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THE AFRICAN
DICHAPETALACEAE IX

A taxonomical revision

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INTRODUCTION AND ACKNOWLEDGEMENTS

This publication, the ninth in the series *The African Dichapetalaceae*, appears much later than announced in part VIII. It is intended that part IX will be the last part dealing with the revision of the African *Dichapetalaceae*, although the additions to the previous parts presented in here indicate that it is likely that further botanical exploration, especially of Western Central Africa, will yield important additional information to be published.

The author is grateful to the directors and curators of the herbaria cited for their continued loan of material. For the fieldwork in Gabon, which yielded the first record for *Dichapetalum rudatisii*, a new variety of *D. choristilum* and a new species, a grant was received from the Foundation for the Advancement of Tropical Research (WOTRO).

The illustrations have been made by Miss Y. F. TAN (fig. 4, 5), Mrs W. WESSEL-BRAND (fig. 7) and Miss H. G. D. ZEWARD (fig. 1, 2, 3, 6, 9, 10, 11, 12). The drawings of N. HALLÉ (fig. 8, 13), first published in 1967, are reproduced with the kind permission of the editors of *Adansonia*.

Thanks are due to the late Miss G. J. H. AMSHOFF and Mr. D. O. WIJNANDS for their help with the Latin descriptions, to Mrs J. M. VAN MEDENBACH DE ROOY-RONKEL for the correct typing of the manuscript, and to Mr. J. J. BOS for polishing the English text.

CYTOLOGY

J. C. Arends & F. M. van der Laan

Sofar only African members of the *Dichapetalaceae* have been analyzed for their chromosome numbers. Table 1 presents the $2n$ numbers of 21 species of *Dichapetalum* and of *Tapura africana*. They represent approximately 25% of the African species. The karyotypes have been analyzed in root tip cells of seedlings grown from seeds collected in the field. The vouchers of the mother plants of these seedlings are mentioned in the second column of Table 1. Most of the chromosome number counting in *Dichapetalum* has been done by GADELLA, whereas some additional counts in this genus and the one for *Tapura africana* have been done by the present authors (for references see the last column of Table 1). There is one erroneous record of $2n = 20$ for *D. pallidum* (as *D. liberiae* by MANGENOT & MANGENOT (1962).

GADELLA analyzed slides produced by microtome sectioning and haematoxylin staining; we employed the orcein squash staining method as outlined in VAN DER LAAN & ARENDS (1985). A photograph of one of the cells analyzed (Photog. 1) of *Dichapetalum affine* shows that the length of the somatic chromosomes

TABLE 1. Somatic chromosome numbers in *Dichapetalaceae*

Taxa	Voucher	Provenance	Reference
species with 2n = 24			
<i>Dichapetalum</i>			
<i>acuminatum</i> De Wild.	<i>Breteler 6445</i>	Gabon	GADELLA 1977
<i>affine</i> (Planch. ex. Bth.) Bret.	<i>Breteler & de Wilde 822</i>	Gabon	new record, nob.
<i>altescandens</i> Engl.	<i>Bos 3631</i>	Cameroun	GADELLA 1970
<i>choristilum</i> Engl.	<i>Bos 4542</i>	Cameroun	GADELLA 1970
<i>choristilum</i> Engl.	<i>Bos 4637</i>	Cameroun	GADELLA 1970, 197
<i>congoense</i> Engl. & Ruhl.	<i>Bos 5029</i>	Cameroun	GADELLA 1970
– published as: <i>D. mekametane</i> Engl.			
<i>congoense</i> Engl. & Ruhl.	<i>Bos 5258</i>	Cameroun	GADELLA 1970
– published as: <i>D. mekametane</i> Engl			
<i>congoense</i> Engl. & Ruhl.	<i>Breteler 6747</i>	Gabon	GADELLA 1972
<i>cymulosum</i> (Oliv.) Engl.	<i>Bos & Breteler 3059</i>	Cameroun	GADELLA 1969
<i>cymulosum</i> (Oliv.) Engl.	<i>Bos & Breteler 3066</i>	Cameroun	GADELLA 1970
<i>cymulosum</i> (Oliv.) Engl.	<i>Bos & Breteler 3102</i>	Cameroun	GADELLA 1969
<i>cymulosum</i> (Oliv.) Engl.	<i>Bos 3249</i>	Cameroun	GADELLA 1970
<i>dewildei</i> Bret.	<i>de Wilde 8269-A</i>	Cameroun	BRETELER 1978 (p. 5)
<i>dictyospermum</i> Bret.	<i>de Koning 3690</i>	Ivory Coast	BRETELER 1978 (p. 6)
<i>filicauale</i> Bret.	<i>Breteler 5503</i>	Ivory Coast	GADELLA 1972
<i>heudelotii</i> (Planch. ex Oliv.) Baill. var. <i>heudelotii</i>	<i>Leeuwenberg 12568</i>	Gabon	nob.
<i>heudelotii</i> (Planch. ex Oliv.) Baill. var. <i>heudelotii</i>	<i>Leeuwenberg 7906</i>	Ivory Coast	GADELLA 1977
<i>heudelotii</i> (Planch. ex Oliv.) Baill. var.			
<i>longitubulosum</i> (Engl.) Bret.	<i>Bos & Breteler 3092</i>	Cameroun	GADELLA 1970
– published as: <i>D. longitubulosum</i> Engl.			
<i>heudelotii</i> (Planch. ex Oliv.) Baill. var.			
<i>longitubulosum</i> (Engl.) Bret.	<i>Bos 4185</i>	Cameroun	GADELLA 1970
– published as: <i>D. longitubulosum</i> Engl.			
<i>heudelotii</i> (Planch. ex Oliv.) Baill. var.			
<i>longitubulosum</i> (Engl.) Bret.	<i>Bos 5002</i>	Cameroun	GADELLA 1972
– published as: <i>D. longitubulosum</i> Engl.			
<i>heudelotii</i> (Planch. ex Oliv.) Baill. var.			
<i>longitubulosum</i> (Engl.) Bret.	<i>Bos 5006</i>	Cameroun	GADELLA (pers. con)
<i>heudelotii</i> (Planch. ex Oliv.) Baill. var.			
<i>ndongense</i> (Engl.) Bret.	<i>Breteler 5216</i>	Ivory Coast	GADELLA 1969, BRETELER 1973
– published as: <i>D. martineau</i> Aubr. & Pellegr. resp. <i>D. ndongense</i> Engl.			
<i>madagascariense</i> Poir. var. <i>madagascariense</i>	<i>Bos 5431</i>	Cameroun	GADELLA 1970
– published as: <i>D. brevitubulosum</i> Engl.			
<i>madagascariense</i> Poir. var. <i>madagascariense</i>	<i>Breteler 7294</i>	Togo	GADELLA 1977 verified nob.
– published as: <i>D. guineense</i> (DC.) Keay			
<i>madagascariense</i> Poir. var. <i>madagascariense</i>	<i>Leeuwenberg 11099</i>	Ghana	nob.
<i>madagascariense</i> Poir. var. <i>madagascariense</i>	<i>Leeuwenberg 12503</i>	Gabon	nob.
<i>mombuttense</i> Engl.	<i>Bokdam 3097*</i>	Zaire	GADELLA 1977*, verified nob.
<i>mombuttense</i> Engl.	<i>Breteler 2113</i>	Cameroun	GADELLA 1969
<i>oblongum</i> (Hook. f. ex Bth.) Engl.	<i>Breteler 5330</i>	Ivory Coast	GADELLA 1969
<i>oblongum</i> (Hook. f. ex Bth.) Engl.	<i>Breteler 5946</i>	Ivory Coast	GADELLA 1970
<i>oblongum</i> (Hook. f. ex Bth.) Engl.	<i>Versteeg & Den Outer 713</i>	Ivory Coast	GADELLA 1977

TABLE 1. (continued)

