. the ovary is constant 2-locular (in *T. gilgiana* as a rule 3-locular); 2. the anthers are distinctly hairy on the dorsal side (in *T. gilgiana* at best rough); 3. the indumentum inside the free parts of the filaments is densely tomentose (not really bearded as is the rule in *T. gilgiana*); 4. the leaflets are only indistinctly glandular dotted (in *T. gilgiana* mostly distinctly glandular dashed and dotted); 5. flowering time of DE BRIEY no. 29 falls in October (all three available records of gatherings made of female flowers of *T. gilgiana* in Bas Congo are in March).

These facts do not make it likely that *T. kisoko* belongs in *T. gilgiana*, but they all point to *T. welwitschii*. The only discrepancy is found in the leaflets, which are nearly glabrous in DE BRIEY no. 29, while in *T. welwitschii* the lower surface of the leaflets is usually shortly but densely hairy. However, as was already pointed out (*T. pynaertii*, *T. caloneura* and *T. oddoni*) that the indumentum on the lower surface of the leaflets of *T. welwitschii* is variable, I see no reason not to accept DE BRIEY no. 29 as a glabrous specimen of *T. welwitschii*. Consequently *T. kisoko* DE WILD. is considered here a later, heterotypic synonym of *T. welwitschii* C.DC.

Distribution. Nigeria, Cameroun, Gabon, Congo, Cabinda, and Angola.

Distributional and ecological notes. *T. welwitschii* is a common species of the central African rain forest area, also occurring in deciduous forests and in gallery forests. Few or no ecological data are available from Nigeria, Cameroun and Gabon. In Congo it is frequently collected; rich collections are in BR. From collectors' notes it is clear that the species is found there especially in secondary forest-types and in ancient cultivated areas. COMPÈRE (no. 623, BR) found it in the M'Vuazi Forest Reserve near Thysville in secondary forest rich in *Elaeis guineensis* JACQ. TOUSSAINT (no. 2095, BR, MO) observed it in stands of *Terminalia superba* ENGL. et DIELS in Bas Congo. Also marshy forest-types are suitable, where it may be found together with *Mitragyna stipulosa* (DC.) O.KTZE. Near Coquilhatville it is repeatedly collected in such



MAP 16. Distribution of 17. *Trichilia welwitschii* C.DC.

marsh forests, and also in forest subject to floods (Eala, COÛTEAUX no. 356, BR). In the surroundings of Yangambi the species is reported to grow in a more primary forest-type dominated by *Scorodophloeus zenkeri* HARMS (LOUIS no. 10929, BR). In the eastern parts of Congo it may be found at an altitude of 1400 m. In these regions it is often reported from gallery forests, e.g. DEVILLÉ (no. 448, BR), collected at an alt. of 1400 m at an affluent of the Ituri River. PIERLOT (no. 622, BR) found it near Walikale at  $1^{\circ}45'S.-28^{\circ}4'E.$ , at 850 m alt., in a forest with *Gilbertiodendron deweyrei* (DE WILD.) J. LÉONARD and *Cynometra* sp. From the same collector is a specimen collected at  $2^{\circ}06'S.-28^{\circ}36'E.$ , in dense secondary vegetation, accompanied by *Musanga cecropioides* R. BR., *Pycnanthus angolensis* (WELW.) WARB., *Trichilia rubescens* OLIV., *Arthrosamanea* sp., and *Albizia* sp., in the area of *Julbernardia sereti*-forest, and at an alt. of ca. 1100 m.

In Cabinda and Angola the species is found in the rain forest region.

Very young leaves of *T. welwitschii* sometimes dry dark brown or blackish, comparable with those of *T. emetica* VAHL (see there). The flowers are white or yellowish and may be fragrant with an odour remembering that of lilacs.

Vernacular names. Not known from Nigeria, Cameroun and Gabon.

Congo: *kaya* (dial. Kindibu), *soko* or *pangi-ya-soko* (dial. Kiumbe), *kisoko* (Ganda-Sundi), *nsowlolo* or *ilolo* (Eala), *dikondo-dibishi* (dial. Baluba and Lulua), *bibadyasi* (dial. Kilendu), *bofondje* or *bolumbe-likolo* (dial. Turumbu), *liloso* (dial. Kundu), *iyundi* or *yundi* (dial. Kirega), *iunji* or *hundji* (dial. Kitembo), *indjolo* (dial. Bashilele), *mabuba* or *obumbo* (Likimi), *mpana* (Kwilu), *sobulolo* (Bangala), *kitulu* (dial. Kikongo), *bokatatumba* or *bokatamatumba* (Boende), *bakoie* or *kongolo* (Nouvelle-Anvers).

Angola: *pau-cahique*.

Uses. As regards utility very little information is given. CORBISIER-BALAND (nos. 1251 and 1694, BR) noted that the wood is bad, easily attacked by insects, and not used in local carpenter's work. MALCHAIR (no. 177, BR) stated that the species is locally used as an enema. DE WILDEMAN (Mission J. DE BRIEY, l.c. 1920) judged the wood as an Acajou of third quality and reports it to be brownish-pink, easy to work, not so hard as that of oak.,

Specimens examined: Nigeria: Sapoba (veget.) KENNEDY 2030 (K); Calabar, Oban (♀ fl.) TALBOT 1712 (BM, K); S. Nigeria, Oban (♂ fl.) TALBOT 1370 (BM).

Cameroun: Bitey, ca. 60 km E.N.E. of Sangmelima (♂ fl.) BATES 1325 (BM); near Yaoundé (♂ fl. Febr.) ZENKER 765 (GOET, lectotype of *T. zenkeri* HARMS; BM, COL, K, M, NY, S, WRSL, iso-lectotypes).

Gabon: Ogooué R. region (♂ fl.) KLAINE 107 (IFAN, K); Libreville (♂ fl. March) KLAINE 122 (NY); Libreville (veget.) KLAINE 486 (P, holotype of *T. caloneura* PIERRE ex PELLEGR.); ibid. (♂ fl. Oct.) KLAINE 2386 (BM, K); Ganda (♂ fl.) LE TESTU 1444 (NY); Nyanga (♂ fl. Oct.) LE TESTU 1816 (BM); Tchibanga (♀ fl. Nov.) LE TESTU 1867 (BM, E); upper course of N'Gounyé R., near Ibagha (♀ fl. Sept.) LE TESTU 5543 (BM, NY, S); upper course of the Ogooué R., near Lastoursville (♂ fl. May) LE TESTU 7318 (BM, IFAN, K, UC); ibid., near Bounzocou (♂ fl. Sept.) LE TESTU 7455 (BM, IFAN, K, P, UC); Lastoursville (♀ fl. Oct.) LE TESTU 7550 (P); upper course of Ogooué R., near Malongo (♂ fl. Sept.) LE TESTU 8389 (BM).

Congo: Equateur: Eala (veget. May) CORBISIER-BALAND 812 (BR, K); ibid. (♀ fl. March) CORBISIER-BALAND 1251 (BR); ibid. (♂ fl. May) CORBISIER-BALAND 1694 (BR, MO); ibid. (♂ fl. Oct.) COÛTEAUX 356 (BR); Basankusu, Lulonga R. (♂ fl. July) DUBOIS 481 (BR, K); Tshuapa Distr., Befale (fl. buds Sept.) DUBOIS 527 (BR); Lolengi, ca. 40 km S. of Befale (fl. buds Febr.) EVRARD 3518 (K, SRGH); Befale (♀ fl. March) EVRARD 3640 (SRGH); Bomputu, ca. 80 km W. of Boende (young fr. April) EVRARD 3971 (SRGH); Eala (♀ fl. May) GERMAIN 8392 (BR); between Bokuma and Bokatola (♂ fl. Sept.) LEBRUN 1364 (BR, NY); Eala (mature fr.) LEEMANS 160 (PRE); Likimi (♂ fl. Febr.) MALCHAIR 177 (BR, K); Eala (♂ fl. Febr.) PYNART 1070 (BR, lectotype of *T. pynaertii* DE WILD.); Eala (♂ fl.) STANER 1298 (C, MO); ibid. (veget. May) VERMOESEN 2288 (S).