Taxa	Voucher	Provenance	Reference
species with $2n = 24$			
<i>oliganthum</i> Bret.	<i>Bos</i> 5028	Cameroun	GADELLA (pers. comm.)
<i>pallidum</i> (Oliv.) Engl. – published as: <i>D. liberiae</i> Engl. & Dinkl.	<i>Breteler</i> 5282	Ivory Coast	GADELLA 1972
<i>pallidum</i> (Oliv.) Engl. – published as: <i>D. liberiae</i> Engl. & Dinkl.	<i>Breteler</i> 5327	Ivory Coast	GADELLA 1972
<i>pallidum</i> (Oliv.) Engl.	<i>Breteler</i> 6032**	Ivory Coast	GADELLA 1972
<i>pierrei</i> Pellegr.	<i>Breteler</i> 7660	Gabon	new record, nob.
<i>rudatisii</i> Engl.	<i>Bos</i> & <i>Breteler</i> 3115	Cameroun	GADELLA 1970
<i>rudatisii</i> Engl.	<i>Bos</i> 3180	Cameroun	GADELLA 1970
<i>rudatisii</i> Engl.	<i>Bos</i> 3255	Cameroun	GADELLA 1970
<i>rudatisii</i> Engl.	<i>Bos</i> 3375	Cameroun	GADELLA 1970
<i>rudatisii</i> Engl.	<i>Bos</i> 3412	Cameroun	GADELLA 1970
<i>rudatisii</i> Engl.	<i>Bos</i> 3464	Cameroun	GADELLA 1970
<i>rudatisii</i> Engl.	<i>Bos</i> 3560	Cameroun	GADELLA 1970
<i>rudatisii</i> Engl.	<i>Bos</i> 3645	Cameroun	GADELLA 1970
<i>thollonii</i> Pellegr.	<i>Breteler</i> 6473	Gabon	GADELLA 1972
<i>toxicarium</i> (G. Don) Baill.	<i>Breteler</i> 5325	Ivory Coast	GADELLA 1969
<i>toxicarium</i> (G. Don) Baill.	<i>Breteler</i> 5342	Ivory Coast	GADELLA 1970
<i>toxicarium</i> (G. Don) Baill.	<i>Breteler</i> 5347	Ivory Coast	GADELLA 1970
<i>zenkeri</i> Engl.	<i>Bokdam</i> 3092	Zaire	GADELLA 1972
<i>zenkeri</i> Engl.	<i>Bos</i> 6943	Cameroun	GADELLA (pers. comm.)
species with $2n = 48$			
<i>Tapura</i> <i>africana</i> Oliv.	<i>Leeuwenberg</i> 9910	Cameroun	ARENDS 1979
species with $2n = 96$			
<i>Dichapetalum</i> <i>crassifolium</i> Chod. var. <i>crassifolium</i>	<i>Oldeman</i> 816	Ghana	new record, nob.

*: erroneously published with voucher *Bokdam* 3092

** : published with voucher *de Bruijn* 1901, a seedling of *Breteler* 6032

falls within a range of approximately 1 to $2\mu\text{m}$. All chromosomes have primary constrictions in the median region. The size of the chromosomes of all species in the *Dichapetalaceae* is similar to those shown in Photog. 1.

It is obvious that the *Dichapetalaceae* are characterized by a basic number of $x = 12$, as $2n$ numbers of 24, 48 and 96 have been found. *Dichapetalum* is almost homogeneous according to chromosome number; the octoploid number ($2n = 96$) of *D. crassifolium* places this species apart from the remainder of the species, which is partly supported by BRETELER (see p. 17).

It remains to be seen whether *Tapura* is a polyploid taxon within the *Dichapetalaceae* as only one species of the genus has been investigated.

Regarding the taxonomic position of the *Dichapetalaceae* there are conflicting



PHOTOG. 1. Somatic metaphase plate in root tip cell of *Dichapetalum affine* (collection *Breteler & de Wilde 822*, Gabon), showing 24 metacentric chromosomes. The arrows indicate two, probably homologous chromosomes with an elongated centromere region (8-hydroxyquinolin pretreatment, orcein staining, magn. 3000 \times).

opinions as to whether the family should be accommodated within the *Geraniales* or within orders such as the *Celastrales* and *Rosales*. BRETELER (1973) has pointed out that most evidence supports a place in the *Geraniales* as conceived by ENGLER. He further suggests that on the basis of comparative morphology the *Dichapetalaceae* are more related to the *Trigoniaceae* than to other families of this order. Earlier BARTH (1896) proposed a close affinity between these two families on anatomical grounds. The (unfortunately approximate) figure of $2n = 20$ for *Trigonia virens* is the only record for the *Trigoniaceae* (GOLDBLATT 1979). It is clear that members of this family should be investigated further for their chromosome numbers in order to establish whether *Trigoniaceae* are possibly characterized by $x = 12$.

Some other families of the *Geraniales* (i.e. the *Vochysiaceae*, *Meliaceae*, *Malpighiaceae* and *Polygalaceae*) have some morphological characteristics in common with the *Dichapetalaceae*. From the compilative works in respect of chromosome numbers by FEDOROV (1969), MOORE (1973, 1974, 1977) and GOLDBLATT (1981, 1984) it can be seen that there is no record for the *Vochysiaceae* and that none of the remaining families is characterized by a single basic number. However, a very minor fraction of the species of these families have the chromosome numbers $n = 12$ and/or $2n = 24$. In the *Meliaceae* the number pertains to the genera *Heynea* (a synonym of *Trichilia*) and *Cedrela*, in the *Malpighiaceae* to *Byrsonima*, *Galphimia* and *Tryallis* and in the *Polygalaceae* to *Polygala*. According to BRETELER none of these taxa has a particular affinity with the *Dichapetalaceae*.

The occurrence of similar chromosome numbers in these different though to some extent related plant groups may be the result of convergent evolution. However the present cytological evidence does not support this or another opinion. As reliable and sufficient information on chromosome numbers of *Trigoniacae* and *Vochysiaceae* in particular is lacking, the basic number of $x = 12$ of the *Dichapetalaceae* does not provide cogent support for or against the inclusion of the latter family within the *Geraniales*.

The other orders which have been suggested to include the *Dichapetalaceae* have also been considered for their chromosome numbers. In the *Celastrales* there is only a record of $2n = 24$ for one species each of *Gymnospora* and *Tripterogium* (both *Celastraceae*). There is conflicting evidence for $n = 12$ or 13 in *Salvadora* (*Salvadoraceae*). For the *Rosales* there are incidental records of $2n = 24$ (or $n = 12$) for a species of *Sedum* (*Crassulaceae*), some species of *Chrysosplenium* and *Castilleja* (*Saxifragaceae*), some species of *Lupinus*, *Vicia*, *Tamarindus* and *Xylia* (*Leguminosae*). Within the same order all species of the genera *Pittosporum* and *Sollya* (*Pittosporaceae*) have $2n = 24$.

None of the taxa mentioned above has an obvious relationship with the *Dichapetalaceae*. In conclusion: cytological data do not support a transfer of the *Dichapetalaceae* from the *Geraniales* to *Celastrales* or *Rosales*, nor do they firmly back the position given to it by BRETELER, as in the Engler system.

COMMENTS ON SOME POLLEN GRAINS OF DICHAPETALUM AND TAPURA

by W. Punt, Laboratory of Palaeobotany and Palynology

***Dichapetalum choristilum* Engl. var. *louisii* Bret.**

Pollen of this variety certainly belongs to the *Dichapetalum choristilum* type because of the characteristic straight to slightly concave sides and the slightly decreasing lumina of the reticulum towards the colpi. The colpi, however, are shorter than in the specimens of *D. choristilum* var. *choristilum* and, moreover, the size of the grains is distinctly less (Material: *J. J. de Wilde c.s. 519*).

***Dichapetalum gassitae* Bret.**

Pollen grains of this species have to be classified in the *Dichapetalum choristilum* type because of their coarse reticulum and long colpi. Also other characters like the straight sides, slightly decreasing size of the lumina towards the colpi and the rather large size are identical (Material: *Louis c.s. 761*).

***Dichapetalum potamophilum* Bret.**

This species is represented by pollen samples of two specimens. Unfortunately the pollen grains of the two samples differ slightly in their morphological characters.

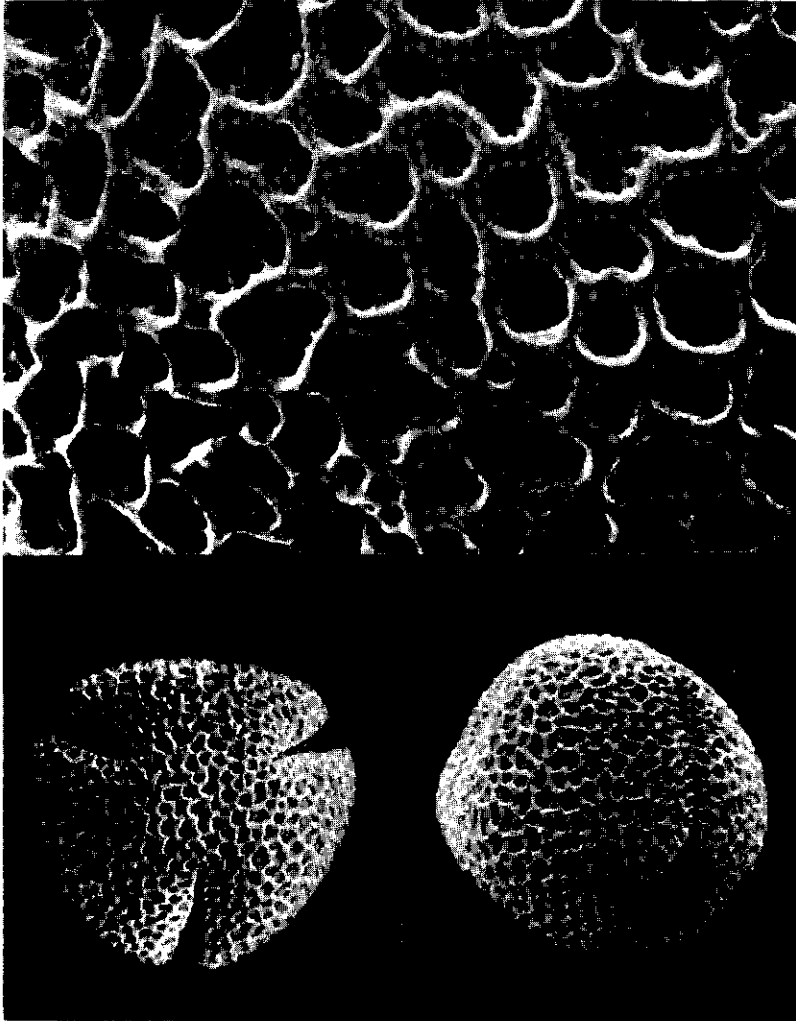
A. *Letouzey 9806*.

Pollen of this specimen resembles remarkably that of *D. gassitae* in ornamentation, shape, and size. The colpi, however, are short.

B. *Breteler & J. J. de Wilde 604*.

Pollen of this specimen fits also in the *D. choristilum* type, but in this specimen the colpi are very long. It differs moreover, from *Letouzey 9806* and pollen of *D. gassitae* by the less obtuse angles and a finer reticulum, a character often found in pollen of the *D. angolense* type.

Although differences occur in the pollen of both specimens they both should be classified as representatives of the *D. choristilum* type.



PHOTOG. 2. Pollen of *Tapura carinata* with detail of bi-reticulate ornamentation. For explanation see text.

Tapura carinata Bret.

Description of the pollen grains

Pollen class: 3-zonocolporate.

P/E ratio: Varying from suboblate to oblate.

Apertures: Ectoaperture – colpus, long, narrow but broadening towards the equatorial plane, not sunken; margins distinct, straight; ends acute; no costae; distinct fastigium present. Endoaperture – indistinct aperture, probably a large porus of rectangular outline; no costae; ends diffuse.

Exine: Sexine about as thick as nexine. Columellae short and indistinct; capita forming a semi-tectate layer.

Ornamentation : Bi-reticulate. A coarse outer reticulum with narrow muri and large lumina, angular and varying in outline; lumina uniform in size, not or only scarcely decreasing in size towards the colpi; inner, infra-reticulum very fine.

Outlines: Equatorial view – elliptic. Polar view – triangular; sides convex, angles gaping.

Measurements: P 24–27 μ ; E 29–32 μ ; P/E ratio 0.79–0.90. Exine ca 2 μ ; lumina at poles and in mesocolpium up to 2.5 μ wide, but usually varying from 1–2 μ (Material: *Pobeguïn s.n.*).

Comments: Pollen of this species is different from all other *Tapura* pollen. It most resembles that of *T. ivorensis*, but differs by its size and remarkable ornamentation, absence of costae around the endoaperture and more convex sides in polar view. The most remarkable feature of this pollen type is the bi-reticulate ornamentation, clearly visible in SEM-micrographs (Photog. 2). This character is certainly not common in pollen of the Angiosperms, but appears regularly in completely different families. It is described from *Phyllanthus* species (*Euphorbiaceae*) (BOR, 1979), various *Labiatae* taxa (NABLI, 1976), and from the Tiliaceous genera *Grewia* and *Sparmannia* (PRESTING, STRAKA and FRIEDRICH, 1983).

TAXONOMIC PART

DESCRIPTION OF THE FAMILY

Dichapetalaceae Baillon, 1886: 365 (as *Dichapetaleae*) nom. cons.; Engler, 1896: 345; Engler & Krause, 1931: 1; Lawrence, 1951: 549; Wagenitz, 1964: 317; Hutchinson, 1973: 187; Mabberly, 1978: 182.

Chailletiaceae Brown, 1818: 23 (as *Chailleteae*); De Candolle, 1825: 57; Endlicher, 1840: 1104; Bentham & Hooker, 1862: 340; Hutchinson 1926: 206; 1959: 150.

Trees, shrubs, subshrubs or lianas. *Stipules* present, caducous or persistent, simple, entire, or variously lobed or divided. Leaves alternate, simple, entire, pinnately nerved, often glandular. *Inflorescences* axillary, sometimes arranged on leafless axillary or terminal shoots, cymose, distinctly branched to subglobose, sessile to pedunculate, the peduncle free or adnate to the petiole and sometimes to the midrib. *Bracts* and bracteoles usually small. *Flowers* small, actinomorphic to zygomorphic, (4-)5-merous, bisexual (Africa) to unisexual; pedicel usually articulate, the upper part (the true pedicel) absent to very distinct. *Sepals* 5(4), subequal to strongly unequal, imbricate, free or shortly united, rarely forming a tube. *Petals* 5(4), equal to very unequal, alternating with the sepals, free or nearly so, or, more often, united with the alternating stamens into a very short to distinct tube composed of (8-)10(-11) elements, entire or bilobed to bicuculate apically. *Androecium* of 2-5 stamens and 3-0 staminodes, opposite the sepals; anthers bilocular, introrse, opening by longitudinal slits, usually with a distinct connective. *Basal staminodes* (disc glands, disc lobes, hypogynous glands) 1-5, epipetalous, free or united, variously shaped. *Pistil* 2-3(4)-merous; ovary superior with two collateral, pendulous anatropous ovules in each locule, raphe ventral, obturator distinct or not; styles 2-3(4), free or nearly so, more often almost completely united with free apical parts. *Fruit* a drupe with 1-3(4) one-seeded, free pyrenes, deeply lobed or not; exocarp dehiscent or indehiscent; mesocarp more or less fleshy; endocarp indehiscent, usually with a distinct apical, and usually partly ventral, suture, pergamentaceous to woody or bony, hairy inside or not. *Seeds* exalbuminous, rarely with some albumen; testa usually thin, glabrous, rarely hairy; cotyledons usually planoconvex. Germination hypogeal, rarely epigeal, first pair of leaves opposite or alternate.

Type genus: *Dichapetalum* Thouars (syn. *Chailletia* DC.)

An almost circumtropical family of ca 160 species in three genera with a few extensions into the subtropics. Africa (including Madagascar) is most species diverse with 86 species in *Dichapetalum* and 7 species in *Tapura*. The neotropics are second with 19 species in *Dichapetalum*, 21 in *Tapura*, and 9 species in the

endemic genus *Stephanopodium*, 49 species in all (PRANCE, 1972–1983). In the Asian tropics and adjacent areas only *Dichapetalum* is present with 19 species in all (LEENHOUTS 1956–1972; KOSTERMANS, 1980).

Note. The *Dichapetalaceae* are a very natural group with uncertain affinities (see BRETELER, 1973: 5). The differing and often rather extreme opinions held on the taxonomic position of the family will be maintained when, for instance, the flower tube is either interpreted as a gamopetalous corolla with the stamens adnate to it (PRANCE 1972–1983; HUTCHINSON, 1969: 65) or as a staminal tube like in *Meliaceae*, a view expressed by the present author in 1973 and, after studying the genus *Tapura* even more strongly advocated now.

DELIMITATION OF THE GENERA

The three genera of *Dichapetalaceae* are closely related. BAILLON (1873: 113) already questioned the proposed genera within *Dichapetalaceae* and asked himself if it was not possible to consider the family as having but a single genus with 4 subgenera notably *Chailletia*, *Stephanopodium*, *Dischizolaena*, and *Tapura*.

Segregation of *Dichapetalum* and *Stephanopodium* particularly would be difficult if the latter occurred in Africa as well.

The American species of *Dichapetalum* have distinctly bilobed and free or nearly free petals, which makes delimitation against *Stephanopodium* quite easy. In Africa, however, entire petals as well as a distinct staminal tube with sessile or nearly sessile anthers occur, that are common features in *Stephanopodium*. In species like the African *D. insigne* Engl., *D. melanocladum* Bret., and *D. montanum* Bret. only the bilobed petals distinguish them from *Stephanopodium* and even this character is not completely reliable as *S. estrellense* Baill. has slightly bifid petals.

As regards the segregation of *Tapura* and *Dichapetalum* this is very easy in Africa, but much more difficult when American species of *Tapura* have to be distinguished on a generic level from African *Dichapetalum*. The zygomorphy of the *Tapura* flower may be so slight in American species that in fact only the reduced number of basal staminodes (or disc lobes) establishes a flower to be *Tapura* and not *Dichapetalum*.