Orientale: Stanleyville region (♂ fl. buds March) CLAESSENS s.n. (BR); Haute-Uele, Bangadi (♀ fl. Jan.) DE GRAER 823 (BR); Ituri R. region (very young fr. June) DEVILLÉ 448 (BR); Yabohondo, Lomani R. (♂ fl. buds Oct.) GERMAIN 8115 (BR); Yangambi (♂ fl. and galled, fruit-like pistillodes June) GILBERT 1237 (BR); ibid. (♀ fl.) GILBERT 10290 (BR); ibid. (mature fr.) HOMÈS 246 (WAG); ibid. (veget.) HOMÈS 249 (WAG); ibid. (young fr. June) LÉONARD 786 (BR); ibid. (♂ fl. Febr.) LOUIS 3315 (BR, K); Lieki, Lomani R. (♂ fl. March) LOUIS 3664 (BR, K, MO, NY); Yangambi (mature fr. May) LOUIS 3847 (BR); ibid. (♂ fl. May) LOUIS 4004 (BR, FI); Yalibwa, N. of Yangambi (♂ fl. June) LOUIS 9729 (K, NY); Yangambi (♂ fl. Aug.) LOUIS 10710 (BR, C, K, MO, SRGH); ibid. (♂ fl. Aug.) LOUIS 10784 (MO, NY); ibid. (mature fr. Aug.) LOUIS 10929 (BR); ibid. (♂ fl. Dec.) LOUIS 13097 (C); ibid. (♂ fl. Febr.) LOUIS 13784 (K, MO).

Léopoldville: Lombo, M'Vuazi reserve (♀ fl. Oct.) COMPÈRE 623 (BR, K); Kinkuza (mature fr. Jan.) COMPÈRE 1299 (BR, K, WAG); Kinsika, Madimba Terr. (very young fr. Febr.) COMPÈRE 1464 (BR); Luzumu, Kasangulu Terr. (fl. buds April) COMPÈRE 1957 (BR); Bas Congo, Ganda-Sundi (♀ fl. Oct.) DE BRIEY 29 (BR, holotype of *T. kisoko* DE WILD.; isotype, P); M'Vuazi, Nkolo forest (mature fr. Sept.) DEVRED 652 (BR); Kandale (♀ fl. Aug.) DEVRED 2480 (BR); Luki, valley of the Singa R. (♂ fl. Nov.) DONIS 1545 (BR); Luki, valley of the Luvu R. (mature fr. Jan.) DONIS 1689 (BR); near Sanda (?) (mature fr.) GILLET 3654 (BR); between Kole and Donkese (♂ fl. Oct.) LEBRUN 6396 (BR, MO); near Sanda (♀ fl. Nov.) ODDON in herb. GILLET 3552 (BR, holotype of *T. oddoni* DE WILD.); Luki, valley of the Minkudu R. (♂ fl. Dec.) TOUSSAINT 2049 (BR, K); *ibid.* (immature fr. Dec.) TOUSSAINT 2095 (BR, MO).

Kasai: Mweka Terr., Bena Longo (immature fr. June) DECLERCQ 37 (BR); Port Franqui, near source of the Mishibu R. (mature fr. Dec.) HUET 17 (BR); *ibid.* (mature fr. Dec.) HUET 26 (BR); Dibaya Terr., Kafumba (fr. Jan.) LIBEN 2167 (BR, WAG).

Kivu: Kalehe Terr. (♂ fl. buds May) GUTZWILLER 1858 (BR); Kama (♂ fl.) LEBRUN 5866 (NY); Shabunda, 2 S.-28°25'E. (♂ fl. March) PIERLOT 233 (BR); road Kavumu-Walikale, 1°45'S.-28°4'E. (young fr. Dec.) PIERLOT 622 (BR); Kalehe Terr., road Buniakiri-Tshigoma, 2°06'S.-28°36'E. (♂ fl. May) PIERLOT 2886 (BR); road Kavumu-Walikale (Kavumu 110 km) (♂ fl. May) TROUPIN 3354 (K, NY, WAG); *ibid.*, Irangi, IRSAC For. Res. (fl. buds Aug.) TROUPIN 3994 (K, NY); *ibid.* (fl. Aug.) TROUPIN 4275 (K); *ibid.* (mature fr. Sept.) TROUPIN 9182 (BR).

Katanga: Mahila, 90 km N. of Albertville, Tokamay R. (young fr. Dec.) LETIEXHE in herb. DELVAUX 701 (BR).

Locality in Congo not known or not verified: *sin. loc.* (mature fruits) GILLET *s.n.* (BR); Ebrega forest (♀ fl.) LEBRUN 5585 (PRE).

Angola: Cabinda: Maiombe, Nsala, near Belize (♂ fl. Febr.) GOSSWEILER 7589 (BM, COI, K, LISJC, LISU); *ibid.* (♂ fl. Dec.) GOSSWEILER 7620 (BM, COI, K, LISU); Maiombe, Cayo, Lufo R. (mature fr. Jan.) GOSSWEILER 7715 (BM, COI, K, LISJC, LISU).

Cuanza Norte: Vila Salazar (♂ fl. Sept.) GOSSWEILER 5135 (LISJC); Monte Belo (♂ fl. Dec.) GOSSWEILER 5436 (BM, COI, LISU); Golungo Alto, Monte de Alta Queta (very young fl. buds Nov.) WELWITSCH 1312 (BM, holotype; COI, K, LISU, M, isotypes of *T. welwitschii* C.DC.); *ibid.* (very young fr. Dec.) WELWITSCH 1312-b (BM, LISU).

Lunda: Dundo, Luachimo R. (♂ fl. Oct.) GOSSWEILER 13783 (BM, K).

## 18. *Trichilia zewaldae* J. J. DE WILDE, *sp. nov.*

Fig. 18, 20c; Map 7

Type: W. J. DE WILDE c.s. no. 2848 (Cameroun: ca. 70 km S.W. of Eséka, holotype in WAG; isotypes: BR, K, P).

Arbor mediocris sempervirens. Folia imparipinnata (1-)4-6-jugata, foliolis oppositis vel suboppositis, anguste obovata usque obovata vel anguste ovata usque ovata, basi cuneata vel subobtusata apice acuminata, supra glabra subtus glabrescentia, nervis lateralibus utrinque 9-15(-17), non vel bene glandulosopunctata. Capsula 3-locularis obovoidea usque subglobosa breviter stipitata apice distincte rostrata. Semina in utroque loculo 2 collateralia arillodiata, arillodio fere dimidium seminis obtegenti.

Note: Species dedicated to Miss IKE ZEVALD, who not only prepared most accurate and artistic drawings which form an essential part of the present study,



but also supplied by her careful observations many details which led to a better understanding of the African representatives of the genus *Trichilia*.

**Description.** Small or medium-sized, rather branched tree. Young twigs terete or slightly flattened, very dark brown, shortly but densely tomentose, indumentum grey; older twigs terete, brown or reddish-brown, shortly tomentose, indumentum gradually becoming looser with age, rarely lenticellate (lenticels small, round, ca. 0.5 mm diam.), longitudinally wrinkled or with dilatation lines; outer bark thin, not peeling off, brown, inner bark thin, dark brown; wood whitish, not very hard.

Leaves imparipinnate, sometimes paripinnate in the absence of the terminal leaflet, 29–62 cm long; petiole terete, more or less flattened on the upper surface, especially in the upper part and near the base, very shortly tomentose or puberulous, rather smooth or finely wrinkled lengthwise, 6–15 cm long, pulvinus slightly swollen, wrinkled, contracted at the insertion; rachis (1.5–) 10–25(–30) cm long, (in the rare case of a 3-foliolate leaf the rachis absent), flattened or slightly sulcate on the upper surface, especially near and between the insertion of the leaflets, otherwise similar to the petiole; petiolules terete, narrowly sulcate on the upper surface, wrinkled lengthwise, shortly tomentose, petiolule of terminal leaflet 10–20 mm, the others (4–)5–9(–12) mm long.

Leaflets (1–)4–6-jugate, opposite or subopposite, not or indistinctly glandular-punctate (young leaflets rather distinctly glandular dashed and dotted), 7–19 (–22) by 3–7 cm, distal leaflets largest, narrowly obovate to obovate, proximal leaflets smaller, narrowly ovate to ovate, intermediate leaflets narrowly oblong to oblong; apex acuminate, often mucronulate, base cuneate or obtuse, margin sometimes very narrowly revolute. Upper surface glabrous, sometimes with a very few short hairs in the furrow formed by the impressed midrib, nerves 9–15 (–17) on either side, opposite or not, straight or slightly arched but curving and anastomosing before reaching the margin; veins indistinct. Lower surface glabrescent, the hairs often with a brownish resinous central canal which extends up to the middle or higher; midrib and nerves very prominent, veins slender but distinct, glandular-translucent, rather closely reticulate.

Inflorescences rather lax, paniculately arranged, axillary or supra-axillary, often crowded near the top of the branches, 5–16(–23) cm long; main axes flattened or angular, wrinkled lengthwise, shortly tomentose, once or twice branching before the pedicel, branches up to 9 cm long. Bracts very early deciduous (not seen).

Male flowers: Pedicels up to 4 mm, usually 1–2 mm long, densely tomentose, longitudinally wrinkled; bracteoles 1 or 2, sometimes absent, very early deciduous (not seen). Receptacle cylindrical, tapering to the base, 0.6–2.0 mm long, wrinkled lengthwise, appressed pubescent, jointed to the pedicel. Calyx cup-shaped, 2.5–3.5 mm high by 4.5–6.5 mm wide, deeply 5-lobed, lobes imbricate in bud, 1.4–2.5(–2.8) mm in diam., broadly ovate or broadly triangular, obtuse or acute at apex, rather thick and fleshy, thinner to the margin, outside pubescent, irregularly wrinkled, inside smooth and glabrous, margin shortly

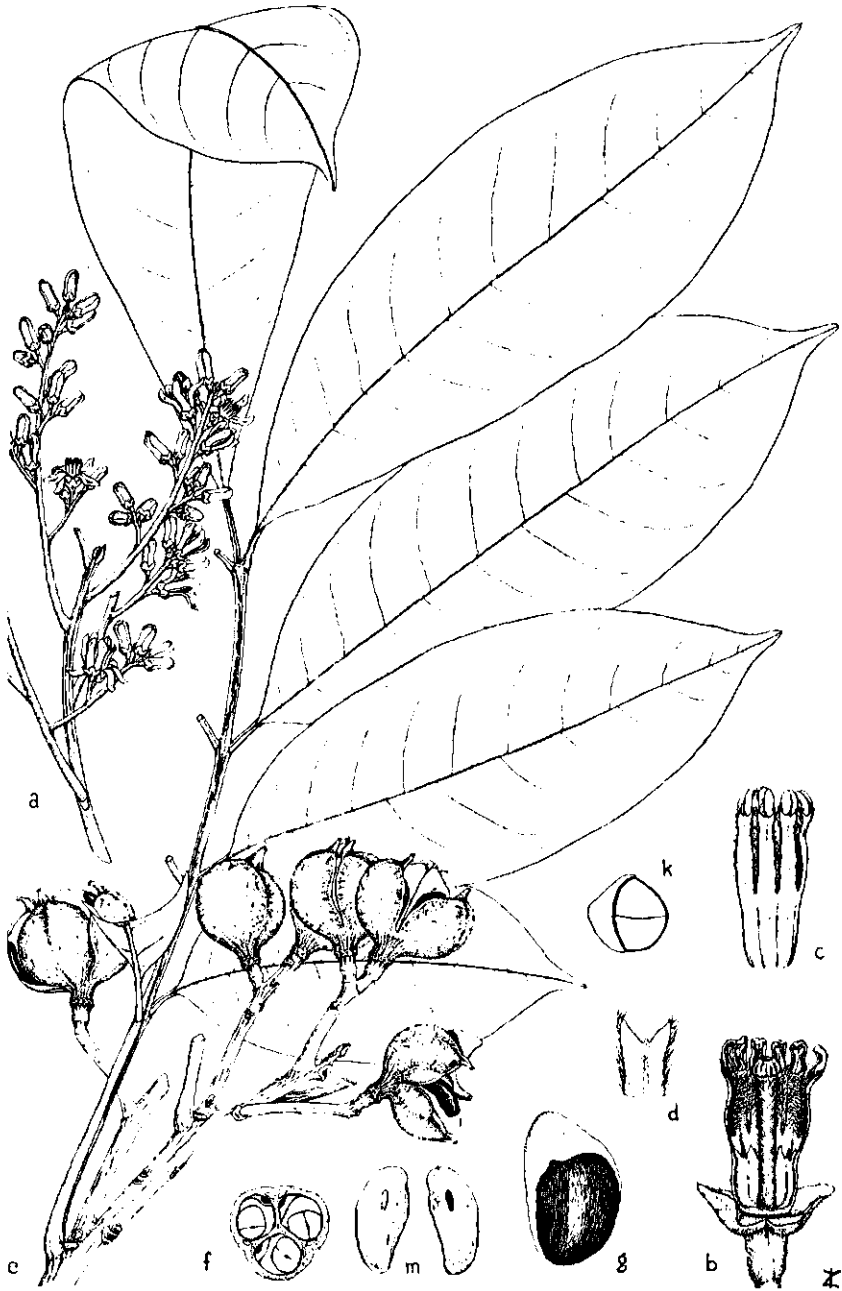
ciliate. Petals 5, free, imbricate in bud, reflexed during anthesis, fleshy in the upper part, (8.2-)9.0-11.3 by (1.6-)1.9-2.5(-2.8) mm, narrowly oblong, often slightly incurved at the obtuse apex, inside glabrous in the lower part, rough by very minute trichomes higher up, outside puberulous. Staminal tube 6.5-8.3 mm long (including the anthers), (9-)10(-11)-fid, incisions to about 3/5 of its length, free parts of the filaments 3.0-4.0 mm long, glabrous outside, densely tomentose with long whitish hairs inside and on the margins, connate part of the staminal tube 2.3-3.6 mm long, glabrous both sides; anthers dorsifix, attached near the base, inserted in the apical sinus between two narrowly triangular or triangular hairy lobes of 0.1-0.7 mm long (often only one of the two lobes developed, but in one flower always lobes present and distinct), at the top of the free part of the filament, 1.4-2.0 by 0.5-0.6 mm, narrowly oblong, mucronulate, glabrous or with very few hairs on the dorsal side, especially near the insertion, otherwise slightly rough, opening laterally, lengthwise, pollen well developed. Disk apparently absent. Pistillode scarcely or not expanded at the base; ovary sterile, pubescent, distinctly 3-celled; ovules vestigial, 2 in each cell, axile, collateral; style 4.8-6.5 mm long, 0.7-1.0 mm wide, rather densely pubescent; stigma subglobose, 0.7-0.9 mm high by 1.0-1.2 mm wide, densely velutinous by very minute trichomes, flattened and slightly 3-lobed at the glabrous depressed apex.

Female flowers not known.