In conclusion it can be stated that disregarding continental separation, viz. *Stephanopodium* and American *Tapura* separated from African *Dichapetalum*, the generic delimitation in *Dichapetalaceae* is very problematic.

KEY TO THE GENERA IN AFRICA

Petals equal; stamens all fertile; basal staminodes (or disc lobes) 5, free or forming a complete ring **Dichapetalum**

Petals unequal, 1–2 distinctly larger; fertile stamens 2–3; basal staminodes (or disc lobes), either free or united, wanting with the large petals . . . **Tapura**

REVISION OF DICHAPETALUM

SUBDIVISION OF THE GENUS

Short history with some critical remarks.

All sections that have been distinguished in *Dichapetalum* are first described by ENGLER. Before ENGLER, DE CANDOLLE, in his *Prodromus* (1825), also classified the known *Dichapetalum* species, but he did so in series not in sections.

In Engler's first classification (1896: 348) the genus is divided in two sections namely *Eudichapetalum* (= section *Dichapetalum*) and *Brachystephanium*. The second section only contains 2 species, the syntypes *D. adnatiflorum* and *D. kamerunense*, the type section all other 72 species known at that time. It is interesting to note that *D. adnatiflorum* and *D. kamerunense* are synonyms of respectively *D. mombuttense* and *D. oblongum*, both species mentioned in Engler's *Eudichapetalum* under number 30 and 54 respectively. This fact gives an indication how well these sections are separated. VAN TIEGHEM (1903: 230) elevated the section *Brachystephanium* to generic level choosing *Stephanella* as its name. As I have lectotypified (1973: 37) this genus with *D. kamerunense* Engl., the same specific name is chosen here to lectotypify the section *Brachystephanium* Engler.

In 1902 ENGLER introduced a third section with a Latin description but without a name, mentioning *D. integripetalum* as the only species. In the same publication a fourth section named *Tapurina* is described with *D. longitubulosum* as the only species.

In 1912 (1912-a) ENGLER gives a complete classification of all the species and presents a key to the 4 sections and the 33 series that are distinguished. The type section contains most species, accommodated in 25 series. The unnamed section of 1902 is now named *Rhopalocarpus* and remains monotypic. The section *Brachystephanium* of 1896, now deprived of its two syntypes, which are classified in the next section, has 11 species in 3 series. Of these species 3 were classified in *Eudichapetalum* in 1896, the other have been described as new since then. The last section, now named *Tapurinia* instead of *Tapurina* as in 1902, has 5 series. Two of these accommodate the two syntypes of section *Brachystephanium* under the names *Adnatiflora* and *Kamerunensia* respectively. In doing so ENGLER in fact united the sections *Brachystephanium* and *Tapurina*, so 3 sections remain. I think that taking type species out and bringing species from other sections in is once more an illustration of the weakness of the characters that define these sections.

In 1914 ENGLER and KRAUSE enriched the type section by a 26th series named *Brauniana* based on the new species *D. braunii*.

Engler's classification is more or less adopted by some authors (FRIES 1916, DE WILDEMAN 1919, EXELL 1927, HAUMAN 1955, 1958-b), but has in fact never been accepted completely.

Objections against Engler's system.

ENGLER's classification is based on a very superficial investigation of characters as observed on a single or a few specimens per species. Characters most frequently used are the size of the inflorescence in relation to petiole length of the supporting leaf, the peduncle being free or adnate to the petiole, the adnation between petals and stamens, the petal length in relation to sepal length, the petal shape, the incision of petals and its ratio to the entire petal, and last but not least, the position of the ovary: superior, half inferior, or inferior.

Inflorescences and petals vary most times too much to be of great value in specific segregation and can hardly be used for species groupings. The same can be said of the other characters used by ENGLER. As regards the position of the ovary it has already been stipulated (BRETELIER 1979: 26) that all species have superior ovaries, only the receptacle may be more or less concave!

In conclusion it can be stated that ENGLER's system is most probably not accepted because it is too artificial, more a classification of specimens than a classification of species.

Review and evaluation of main characters and their supposed evolutionary trends.

Before presenting any new classification of the genus a review and evaluation of important characters is given. This review will also illustrate the difficulties that have been met with in the attempt to structure the subdivision of the genus.

Most vegetative characters vary to such an extent and/or may occur so unpredictably, i.e. not in relation with any other character, that their use in the classification of the *Dichapetalum* species has been very little. The production of a reddish, slimy exudate in wounded phloem, for example, is only seen in *D. crassifolium* and *D. librevillense*, two species which do not show any relation as other characters are concerned. The leaf glands, another example, often vary in number and position and within a single specimen, although they seem, in general, to be more numerous and more obvious in the advanced species than in the primitive ones.

As regards the inflorescence some evolutionary tendencies may be mentioned. The widely branched, distinctly peduncled, many flowered inflorescence (e.g. *D. angolense*) is considered to be original and the few flowered, indistinctly branched, sessile or nearly sessile inflorescence derived, with a glomerule or fascicle as the most advanced type. The development of the dichasial branching system into a scorpioid one, as seen in many species, is also considered as an evolutionary trend. These trends are very general and it is difficult to use them

in characterizing a species. Therefore inflorescence characters have been of little value in species grouping.

The absence of the joint in the pedicel considered to be an advanced character, occurs in three species, two of them, *D. glomeratum* and *D. pulchrum* are certainly closely related, the third, *D. trichocephalum* stands far apart.

The position of the sepals whether being erect or reflexed is of importance in some groups of species but is completely unreliable in others. It is the author's opinion, however, that in general reflexed sepals represent the more primitive condition, notwithstanding the fact that some primitive species as *D. bangii* and *D. lujae* have erect sepals.

The length of the adnation between petals and stamens, sometimes resulting in a distinct staminal tube which characterizes for example the genus *Stephanopodium*, varies even within a single species (e.g. *D. heudelotii*) and seems to occur independently from any other character.

The type of indumentum of the ovary is certainly a character of importance when the original or the more advanced status of a species has to be established. An arachnoid indumentum is considered to be primitive and precedes the glabrous or velutinous condition of the ovary. Glabrous ovaries may result when the arachnoid indumentum disappears (compare *D. mundense* with *D. bellum*) and glabrous fruits may be produced as happens in these species. The glabrous condition of the ovary may, however, also lead to velutinous*) fruits as in *D. umbellatum*. It is likely that in this case the appearance of the velutinous indumentum is initiated by the fertilisation of the ovary. In several species from Madagascar, however, it seems that the change from glabrous to velutinous may be initiated independently from fertilisation (see BRETELER 1979: 59, note under *D. leucosia*).

As both the arachnoid and the glabrous condition may be observed in the closely related *D. mundense* and *D. bellum*, so the arachnoid and the velutinous condition can be seen in the two closely related *D. pallidum* and *D. albidum*. In the former the ovary becomes velutinous immediately after fertilisation shedding its arachnoid hairs, in the second the ovary is velutinous from the very start, sometimes mixed with a trace of an arachnoid indumentum.

Glabrous fruits are not only obtained from species with arachnoid or glabrous ovaries but also from species with velutinous ovaries as happens, for example, in *D. integripetalum*, *D. minutiflorum* and *D. montanum*. So in fact three different stages in the evolution of the ovary indumentum may lead to glabrous fruits: arachnoid, glabrous, and velutinous.

It is expected that velutinous ovaries leading to glabrous fruits may evolve into glabrous ovaries and it is asked whether in *D. braunii* such an evolution has already happened or not. In fig. 1 the evolution of the ovary indumentum, including the hypothetical last stage, and the two fruit conditions which may

*) For convenience, all indumentum types not being arachnoid are comprised under the term velutinous, although some ovaries and fruits have in fact an indumentum consisting of weaker and/or curly hairs.