Fruit a 3-chambered, shortly stipitate, distinctly beaked, obovoid-subglobose capsule, slightly 3-lobed, ca. 20-25 mm diam., (stipe excluded), densely covered with a mealy indumentum of very short trichomes, otherwise puberulous, pale brown or brownish-violaceous, loculicidally dehiscent, 3-valved; stipe 2-5 mm long, ca. 6-7 mm thick, slightly tapering to the base, wrinkled lengthwise; beak 3-5 mm long, tapering to the appressed pubescent apex and there abruptly terminated by a circular glabrous scar (where the style is broken off); dry valves thick, more or less woody, broadly obovate, mucronate at apex, rather gradually tapering into a cuneate base, transversely or rather irregularly wrinkled, often slightly verrucose in the upper half.

Seeds 2 in each chamber (often 1 chamber with 2 seeds not or only partially developed), collateral, attached to the funicle ca. 5 mm beneath the apex, funicle running down along the axial side of the seed and inserted near the base of the axillary placenta. Mature seed 19-22 by 11-16 mm, arillodiate, plano-convex, flat on the adjacent sides; testa for about half its surface developed into a fleshy arillodium (sarcotesta); arillodium orange-red without, whitish within,

FIG. 18. *Trichilia zewaldae* J. J. DE WILDE, *sp. nov.* - *a*: part of inflorescence, ♂ ( $\times \frac{1}{2}$ ); *b*: section of ♂ fl., petals removed ( $\times 3$ ); *c*: part of staminal tube, outside, ♂ ( $\times 3$ ); *d*: upper part of filament, outside, anther removed ( $\times 9$ ); *e*: branch with fr. and leaf ( $\times \frac{1}{2}$ ); *f*: transverse section of nearly mature fr. ( $\times \frac{1}{2}$ ); *g*: seed ( $\times 1$ ); *k*: transv. sect. of seed ( $\times 1$ ); *m*: cotyledons ( $\times 1$ ). - *a-d*: W. J. DE WILDE and DE WILDE-DUYFJES 1787; *e-m*: W. J. DE WILDE and DE WILDE-DUYFJES 2848.



developed especially on the flat side, on the apex and near the base of the seed, occupying the surface of the seed for about its half or slightly less, leaving nearly the whole convex dorsal side (15–16 by 10–12 mm) of thin, glossy, blackish, leathery testa; cotyledons firm, fleshy, pale brown outside, whitish within, plano-convex, 13–14 by 5–7.5 mm; radicle narrowly obovoid to obovoid, longitudinally slightly compressed, minutely ciliate with downwards directed hairs on the edge, 2.3–2.7 by 1.0–1.2 mm, between the cotyledons at 2.5–4.0 mm beneath the apex.

Seedling: Germination epigeal. Tap root. Hypocotyl 2.5–4.5 cm long, densely tomentose. Cotyledons opposite or sub-opposite, sessile, fleshy, not developing, falling about 3 months after germination. Epicotyl 3–6.5 cm long, rather thinly pubescent. First two leaves opposite (or sub-opposite), simple, petiolate, ca. 5–7 by 1.5–3 cm, obovate to narrowly obovate or narrowly ovate, cuneate at the base, acuminate at apex, mucronulate, glabrous above except for some indumentum in the furrow of the slightly impressed midrib and primary nerves, glabrescent beneath (normal hairs often mixed with very minute, sausage-shaped trichomes filled with a pale brown resinous content), not or very minutely and indistinctly glandular-punctate. Petiole 5–6 mm, pubescent. Following leaves alternate, simple, gradually becoming larger, up to ca. 15 by 9 cm, ovate or obovate, otherwise similar to the above-described but with petioles up to 7 cm long. The eighth (sometimes only the eleventh) leaf after the cotyledons may be compound and is found to be two or three-foliolate at an age of the seedling of ca. 10 months.

Note. If fruiting material is available, *T. zewaldae* is readily distinguished by its distinctly beaked fruits. More or less apiculate or mucronate fruits occur occasionally in *T. dregeana* SOND., but they never are really beaked as is the case in *T. zewaldae*.

Among the African representatives of the genus *Trichilia*, the only taxon which also shows beaked fruits is *T. grandifolia* OLIV. (see there). *T. grandifolia*, however, is an endemic of São Tomé, and quite different by many characters. Notwithstanding these differences, their distribution pattern, together with the fact that both species have beaked fruits, suggest that *T. zewaldae* and *T. grandifolia* are descendants of a common ancestor. (See also the note under *T. grandifolia* OLIV.).

The holotype of *T. zewaldae* (W.J. DE WILDE c.s. no. 2848) shows leaflets which are very distinctly glandular dashed and dotted. In this character it is close to *T. gilgiana* HARMS, but in the last mentioned taxon I never found beaked (or even apiculate) fruits. Moreover, ZENKER no. 3970, collected in the type locality of *T. zewaldae*, and with distinctly beaked fruits, shows older leaflets which are not or only obscurely glandular dashed and dotted. From this I wonder if glandular punctation is a constant character in *T. zewaldae*.

With some diffidence I refer the above-described, flowering material, to *T. zewaldae*. The flowers have very much in common with *T. monadelpha* (THONN.) J. J. DE WILDE. However, the flowers (especially the calyx) of *T. zewaldae* are in

average slightly larger than of *T. monadelpha*. Moreover, in *T. zewaldae* the connate part of the staminal tube is always glabrous inside, whereas in the vast range of specimens I examined of *T. monadelpha*, the connate part of the staminal tube always showed some hairiness inside. The lobes, or 'teeth', on top of the free parts of the filaments, often very short or not developed in *T. monadelpha*, are always distinct in *T. zewaldae*. In the leaflets no really diagnostic characters are found to segregate *T. zewaldae* from *T. monadelpha*. Nevertheless, the tertiary nervation found in the leaflets of *T. monadelpha* is usually closer, and more distinct, as compared with that of *T. zewaldae*.

The flowering material here described did not agree with *T. monadelpha* (and belonged in no other known species). It was collected in the type locality of *T. zewaldae*. This led me to assume that the flowering twigs probably belong in *T. zewaldae*. Unfortunately, female flowers are not known. Future collecting and research is needed.

Distribution. Cameroun.

Ecological, biological, and distributional notes. *T. zewaldae* seems confined to a small area of Moist Forest in the S.W. part of Cameroun. The holotype (W. J. DE WILDE c.s. no. 2848) was collected South of the Nyong River, ca. 70 km S.W. of Eséka, in more or less primary forest, at an altitude of ca. 200 m. The collector noted that it was a tree, ca. 25 m tall and 60 cm d.b.h., with bright brown stem. W. J. DE WILDE c.s. no. 1787 (WAG), a flowering, male specimen, was collected 10 km N.W. of Eséka, in the border of secondary forest. The collector stated that it was a tree, ca. 7 m tall and 20 cm d.b.h., with very fragrant flowers, which were frequently visited by insects. The flowers are reported to be cream-coloured or greenish-yellow. The gatherings made by ZENKER (nos. 587, 3970, 4659, and 4798) were all collected near Bipindi, ca. 70 km S.W. of Eséka. (See also the holotype, W. J. DE WILDE c.s. no. 2848). Probably *T. zewaldae* is endemic to Cameroun.

Vernacular names and uses. No data came to my attention.

Specimens examined: Cameroun: 10 km N.W. of Eséka (♂ fl. Febr.) W. J. DE WILDE c.s. 1787 (WAG); ca. 70 km S.W. of Eséka, S. of the Nyong R. (mature fr. July) W. J. DE WILDE c.s. 2848 (WAG, holotype of *T. zewaldae*; isotypes in BR, K, P); Bipindi (♂ fl. March) ZENKER 587 (BOL, C, G, MO, NY, UC, WAG); *ibid.* (immature fr.) ZENKER 3970 (BR, COI, E, G, GOET, L, MO, S, WRSL); *ibid.* (♂ fl.) ZENKER 4659 (BM, COI, FHO, G, GOET, K, L, M, S, W, WRSL); *ibid.* (♂ fl.) ZENKER 4798 (BM, COI, G, GOET, L, M, MO, S, W, WRSL).

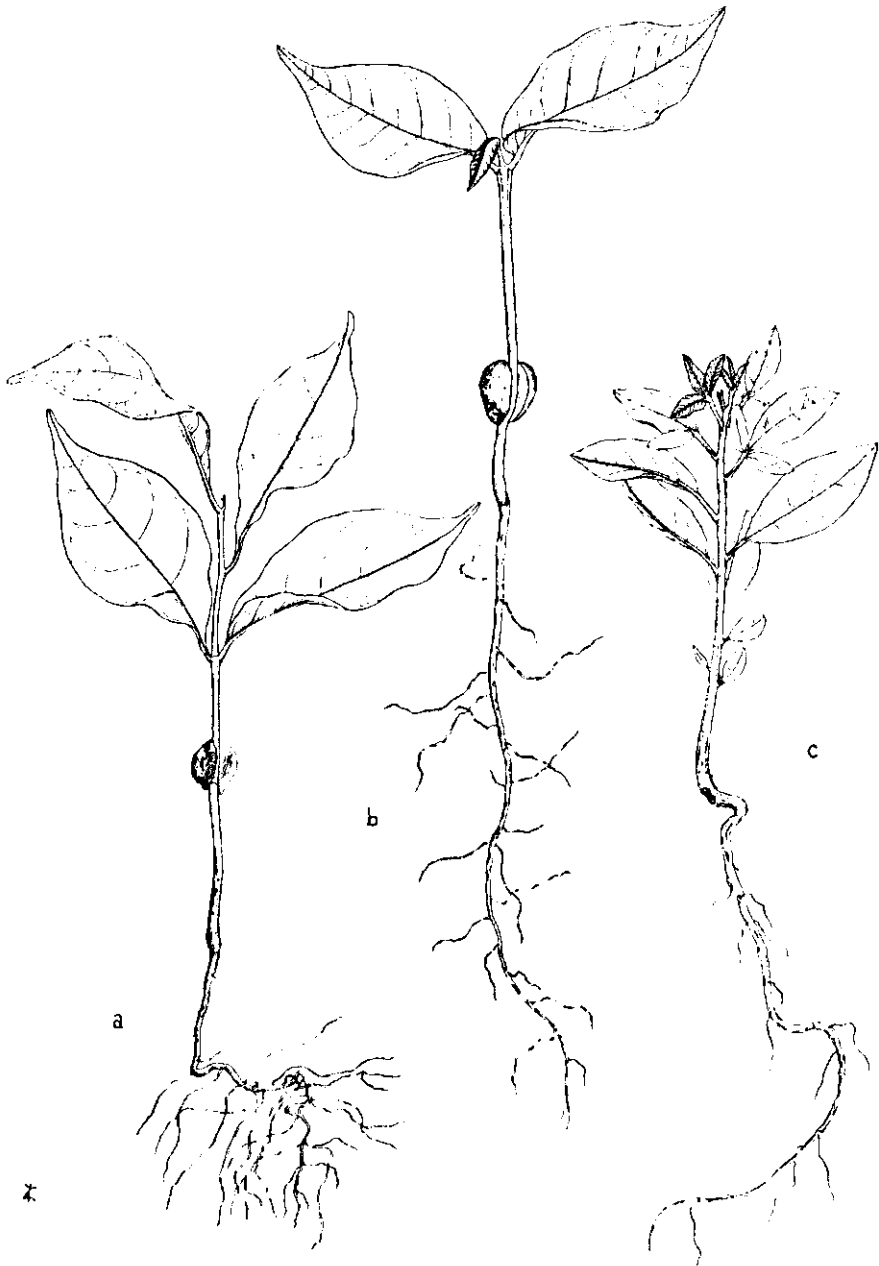


FIG. 19. Seedlings. - a: *Trichilia prieureana* A. JUSS. subsp. *vermoesenii* J. J. DE WILDE ( $\times \frac{1}{2}$ ); b: *Trichilia dregeana* SONN. ( $\times \frac{1}{2}$ ); c: *Trichilia emetica* VAHL subsp. *emetica* ( $\times \frac{1}{2}$ ). - a: LEEUWENBERG 4112 (from spirit mat.!); b: W. J. DE WILDE and DE WILDE-DUYFJES 6913 (spirit mat.!); c: FANSHAWE F-1509.

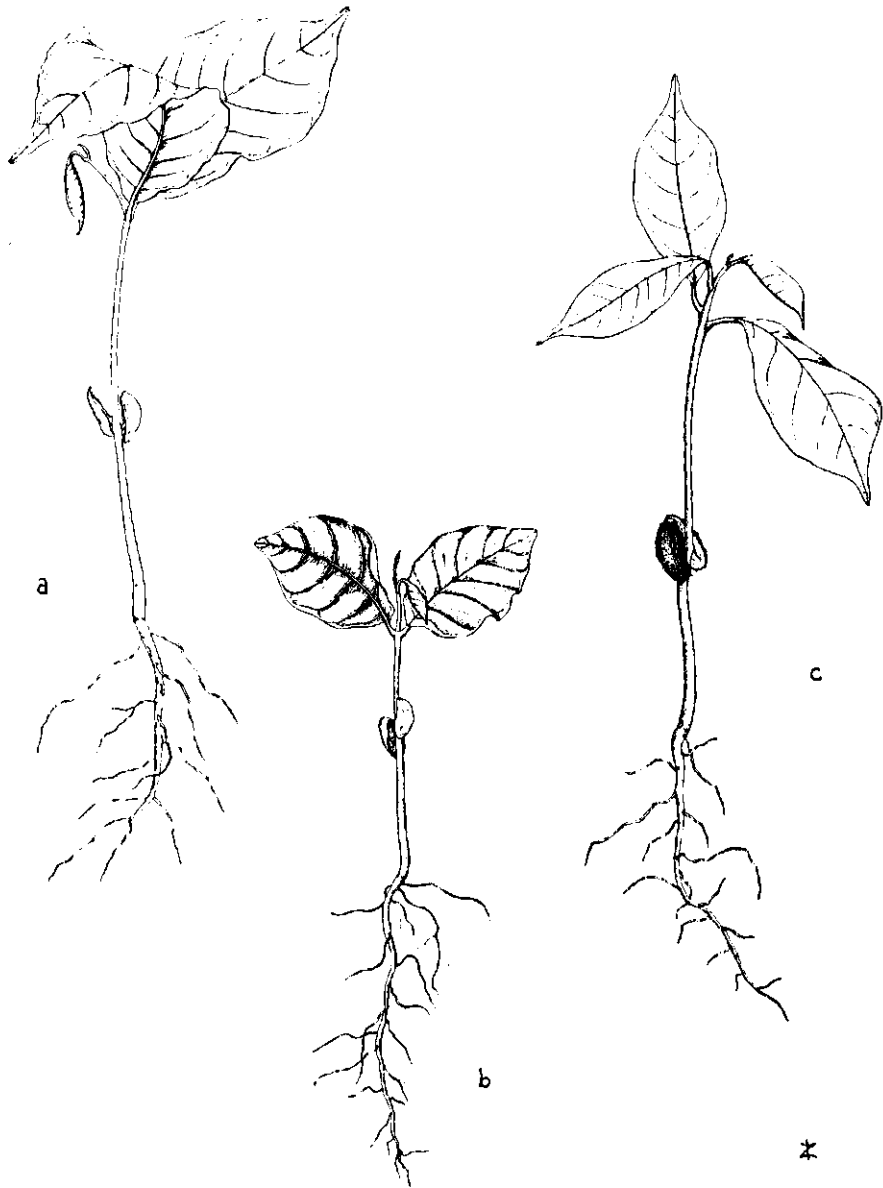


FIG. 20. Seedlings. - a: *Trichilia ornithocheira* J. J. DE WILDE ( $\times \frac{1}{2}$ ); b: *Trichilia monadelphica* (THONN.) J. J. DE WILDE ( $\times \frac{1}{2}$ ); c: *Trichilia zewaldae* J. J. DE WILDE ( $\times \frac{1}{2}$ ). - a: J. J. DE WILDE 3620 (from spirit mat.!); b: J. J. DE WILDE 3415 (spirit mat.!); c: J. J. DE WILDE 3969 (spirit mat.!).