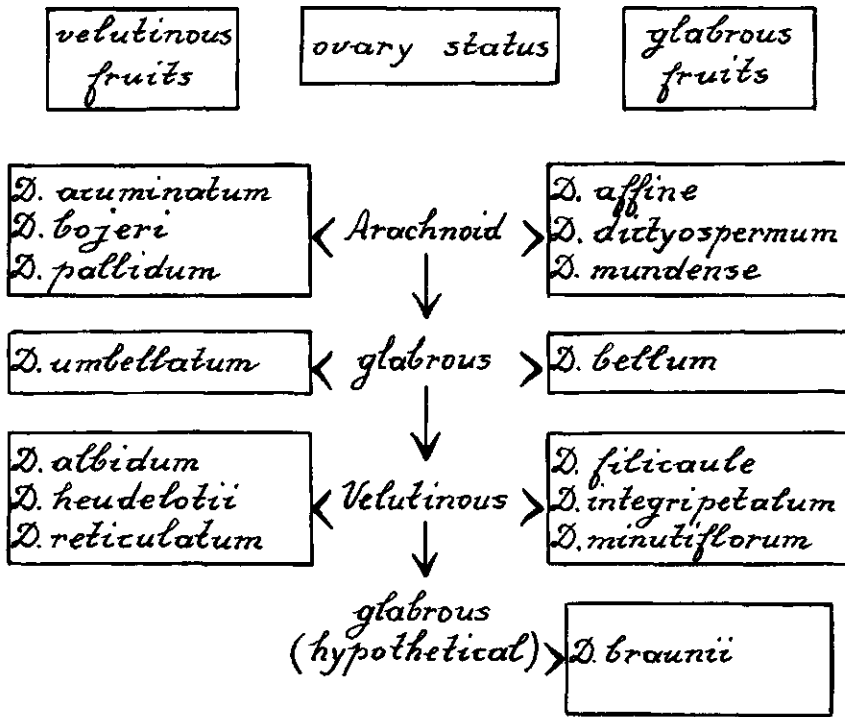


FIG. 1. Relation between ovary and fruit indumentum. For explanation see text.

result are schematically reproduced, with examples of species. If the hypothetical last stage in the ovary indumentum does not occur, *D. braunii* becomes an example next to *D. bellum*.

Whether the species have a 2-locular or a 3-locular ovary has not proven to be of any value in delimitating groups of species. Although the bilocular condition is considered to be more advanced than the 3-locular one, it must be observed that the advanced status not only occurs in advanced species like *D. montanum* and *D. oliganthum*, but also in more primitive ones like *D. bocageanum* and *D. zenkeri*.

As regards the fruit shape it is not clear how evolution is directed. The fruits with very distinct lobes sometimes even with almost separate mericarps, a distinct beak, and a thin layer of mesocarp as in *D. arachnoideum*, *D. bangii* and *D. lujae*, are considered to be primitive. Globose fruits or fruits which are distinctly lobed but apically impressed and not or hardly apiculate and have a juicy mesocarp as for example in *D. congoense*, *D. crassifolium*, and *D. cymulosum* are considered to be advanced. However, the fruit shape may be very variable within a single species (e.g. *D. madagascariense*, *D. mundense*) and is unknown for quite a few species. Therefore fruit shape has been of little importance in classifying the *Dichapetalum* species.

The combination dehiscent exocarp and *Mucuna*-like irritating hairs bounds the species *D. acuminatum*, *D. albidum*, *D. altescandens*, *D. gillettii*, *D. pallidum*, *D. pedicellatum*, and probably also *D. beilschmiedioides*. In *D. pallidum*, however, specimens occur with indehiscent fruits that have no irritating hairs and fruits of *D. staudtii*, a completely different species, often have irritating hairs but are never dehiscent. Dehiscent fruits are considered as primitive.

The nature of the endocarp and its inside being glabrous or hairy, is, partly for lack of information, partly for its variability within one species, considered to be of little value in species classification. The same holds for the seedcoat, in which respect *D. mossambicense*, with densely hairy seeds, has a rather isolated position.

The seedling type, which has so far been established for 20 African species, seems to be constant in some groups of species (e.g. '*Adnatae*', p. 16) and variable in others. The type with the first pair of leaves opposite (see BRETELER 1973: 29) is considered to be the primitive one.

In Table 2 a summary is given of the parts of the plant that have been discussed and their supposed primitive and advanced character state.

The new 'classification'.

When publishing the first part of the revision (1973) the present author stated that a new subdivision of the genus would be presented at the completion of it.

At present, 13 years later and the revision being completed, a new or a revised subdivision of the genus into sections will not be presented. The review and evaluation of the main characters revealed that clear cut divisions cannot be made because the characters vary mostly independently from one another. A

TABLE 2. For explanation see text.

Part of plant	Character state	
	Primitive	Advanced
leaf glands	few, obscure	many, obvious
inflorescence	stalked, many flowered, widely branched, dichasial branching	sessile, few flowered, indistinctly branched, scorpioid branching
pedicel	jointed	not jointed
sepals	reflexed	erect
ovary	3-locular	2-locular
fruit	apiculate, distinctly lobed, little mesocarp	rounded, subglobose, juicy
exocarp	dehiscent	indehiscent
seedling	first pair of leaves opposite	first pair of leaves alternate

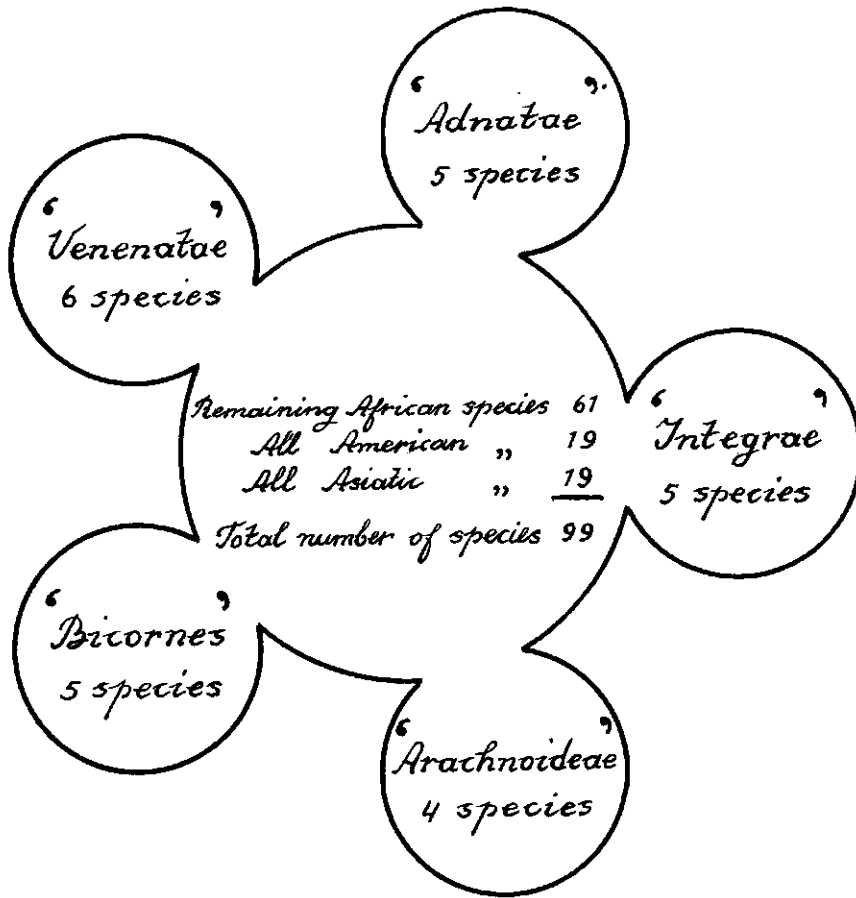


FIG. 2. 'Classification' of the 124 species of the genus *Dichapetalum*. For explanation see text.

reticulate pattern of relation between the species is the result. I think that in this genus the evolution is still in 'full swing' and that therefore most evolutionary trends have not yet resulted in distinct sections.

Some clusters of species can certainly be achieved, both the characters of such clusters are weak and not constant which means that they are not acceptable as distinct sections.

Nevertheless a few of such clusters will be mentioned and briefly discussed as it is felt that those clusters may become sections in future development. In relation to the other species of the genus these clusters may at present be seen as bulges on a globe representing the entire genus (see fig. 2). When, eventually, these clusters become more independent i.e. may be considered as sections, they may then be seen as satellites of the large central element, the type section.

The following 5 clusters of species are figured as bulges and indicated by a

name between ' ', which means that this name should not have any status under the Code.

- 'Adnatae' characterized by the peduncle adnate to the petiole of the supporting leaf, with flowers and fruits which resemble each other very much, and all with the same type of seedling namely with opposite first leaves. The following 5 species belong to this entity: *D. affine*, *D. mombuttense*, *D. pierrei*, *D. rudatisii*, *D. toxicarium*. Except for the latter which is confined to West Africa, all species have a Central African distribution.
- 'Arachnoideae'. The four species of this cluster, *D. arachnoideum*, *D. bangii*, *D. lujae*, *D. nyangense*, are characterized by an arachnoid deciduous indumentum on the vegetative parts. This element together with their primitive fruit type are the main characters of this cluster. The species are almost entirely confined to Central Africa, only *D. bangii* occurs somewhat outside this area as well.
- 'Bicornes' characterized by the same type of hairy petals and two-horned basal staminodes. Also the inflorescences and fruits (as far as known) resemble. The only non-Central African species (*D. lofense*) of this cluster is somewhat aberrant. Species: *D. lofense*, *D. reticulatum*, *D. ruficeps*, *D. trichocephalum* and *D. umbellatum*.
- 'Integrae' consisting of 5 species from Madagascar, all with entire petals: *D. bojeri*, *D. leucosia*, *D. rufum*, *D. virchowii* and *D. vondrozanum*. On the continent entire petals only occur in *D. crassifolium* which species does not belong to this cluster according to other characters.
- 'Venenatae' is a cluster of species which are, with the exception of *D. integripetalum*, known for their poisonous properties. Apart from this its species are relatively large-flowered with rather flat and only shallowly lobed petals. The following six species belong in this cluster: *D. barteri* from West and Central Africa, *D. integripetalum* from Central Africa, *D. cymosum*, the Gifblaar, the most southern species of Africa, and *D. braunii*, *D. ruhlandii* and *D. stuhlmannii* mainly from East Africa.