## 10. DUBIOUS SPECIES

***Trichilia subcordata*** GÜRKE in ENGL., Pflanzenw. Ost-Afr. C: 232. 1895; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4): 305. 1896; HARMS in ENGL., Bot. Jahrb. 23: 163. 1896; ENGLER in ENGL. and DRUDE, Veg. der Erde, 9, Die Pflanzenw. Afr. 3(1): 821. 1915; HARMS in Nat. Pflanzenf. 2nd ed. 19BI: 110. 1940; BRENNAN, Check-Lists of the Br. Emp. No. 5, Tanganyika Terr. 2: 319. 1949.

Type: HOLST no. 2723 (Tanzania: Amboni, N. of Tanga, holotype destroyed in B?, no type material seen).

Note. The data which came to my attention are insufficient to arrive at a decision as to which taxon this name should be ascribed. No type material could be traced. SCHLIEBEN no. 4626 (G, M, P), sent out from Berlin as *T. subcordata* GÜRKE, belongs in *Trichilia dregeana* SOND.

GÜRKE, in the protologue to *T. subcordata*, stated that it concerns a shrub or small tree, up to 10 m tall. The leaflets are more or less cordate at base. The collecting locality and the habit point to *T. emetica* subsp. *emetica*, which rarely is found with leaflets slightly cordate at the base. However, in the diagnosis GÜRKE described the leaves as 6-7-jugate, a number never occurring in either *T. dregeana* SOND., or *T. emetica* subsp. *emetica* (in both taxa the leaves are at most 5-jugate). Moreover, GÜRKE described the fruit as a one-seeded capsule, which is unknown in African *Trichilia* (only galled fruits may seem to be one-seeded). HARMS (l.c., 1896) who examined the type material, stated that there were no flowers, and that the fruits were badly developed.

It seems uncertain that *Trichilia subcordata* GÜRKE belongs in the genus *Trichilia*; at any rate it cannot be identified with reasonable certainty.



## II. EXCLUDED SPECIES AND NAMES

*Trichilia alata* N. E. BROWN in Kew Bull. No. 117-118 : 160. 1896. Syntypes: from South Africa: WOOD nos. 1022, 1043, 3403 (not seen), 5439; GALPIN nos. 1083 and 1226 = *Ekebergia pterophylla* (C.DC.) HOFM. in Journ. of Bot., Br. and Foreign 63 : 57. 1925.

*Trichilia bilocularis* PAX in ENGL., Bot. Jahrb. 39 : 629. 1907; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 112. 1940; CUFODONTIS in Bull. Jard. Bot. Brux. 26 (Suppl.) : 402. 1956. Type: ROSEN s.n. (Ethiopia: Tschertscher Prov. (presently spelled: 'Chercher'), between Addis Ababa and Harar, holotype destroyed in B, lectotype in WRS�) = *Lepidotrichilia volkensis* (GÜRKE) LEROY in Fl. Zamb. 2(1) : 305, tab. 59 (B, 1-4). 1963.

*Trichilia briei* DE WILD. in Fedde Repert. 13 : 374. 1914, laps. cal. pro *Treculia briei* DE WILD.; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940 (stating this is a lapse, which must be read: *Treculia*); STANER in Bull. Jard. Bot. Brux. 16(2-3) : 180. 1941 (cited under *Trichilia* species excludendae, err. cal. pro *Treculia briei*); HAUMAN in Fl. Cong. Belg. 1 : 91. 1948 (stating it concerns a lapse, which must be read: *Treculia briei* DE WILD.). Type: DE BRIEY no. 133 (Congo: Ganda-Sundi, holotype in BR) = *Treculia* cf. *obovoides* N. E. BR. (*Moraceae*).

*Trichilia buchananii* C.DC. in Bull. Herb. Boiss. 2 : 580. Sept. 1894; HARMS in ENGL., Bot. Jahrb. 23 : 163. 1896; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306. 1896; LEBRUN, Les Essenc. For. Reg. Mont. Congo Or. 2 : 111. 1935; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 112. 1940; WHITE, For. Fl. North. Rhodesia: 181. 1962. Type: BUCHANAN no. 155 (Malawi: sin. loc., holotype in G) = *Lepidotrichilia volkensis* (GÜRKE) LEROY in Fl. Zamb. 2(1) : 305. 1963.

*Trichilia capensis* (SPARRM.) PERS., Syn. 1 : 468. 1805 = *Ekebergia capensis* SPARRM.

Note: PERSOON (i.c., 1805) referred to *Ekebergia capensis* in WILLDENOW, Species Plantarum 2 : 549. 1799. *Ekebergia capensis* goes back on SPARRMAN (in Svensk Vet. Akad. Handl. 40 : 282. 1779). Obviously PERSOON wanted to make a new combination: *T. capensis* (SPARRM.) PERS.

In the description of *T. capensis* PERSOON stated: 'foliolis impari-pinnatis margine undulatis'. A specimen found in L (in Herb. PERSOON s.n.; in Leyden afterwards numbered: 'Herb. Lugd. Bat. No. 903295-452') is conform to PERSOON's description, and identified as *Ekebergia capensis* SPARRM.

*Trichilia cedrata* A. CHEV., Vég. util. Afr. trop. Franç. 5 : 215. 1909; CHEVALIER, Expl. Bot. Afr. Occ. Fr. 1 : 113. 1920; HUTCH. and DALZ., Fl. W. Trop. Afr. 1st ed. 1(2) : 493. 1928; PELLEGRIN in Bull. Soc. Bot. Fr. 75 : 180.

*Meded. Landbouwhogeschool Wageningen 68-2 (1968)*

1928 = *Guarea cedrata* (A. CHEV.) PELLEGR., *comb. nov.*; AUBRÉVILLE, Fl. For. Côt. Iv. 1st ed. 2 : 130, 1936 (in syn. to *Guarea cedrata*); KENNEDY, For. Fl. S. Nigeria : 162, 1936 (in syn. to *G. cedrata*); PELLEGRIN in Bull. Soc. Bot. Fr. 86 : 154, 1939 (in syn. to *G. cedrata*); HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 135, 1940 (in syn. to *G. cedrata*); STANER in Bull. Jard. Bot. Brux. 16(2-3) : 187, 1941 (in syn. to *G. cedrata*); DALZIEL, Useful Pl. W. Trop. Afr. 2nd reprint : 328, 1955 (in syn. to *G. cedrata*); KEAY in HUTCH. and DALZ., Fl. W. Trop. Afr. 1(2) : 706, 1958 (in syn. to *G. cedrata*); AUBRÉVILLE, Fl. For. Côt. Iv. 2nd ed. 2 : 160, 1959 (in syn. to *G. cedrata*); WHITE in KEAY et al., Nigerian Trees 2 : 278, 1964 (in syn. to *G. cedrata*); VOORHOEVE, Liberian high forest trees : 264, 1965 (in syn. to *G. cedrata*). Syntypes: CHEVALIER no. 16125 (Ivory Coast: Bouroukrou, G, P); CHEVALIER no. 16127 (Ivory Coast: Bouroukrou, P) and CHEVALIER no. 16171 (Ivory Coast: Makouïé, P) = *Guarea cedrata* (A. CHEV.) PELLEGR.

*Trichilia ekebergia* E. MEY. ex DRÈGE, Zwei Pflanzengeogr. Docum., in Besondere Beigabe zur Flora 2 : 227, 1843, *nom. nud.* = *Ekebergia capensis* SPARRM.

*Trichilia* (erroneously printed as *Trichilia*) *ekebergia* E. MEY. ex DRÈGE in Cat. Plant. Exsic. Afr. Austr. : 18, 1838, *nom. nud.* = *Ekebergia capensis* SPARRM.

*Trichilia ekebergia* E. MEY. ex SOND. in HARVEY and SONDER, Fl. Cap. 1 : 246, 1860. Based on a number of syntypes collected by DRÈGE and by KRAUSS in S. Africa (present in TCD) = *Ekebergia capensis* SPARRM.

Note: The type material preserved in the herbarium of Trinity College, Dublin, leaves no doubt that this belongs in *Ekebergia*. Already C.DC. in A. and C.DC., Mon. Phan. 1 : 642, 1878, came to this conclusion.

*Trichilia guentheri* HARMS in Notizbl. Bot. Gart. Berlin 7 (no. 65) : 230, 1917. Type: GUENTHER TESSMANN no. 2045 (Central African Republic: Nola, road to Mbaiki, holotype not seen, probably destroyed in B, no isotypes seen).

Note: Although I did not see the type, the description supplied by HARMS (i.e., 1917) distinctly shows that this taxon does not belong to *Trichilia*. The anthers seem to be included in, or hardly exerted beyond, the staminal tube. The ovary is described to be 3-locular, with 2 superposed ovules in each locule (a placentation not found in African *Trichilia*).

According to PELLEGRIN (in Bull. Soc. Bot. Fr. 86 : 153, 1939) *T. guentheri* HARMS is a later synonym of *Guarea laurentii* DE WILD. (*Meliaceae*). PELLEGRIN's opinion is accepted by HARMS (the author of *T. guentheri*) in his revision of the *Meliaceae* (in Nat. Pflanzenf. 2nd ed. 19B1 : 116, 1940).

*Trichilia natalensis* SOND. in Linnaea 23 : 23, 1850. Type: GUEINZIUS no. 526 (South Africa: Port Natal (Durban)).

Note: Although I did not see the type, from the protologue it is evident that

*Trichilia natalensis* does not belong in *Trichilia*. The flowers are described to be 4-merous; the leaflets are serrate. C. DE CANDOLLE (in A. and C. DC., Mon. Phan. 1 : 712. 1878) added this taxon to *Trichilia*, putting it in 'species incertae sedis'. HARMS in his treatise of the family *Meliaceae* (in Nat. Pflanzenf. 2nd ed. 1911 : 117. 1940) stated: 'Kann wegen der gesägten Blättchen nicht zur Gattung (*Trichilia*) gehören'. HARMS does not indicate where (within *Meliaceae*?) it had to be placed. Probably it belongs in *Anacardiaceae*.

*Trichilia pterophylla* C. DC. in Bull. Herb. Boiss. 2 : 581. 1894. Type: WOOD no. 1022 (South Africa: near Groenberg, holotype in G; isotype, NH) = **Ekebergia pterophylla** (C. DC.) HOFMEYER in Journ. of Bot., Br. and Foreign 63 : 57. 1925.

*Trichilia reygartii* DE WILD. in Fedde Repert. 13 : 375. 1914; DE WILDEMAN in Bull. Jard. Bot. Brux. 5 : 286. 1919; VERMOESEN in Rev. Zool. Afr. 10(1) Suppl. Bot. : B22 and B50. 1922 (in syn. to *Guarea laurentii*); PELLEGRIN in Bull. Soc. Bot. Fr. 86 : 153. 1939 (in syn. to *Guarea laurentii*); HARMS in Nat. Pflanzenf. 2nd ed. 1911 : 110. 1940 (in syn. to *Guarea laurentii*); STANER in Bull. Jard. Bot. Brux. 16(2-3) : 192. 1941 (in syn. to *Guarea laurentii*); STANER and GILBERT in Fl. Cong. Belg. 7 : 203. 1958 (in syn. to *Guarea laurentii*). Syntypes: REYGAERT no. 788 (Congo: near Mobwasa, BR, not seen); REYGAERT no. 791 (Congo: near Mobwasa, BR); DE GIORGI no. 1111 (Congo: Dundusana, BR); MORTEHAN no. 133 (Congo: sin. loc., BR) = **Guarea laurentii** DE WILD.

Note: Material of the syntypes cited above, which I was able to examine, shows the anthers included in the staminal tube and a (3-)4-locular ovary containing 2 superposed ovules in each locule. *T. reygartii* DE WILD. belongs not in African *Trichilia*. According to the authors cited above, this taxon is a synonym of *Guarea laurentii* DE WILD.

*Trichilia rueppelliana* FRESEN. in Mus. Senckenb. 2 : 278. 1837. Type: RÜPPELL s.n. (Ethiopia: between Halei and Temben, holotype in FR) = **Ekebergia capensis** SPARRM.

*Trichilia siderotricha* CHIOV. in Atti R. Accad. Ital., Mem. Cl. Sc. Fis. Mat. Nat. 11 : 24. 1940; CUFODONTIS in Bull. Jard. Bot. Brux. 26 (Suppl. Sept.) : 402. 1956. Type: MARCHETTI no. 12 (Ethiopia: Sidamo, Uondo, holotype in FI).

Note: The type specimen, MARCHETTI no. 12, consists of two detached leaflets of *Brucea antidiysenterica* MILL. (*Simaroubaceae*) and of nine unidentified reniform seeds with a red testa.

*Trichilia volkensii* GÜRKE in ENGL., Bot. Jahrb. 19, Beibl. 47 : 33. Aug. 1894; GÜRKE in ENGL., Pflanzenw. Ost-Afr. C : 232. 1895; HARMS in ENGL., Bot. Jahrb. 23 : 163. 1896; HARMS in ENGL., Nat. Pflanzenf. 1st ed. 3(4) : 306, tab. 164 (T, U and V). 1896; HARMS in MILDBRAED, Wissens. Erg. Deutsch. Zentr.-Afr. Exp. 1907-1908 2 : 435. 1912; ENGLER in ENGL. and DRUDE, Veg. der

Erde, 9, Die Pflanzenw. Afr. 3(1) : 822. 1915; HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 112, tab. 28. 1940; STANER in Bull. Jard. Bot. Brux. 16(2-3) : 146, tab. 8. 1941; ROBYNS, Fl. Spermat. Parc Nat. Albert 1 : 423. 1948; BRENNAN, Check-Lists of the For. Trees and Shrubs of the Br. Emp. 5, Tanganyika Terr. 2 : 319. 1949; EGGELING and DALE, Indig. Trees Uganda Prot. : 198. 1952; CUFODONTIS in Bull. Jard. Bot. Brux. 26 (Suppl. Sept.) : 402. 1956; STANER and GILBERT in Fl. Cong. Belg. 7 : 160. 1958; DALE and GREENWAY, Kenya Trees and Shrubs : 271. 1961; WHITE, For. Fl. North. Rhod. : 182. 1962. Syntypes: VOLKENS nos. 1269 and 1423 (Tanzania: Marangu). The original material was probably destroyed in B. A duplicate of VOLKENS no. 1423, present in E, is designated as the lectotype; more duplicates of VOLKENS no. 1423 are in WRSL and K. = **Lepidotrichilia volkensis** (GÜRKE) LEROY in Fl. Zamb. 2(1) : 305, tab. 59 (B, 1-4). 1963.

*Trichilia volkensis* var. *buchananii* (C.DC.) PIC. SER. in Webbia 7 : 333. 1950; WHITE and STYLES in Fl. Zamb. 2(1) : 307. 1963 (pro syn.). Type: BUCHANAN no. 155 (Malawi: sin. loc., holotype in G) = **Lepidotrichilia volkensis** (GÜRKE) LEROY, l.c. 1963.

*Trichilia volkensis* var. *genuina* PIC. SER., l.c. : 334. 1950; BRENNAN in Mem. N.Y. Bot. Gard. 8(3) : 235. 1953; WHITE and STYLES in Fl. Zamb. 2(1) : 307. 1963 (pro syn.). Lectotype: VOLKENS no. 1423 (Tanzania: Marangu, near Mondjo creek, E; iso-lectotypes in WRSL and K) = **Lepidotrichilia volkensis** (GÜRKE) LEROY, l.c. 1963.