The last cluster is in my opinion the most advanced, the 'Arachnoideae' the most primitive one. The other 3 clusters deserve a more or less intermediate position.

The globe contains the majority of the African species and all the American and Asiatic ones. Also within this large entity, but on weaker grounds, some species groupings can be made and some rather isolated species may be distinguished. The American species for instance, are rather uniform and very closely related between each other. They may be considered as such a group. The Asiatic species are more diverse and not so easily placed in a single group. As regards

the remaining African members the following isolated and (some) twins of strongly related species may be distinguished:

Isolated species	Twins
<i>D. chalotii</i>	{ <i>D. arenarium</i>
<i>D. chlorinum</i>	{ <i>D. barbosae</i>
<i>D. crassifolium</i>	{ <i>D. bellum</i>
<i>D. dewildei</i>	{ <i>D. mundense</i>
<i>D. edule</i>	{ <i>D. choristilum</i>
<i>D. eickii</i>	{ <i>D. potamophilum</i>
<i>D. gassitae</i>	{ <i>D. gabonense</i>
<i>D. parvifolium</i>	{ <i>D. thollonii</i>

A group of four species with juicy, glabrous fruits is formed by *D. bodyi*, *D. cymulosum*, *D. dictyospermum*, and *D. filicaule*. Another group with dehiscent exocarp has already been mentioned in the review of characters. Any further distinction of groups seems to me of very little value.

Comparison with Punt's classification.

Punt's classification of the pollen (1975) was published before the revision of the genus had been completed. This is why some differences are present in the nomenclature between his work and mine. Moreover some new species published after 1975 are not investigated by PUNT.

The pollen of the *Dichapetalum* species is classified in 23 pollen types, 17 for the African species, 5 for the Asiatic ones, and only one for the American species. In some cases different pollen samples of the same species are classified in different pollen types. Pollen of *D. heudelotii* var. *ndongense* is classified in the *D. zenkeri* type under its synonym *D. sankuruense*, and in the *D. heudelotii* type under *D. martineaui* and *D. ndongense*. *D. zenkeri* pollen is found in three different types namely in the *D. angolense* type, the *D. heudelotii* type and the *D. zenkeri* type.

Most clusters of species that are distinguished and figured as bulges in Fig. 2, are found in Punt's classification as pollentypes with more or less the same species. My 'Adnatae', 'Integrae', and 'Venenatae' respectively fit Punt's *D. mombuttense* type, the *D. leucosia* type, and the *D. barteri* type. The 'Arachnoideae' are more narrowly circumscribed than in Punt's *D. bangii* type, as they contain only 4 of the 6 species of this pollen type.

The species of the 'Bicornes', however, are not found in a single pollen type. *D. reticulatum* and *D. umbellatum* are classified under the *Reticulatum* group of the *D. gilletii* type and *D. lofense* is found under the *Pallidum* group of the *D. angolense* type. The other 2 species of this cluster, namely *D. ruficeps* and *D. trichocephalum*, have been published after Punt's publication.

Concerning the remainder of the African species the differences between Punt's classification and mine are obvious. The ca 60 species that are left are

classified by PUNT in 13 different pollen types while in my 'classification' they are kept as an entity. There are, however, also some correspondencies.

Some species as *D. chlorinum* and *D. parvifolium* which have been mentioned as isolated species, are in Punt's work also isolated in a pollen type of their own. The same is observed for some twins of species like *D. arenarium* + *D. barbosae* and *D. bellum* + *D. mundense*. Moreover when Punt's comments on each pollen type are taken into consideration, the differences appear to be not so fundamental as might be expected at first sight.

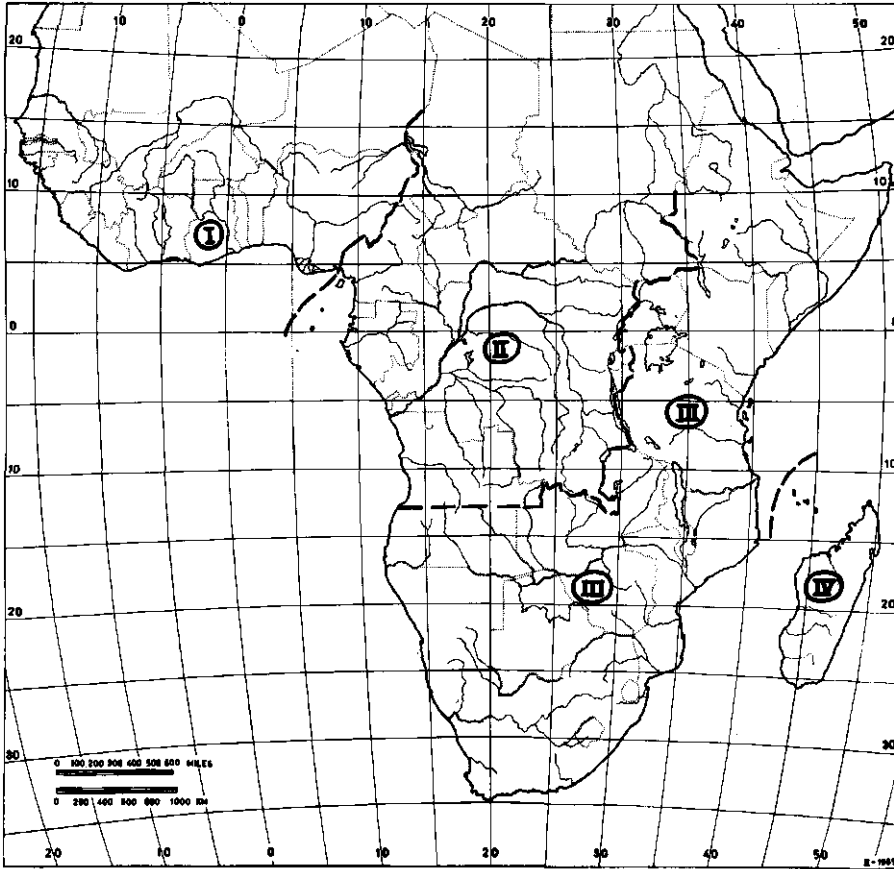
PUNT also described the evolutionary trends in the pollen characters and based an evolutionary scheme on it. The evolutionary trends in the macromorphology that I have indicated are insufficient in quantity and quality to build an evolutionary scheme upon it. I think, however, that Punt's scheme is generally quite acceptable from my point of view.

KEYS TO THE AFRICAN SPECIES

The distribution of the species over the continent and Madagascar has led to the decision not to attempt to make a single key to the African species but to produce 4 keys, each one for a separate geographic entity or area, i.e. (see map 1) West Africa (I), Central Africa (II), East and South (Sub)Tropical Africa (III), and Madagascar and the Comores (IV). The first entity comprises the area of the Flora of West Tropical Africa excluding the southern part of the former British Cameroon and Fernando Po: these territories are added to Central Africa, following state borders between Nigeria on the one hand and Cameroun and Equatorial Guinea on the other hand. The border between areas II and III follows almost completely the state borders of the countries concerned with the exception of Angola that has been divided along latitude 13° South into a northern part belonging to Central Africa and a southern part belonging to area III. Along this latitude in Angola, in a zone of at least a few hundred kilometers wide, not a single *Dichapetalum* species has been recorded. Moreover, there are no species occurring on both sides of this zone. The border between the entities III and IV is obvious.

It is undeniable that the borders between these geographic entities are often artificial as regards species distribution, but it is of great advantage not to have to deal with a large number of, for example, Central African species when trying to identify a specimen from Ghana. Of the 26 West African species only 6 do not occur in the area of key II, but of the 64 species of the latter area only 23 occur in the West African entity, which means that 41 species do not. The overlap between the Central African area and area III is even less: 11 of the 20 species of area III do not occur elsewhere. Area IV is almost completely different from the continent, only having one species in common.

Only when it was inevitable and in order to distinguish a few species only, characters of the fruits have been used in the keys, otherwise only characters of flowering material are used. A key based on fruiting material has not been



MAP 1. Key areas: I - West Africa; II - Central Africa; III - East and South (Sub)Tropical Africa; IV - Madagascar and the Comores.

attempted for two reasons: there are too many species with fruits still unknown, and in many instances the fruits offer too few distinguishing characters.

KEY I: WEST AFRICAN SPECIES

- 1 a Leaves beneath with a felty, long persistent, white or dirty brown cobweb-like indumentum 2
- b Leaves glabrous or glabrescent beneath, if hairy the indumentum of different nature. 3
- 2 a Indumentum of ovary stiff, erect-hairy. Liberia-western Ghana **D. albidum**

- b Indumentum of ovary like cotton-wool, either white or dirty brown. Guinea-Nigeria. **D. pallidum**
- 3 a Stipules deeply pinnatisect, at least dentate, very rarely entire, usually long persistent. Liberia-Nigeria **D. angolense**
- b Stipules entire, very rarely with a few teeth, or stipules early caducous 4
- 4 a Indumentum of ovary like cotton-wool, i.e. with waved or strongly curled hairs, either white or dirty brown 5
- b Indumentum of ovary consisting of erect or nearly erect, usually straight or slightly curved hairs, either short and usually stiff or longer and more flexible, or ovary glabrous 19
- 5 a Leaves coriaceous, glabrous or nearly so, (6.5)12–16 × (3)7–8 cm; flowers glomerate fasciculate, stamens longer than petals. S.E. Nigeria. **D. obanense**
- b Above characters not combined 6
- 6 a All or nearly all flowers of a specimen with 2-lobed styles and 2-locular ovaries 7
- b All or nearly all flowers of a specimen with 3(4)-lobed styles and 3(4)-locular ovaries. 10
- 7 a Sepals reflexed, at least most sepals of a single flower. 8
- b Sepals erect or nearly so 9
- 8 a Inflorescence sessile in the leaf axil or nearly so (peduncle at most 0.5 cm long). Liberia-Nigeria **D. choristilum**
- b Inflorescence distinctly pedunculate. S.E. Nigeria **D. zenkeri**
- 9 a Branches and branchlets hollow; peduncle of inflorescence adnate to petiole. S.E. Nigeria **D. gabonense**
- b Branches and branchlets solid; peduncle free from petiole. Sierra Leone-Nigeria **D. oblongum**
- 10(6) a Specimen from west of Togo. 11
- b Specimen from Togo or from east of it 13
- 11 a Style deeply split, lobes 1–3 mm long. Liberia-Ivory Coast **D. choristilum**
- b Style very shortly lobed 12
- 12 a Sepals reflexed; fruits glabrous. Ivory Coast **D. dictyospermum**
- b Sepals erect; fruits hairy. Guinea Bissau-Ghana **D. toxicarium**
- 13 a Sepals reflexed, glabrous outside or nearly so, the margin puberulous. S.E. Nigeria **D. mundense**
- b Sepals reflexed or not, completely hairy outside 14
- 14 a Branches and branchlets hollow. S.E. Nigeria **D. gabonense**
- b Branches and branchlets solid 15
- 15 a Flowers arranged in an indistinctly branched (rarely once distinctly so) head or subumbel, the stalk of the inflorescence short or long, free or adnate to petiole. 16
- b Flowers arranged in distinctly branched inflorescences, its peduncle, if present, free from petiole or not 17

- 16 a Peduncle short, (4)7–11 mm long, at least partly adnate to petiole; branchlets with a brown, short-hairy, somewhat papillate-like indumentum. S.E. Nigeria **D. rudatisii**
 b Peduncle slender, (0.5)1.5–3.5(4.5) cm long, free from petiole; indumentum of branchlets different. S.E. Nigeria **D. tomentosum**
- 17 a Inflorescence sessile in the leaf axil or nearly so (peduncle at most 0.5 cm long); style deeply split, lobes 1–3 mm long. S.E. Nigeria. **D. choristilum**
 b Inflorescence usually distinctly pedunculate; style very shortly lobed 18
- 18 a Sepals reflexed. S.E. Nigeria **D. fructuosum**
 b Sepals erect or nearly so. S.E. Nigeria **D. unguiculatum**
- 19(4) a Pistil glabrous, at most with a very few, sparse hairs (ovary soon velutinous after fertilisation). Nigeria **D. umbellatum**
 b Pistil, at least the ovary, ditinctly hairy 20
- 20 a Petal lobes densely hairy outside. Nigeria **D. reticulatum**
 b Petal lobes glabrous outside, at most with a few hairs or petals entire or nearly so 21
- 21 a Upper part of pedicel more or less as long as the reflexed sepals, at least as long as the lower part. Ivory Coast-Nigeria. . . **D. parvifolium**
 b Upper part of pedicel shorter than the lower part, when equal at most half as long as the sepals, or 0, or flowers sessile or nearly so 22
- 22 a Erect shrub or tree 23
 b Lianescent shrub or liana 25
- 23 a Sepals reflexed, at least most sepals of a single flower. S.E. Nigeria **D. obanense**
 b Sepals erect or nearly so 24
- 24 a Sepals 4–6(7) mm long; petals retuse to 1 mm split, lobes rather flat. Ivory Coast-Nigeria **D. barteri**
 b Sepals (1)1.5–2.5(3) mm long; petals distinctly bilobed, lobes concave. Guinea Bissau-Nigeria. **D. madagascariense**
- 25 a Petals entire to emarginate, if shallowly lobed lobes not concave, with stamens united into a 0.5–2.5 mm long tube. Liberia-Nigeria **D. crassifolium**
 b Petals lobed, if united with filaments into a distinct tube, then lobes concave 26
- 26 a Fruits glabrous; thin liana or lianescent shrub usually not more than 1 cm diam.; midrib of leaves prominent above. Ivory Coast-western Ghana **D. filicaule**
 b Fruits hairy; other characters usually not associated 27
- 27 a Petals thin, fragile, 1.7–3 mm long; style almost hairy to the top. Liberia-western Ivory Coast **D. lofense**
 b Petals different, usually longer; style if hairy only so in lower half . 28

- 28 a Leaves coriaceous, glabrous or nearly so; flowers glomerate-fasciculate; sepals reflexed at least most sepals of a single flower; lower part of style hairy. S.E. Nigeria **D. obanense**
- b Above characters not associated. 29
- 29 a Petals and stamens slightly spreading at base, upper parts usually curved inwards; petal lobes flat or nearly so. Ivory Coast, Nigeria **D. dewevrei**
- b Petals and stamens erect, without inflexed upper parts; petal lobes concave 30
- 30 a Style hairy in lower half; inflorescence usually distinctly stalked and/or branched. Guinea Bissau-Nigeria **D. madagascariense**
- b Style glabrous in lower half, rarely not so; inflorescence a glomerule or fascicle, usually sessile and indistinctly branched (some inflorescence of a specimen may be very shortly stalked and/or branched). 31
- 31 a Leaf acumen with a distinct mucro, if not the leaf blade beneath at least with distinct, large (0.2–0.7 mm diam.) glands along midrib, especially near base and/or on the acumen or top (sometimes hidden by indumentum). Guinea Bissau-Nigeria **D. heudelotii**
- b Leaf acumen usually broad, obtuse, without a distinct mucro; glands usually smaller than above. Ivory Coast, Nigeria **D. staudtii**

KEY II: CENTRAL AFRICAN SPECIES

- 1 a Pistil glabrous, at most with a very few sparse hairs (ovary may become densely hairy soon after fertilisation) 2
- b Pistil, at least the ovary, hairy 3
- 2 a Leaves and branchlets glabrous or nearly so; fruits glabrous. Gabon, Congo **D. bellum**
- b Leaves and branchlets hairy; fruits velutinous. Western Central Africa **D. umbellatum**
- 3 a Indumentum of the ovary like cotton-wool, i.e. with waved or strongly curled hairs, either white or dirty brown 4
- b Indumentum of the ovary consisting of erect or nearly erect, usually straight or slightly curved hairs, either short and usually stiff or long and usually flexible. 39
- 4 a Leaves, at least when young, with long arachnoid (cobweb) hairs beneath, either forming a loose web or a close felt. 5
- b Leaves without arachnoid hairs beneath 9
- 5 a Stipules, at least some, palmately divided into 2–4(5) parts, the parts leaving separate or quite nearly separate scars 6
- b Stipules entire 8
- 6 a Sepals reflexed. Gabon. **D. nyangense**
- b Sepals erect or nearly so 7