## 12. REJECTED NAMES

*Trichilia euryphylla* HARMS ex BURTT DAVY et BOLTON, Check-Lists of the Br. Emp. No. 1, Uganda Prot. : 65. 1935, *nomen nudum*.

Note: *T. euryphylla* probably concerns a manuscript name supplied by HARMS. BURTT DAVY and BOLTON (l.c., 1935) refer with doubt to this name a specimen collected by HARRIS (in Herb. Forest Dept. no. 738, not seen). They state that it is an understorey shrub or small tree, up to 7.5 m tall. No more data being available, and no latin descriptive data being present as part of the protologue, the name is to be rejected.

*Trichilia holtzii* HARMS in Nat. Pflanzenf. 2nd ed. 19B1 : 110. 1940.

Note: HARMS (l.c., 1940) only mentions the name *T. holtzii*, stating that it is very similar to *Trichilia grotei* HARMS (in this study placed in synonymy of *T. emetica* subsp. *emetica*), but that it has acute leaflets. No specimens are cited. BRENNAN (Check-Lists of the Br. Emp. No. 5, Tanganyika Terr. 2 : 319. 1949) copies the statement made by HARMS, not citing any material. The name *T. holtzii* HARMS, being not validly published as a Latin diagnosis or description is missing (Code, Art. 36), must be rejected.

*Trichilia integrifilamentosa* C.DC. ex BRIQUET in Mém. Inst. Genevois 24 : 116. 1935.

Note: C.DC. (in Ann. Conserv. bot. Genève 10 : 157. 1907) validly published the name *Trichilia integrifilamenta*. This name was reduced to the synonymy of *T. monadelpha* (see there). *T. integrifilamenta* C.DC. is based on ZENKER no. 837 (G). ZENKER no. 837 (in G) bears a label, written by CASIMIR DE CANDOLLE, mentioning the name *T. integrifilamentosa* C.DC. However, the combination *T. integrifilamentosa* was never published by C.DC., it merely concerns a manuscript name.

BRIQUET (l.c., 1935) must have seen ZENKER no. 837 in Geneva and copied the name *T. integrifilamentosa* from DE CANDOLLE's label, but did not cite any specimen. The name *Trichilia integrifilamentosa* C.DC. ex BRIQUET, published after 1 Jan. 1935 without Latin description or diagnosis, must be rejected (Code, Art. 36).

*Trichilia sibangensis* A. CHEV. ex PELLEGR. in Not. Syst. 9(1) : 23. 1940, *nomen nudum*.

Note: PELLEGRIN (l.c., 1940) mentions the name *T. sibangensis* A. CHEV. in the synonymy of *T. heudelotii* PLANCH. ex OLIV., stating explicitly that it concerns a manuscript name he found in the herbarium. There is no material cited. The name *T. sibangensis* A. CHEV. ex PELLEGR. must be rejected.

*Trichilia umbellata* C.DC. ex MEDLEY WOOD in Trans. Roy. Soc. of S. Afr. 3 : 48. 1913, *nomen nudum*; *T. umbellata* C.DC. ex BEWS, An Introduction to the Fl. of Natal and Zululand : 119. 1921, *nomen nudum*.

Note: In 1913, MEDLEY WOOD, in an addendum to the revised list of the Flora of Natal (l.c., 1913), published the name *Trichilia umbellata* C.DC., citing: 'RUDATIS 120, Umtwalumi, 2500 ft., Oct., Umziato Distr.'

No further information could be traced. The name was not entered into Index Kewensis, nor into Index Londinensis. I did not manage to see RUDATIS no. 120. BEWS, most probably, copied the name without further investigation from MEDLEY WOOD's list. BEWS did not cite any material but only stated: 'Umtwalumi, 2500 ft.'. Probably it concerns a manuscript name. Anyhow, the names *Trichilia umbellata* C.DC. ex MEDLEY WOOD and *T. umbellata* C.DC. ex BEWS, being *nomina nuda*, are to be rejected.

### 13. SAMENVATTING (SUMMARY)

Toen in 1830 het klassiek geworden werk van ADRIEN DE JUSSIEU 'Mémoire sur le groupe des Méliacées' verscheen, kende hij slechts 2 *Trichilia*-soorten uit Afrika. Sedertdien zijn ruim 80 soorten van het Afrikaanse continent beschreven. In 1940 publiceerde HARMS een overzicht van de *Meliaceae*, de meest recente, overigens globale, revisie. Voor de Afrikaanse *Trichilia*'s bleek deze revisie onbevredigend. De nu gepubliceerde studie van de continentaal-Afrikaanse *Trichilia*'s erkent slechts 18 soorten, waaronder 2 (*T. ornithoothera* en *T. zewaldiae*) die hier voor het eerst worden beschreven.

Het genus is het rijkst vertegenwoordigd in tropisch Amerika; ca. 250 soorten worden aan dat werelddeel toegeschreven. Een kritische monografie van de Amerikaanse soorten ontbreekt nog. Er zijn geen soorten bekend, die zowel in Amerika als in Afrika voorkomen.

De Afrikaanse soorten blijken zonder uitzondering tweehuizig. De morfologische verschillen tussen ♂ en ♀ bloemen zijn echter uitermate gering. In ♂ bloemen bevatten de helmknoppen goed ontwikkeld pollen, terwijl dit in ♀ bloemen ontbreekt. Mannelijke exemplaren worden in het herbarium veelvuldiger aangetroffen dan vrouwelijke. Voor één taxon (*T. emetica* subsp. *emetica*) werd dit nagegaan en bleek de verhouding 3:1 te zijn. De mogelijkheid dat ♂ exemplaren vaker bloeien dan ♀ en dus vaker worden ingezameld, wordt geopperd.

Vooral vrucht- en zaadkenmerken wijzen uit, dat de Afrikaanse *Trichilia*-soorten een nauw samenhangende homogene groep vormen, met uitzondering van *T. capitata* KLOTZSCH. Deze laatste soort vertoont een aantal opvallende verschillenmerken (aanwezigheid van een arillus i.p.v. een arillodium, bezit van endosperm, een buiten de cotylen uitstekend kiempje, etc.).

Het Indo-Malesische genus *Heynea* ROXB. ex SIMS, recentelijk met het genus *Trichilia* verenigd, wijkt in een aantal essentiële kenmerken af van de Afrikaanse *Trichilia*'s. Indien de Aziatische *Heynea*'s inderdaad in het genus *Trichilia* behoren te worden geplaatst, dan moet dit berusten op combinaties van kenmerken eigen aan Amerikaanse *Trichilia*'s. Voor het bestaan hiervan levert de literatuur geen aanwijzingen en daarom schijnt vereniging van het genus *Heynea* met *Trichilia* overhaast.

De continentaal-Afrikaanse *Trichilia*-soorten worden in alfabetische volgorde behandeld. Na een overzicht van de literatuur volgt voor elke soort de typificatie en synonymie. De synoniemen zijn ook getypificeerd en van commentaar voorzien. Na een korte karakteristiek wordt elke soort uitvoerig beschreven, waarbij de variabiliteit der kenmerken in het bijzonder tot uitdrukking wordt gebracht. De natuurlijke verspreiding en geografische, ecologische en biologische bijzonderheden van elke soort zijn zo uitvoerig mogelijk geschetst en samengevat. Relaties met de mens (gebruiksmogelijkheden) en dier worden vermeld. Aan het eind van de behandeling van elke soort wordt het geraadpleegde materiaal geciteerd. Elk taxon gaat vergezeld van een gedetailleerde afbeelding. Op een vindplaatsenkaart wordt het huidige natuurlijke verspreidingsgebied benaderd. Tenslotte volgt een index op namen en illustraties.

## 14. INDEX OF NAMES

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