- 7 a Young leaves above and often also the branchlets with a cobweb indumentum. Whole area **D. lujae**
 b Young leaves above and branchlets lacking the cobweb hairs. Whole area **D. bangii**
- 8 a Arachnoid hairs on leaves beneath forming a persistent close felt. Western Central Africa **D. pallidum**
 b Arachnoid hairs on leaves beneath deciduous. Western Central Africa **D. arachnoideum**
- 9 a Stipules pinnatisect, at least dentate, usually long persistent 10
 b Stipules entire, or stipules early caducous 11
- 10 a Styles predominantly 3(4)-lobed, ovary 3(4)-locular. Whole area **D. angolense**
 b Styles predominantly 2-lobed, ovary 2-locular. Sao Tomé, Principe **D. bocageanum**
- 11 a Fully developed leaves with strongly and rather abruptly revolute margins at the extreme base, more or less covering one or a pair of rather large glands on each side of the midrib. Whole area **D. congoense**
 b Base of leaf-blade not as above 12
- 12 a Sepals rather sharply reflexed in fully developed flowers 13
 b Sepals not sharply reflexed in fully developed flowers, at least never most sepals of a single flower but sepals usually erect or slightly or loosely spreading. 25
- 13 a All or nearly all flowers of a specimen with 2-lobed styles and 2-locular ovaries 14
 b All or nearly all flowers of a specimen with 3-lobed styles and 3-locular ovaries 15
- 14 a Inflorescence sessile in the leaf axil or nearly so; petals dark-brown to black in dry specimens. Whole area. **D. choristilum**
 b Inflorescence usually distinctly pedunculate; petals yellowish to pale brown in dry specimens. Whole area **D. zenkeri**
- 15 a Styles deeply split, lobes 1–3 mm long 16
 b Styles very shortly lobed 17
- 16 a Leaves elliptic to obovate, acuminate at top, rarely not so, usually tapering to a cuneate or narrowly rounded base. Whole area **D. choristilum**
 b Leaves ovate to elliptic, top rounded, rarely acuminate and then not distinctly so, broadly rounded to obtuse or cordate at base. Cameroun, Gabon **D. potamophilum**
- 17 a Flowers with an up to 15 mm long slender pedicel with 3–6 mm long upper part, and aggregated on a knob-like or very shortly branched base; peduncle, at most as long as the petiole, usually adnate to it. Eastern Zaïre **D. ugandense**
 b Flowers not arranged as above and/or pedicels different 18
- 18 a Sepals glabrous outside or nearly so, the margin puberulous. Whole area **D. mundense**

- b Sepals completely hairy outside 19
- 19 a Inflorescence a slender-stalked usually indistinctly branched (sometimes distinctly branched apically, i.e. just below the head) subglobose head; leaves with rather long, more or less appressed (but usually perpendicular to the nerves) hairs on midrib and main lateral nerves beneath. S.E. Gabon, Congo, western Zaïre **D. gillettii**
- b Inflorescence not as above; leaves glabrous or nearly so, if hairy hairs appressed on main nerves beneath. 20
- 20 a Petiole (5)7–10(12) mm long; branches usually hollow. Gabon **D. beilschmiedioides**
- b Petiole (1)2–5(10) mm long; branches solid 21
- 21 a Leaf-top distinctly glandular and tomentose beneath. Whole area **D. librevillense**
- b Leaf-top not as above 22
- 22 a Fruits beaked to apiculate, indehiscent. Whole area . . . **D. fructuosum**
- b Fruits rounded to obtuse at top, exocarp dehiscent 23
- 23 a Inflorescence a long-stalked, shortly but distinctly branched, rusty peberulous cyme; flowers with long slender pedicels, aggregated on a few knob-like bases. Congo, Zaïre. **D. pedicellatum**
- b Inflorescence long-stalked or not, usually long-branched, pale-hairy; flowers not aggregated 24
- 24 a Leaf-blade (2)3–4(5) times as long as wide, (4)6–10(14) × (1)2–4(5) cm; exocarp not reticulately fissured. Gabon, Congo, Zaïre **D. acuminatum**
- b Leaf-blade 2.5–3 times as long as wide, (6)8–12(16) × (2)3–4(6) cm; exocarp reticulately fissured. Cameroun, Gabon . . . **D. altescandens**
- 25(12) a Inflorescence a slender-stalked subglobose head, indistinctly branched or once distinctly so just below the head, peduncle free from petiole 26
- b Inflorescence either very distinctly and more than once branched or not slender stalked or both, or peduncle adnate to petiole or inflorescence sessile. 27
- 26 a Stamens distinctly longer than petals; fruits with dehiscent exocarp and stinging caducous hairs. S.E. Gabon, Congo, western Zaïre. **D. gillettii**
- b Stamens as long as the petals or nearly so; fruits indehiscent, velutinous to tomentose. Western Central Africa **D. tomentosum**
- 27 a Peduncle of inflorescence adnate to petiole (the blade of the supporting leaf may be strongly reduced) 28
- b Peduncle of inflorescence free from petiole or inflorescence sessile or nearly so 33
- 28 a Branches and branchlets hollow, at least between the nodes 29
- b Branches and branchlets solid 30
- 29 a Fresh leaves papery, usually with domatia in some lateral nerve axils beneath; glands on lower surface less than 0.2 mm diam.; petals

- 3–4.5 mm long, usually slightly shorter than the stamens; pistil 2–3-merous, 3–6 mm long. Western Central Africa . . . **D. gabonense**
- b Fresh leaves coriaceous, without domatia; glands on lower surface 0.3–1 mm diam.; petals 5.5–8 mm long, usually slightly longer than stamens; pistil 3-merous, 6.5–8 mm long. Gabon, Congo, western Zaïre, northern Angola (Cabinda). **D. thollonii**
- 30 a Fruits glabrous 31
- b Fruits hairy (hairs may be very short!). 32
- 31 a Fruits lenticellate, beaked. Whole area **D. mombuttense**
- b Fruits smooth, at most with a few lenticells, obtuse to apiculate apically. Cameroun, Equatorial Guinea, Gabon. **D. affine**
- 32 a Branchlets glabrous, if puberulous soon glabrescent. Gabon **D. pierrei**
- b Branchlets with a brown, powdery-like indumentum, often mixed with some normally developed hairs, not soon glabrescent. Cameroun, northern Gabon **D. rudatisii**
- 33(27) a Style deeply split, lobes 1–3 mm long. Whole area . . . **D. choristilum**
- b Style very shortly lobed 34
- 34 a Petals and stamens 2–3 mm long. Cameroun, Gabon **D. tetrastachyum**
- b Petals and stamens (3.5)4–6 mm long 35
- 35 a Style 2-lobed, ovary 2-locular (a few 3-merous pistils may be present). Cameroun, Gabon **D. oblongum**
- b Style 3(4)-lobed, ovary 3(4)-locular (a few 2-merous pistils may be present). 36
- 36 a Petals tomentose outside and on keel inside. Gabon **D. pierrei**
- b Petals glabrous or with a very few hairs just below split outside . . 37
- 37 a Sepals 5–6.5 mm long. Cameroun, Gabon **D. witianum**
- b Sepals 2.5–4 mm long 38
- 38 a Petals and stamens basally united into a 2–3 mm long tube. Angola. **D. sumbense**
- b Petals free from stamens or nearly so. Whole area . . **D. unguiculatum**
- 39(3) a Leaf-blade at base with 2 very distinct pearshaped pouches. Gabon **D. gassitae**
- b Leaf-blade at base not as above 40
- 40 a Stipules deeply lobed, at least dentate, usually long persistent . . . 41
- b Stipules entire or stipules early caducous 43
- 41 a Flowers arranged in a stalked subglobose head; petal lobes hairy outside. Gabon. **D. trichocephalum**
- b Flowers glomerate; petal lobes glabrous outside 42
- 42 a Stipules ovate to elliptic in outline, deeply pinnatisect with almost threadlike lobes; pistil 3–4.5 mm long. Central Zaïre. . . **D. germainii**
- b Stipules triangular in outline, dentate; pistil 5.5–9 mm long. Cameroun, Gabon, Congo **D. pulchrum**
- 43 a Flowers predominantly with 2-lobed styles 44

- b Flowers predominantly with 3(4)-lobed styles 50
- 44 a Petals geniculate below the spreading lobes; stamens at most half as long as the petals. Central Zaïre, Gabon (?) **D. staminellatum**
- b Petals geniculate or not, stamens relatively longer 45
- 45 a Petals and stamens at base united into a distinct 0.5–1 mm long tube, the stamens usually distinctly shorter than petals, the anthers sometimes almost sessile on tube 46
- b Petals and stamens free from each other or nearly so 47
- 46 a Branchlets sparsely hairy when young, soon glabrescent. Cameroun, Gabon, eastern Zaïre. **D. montanum**
- b Branchlets densely villous-tomentose, the indumentum long persistent. Western Central Africa. **D. insigne**
- 47 a Branchlets glabrous to sparsely puberulous, very soon glabrescent; inflorescence an up to 7-flowered cymule; fruits glabrous. Cameroun, Gabon **D. minutiflorum**
- b Branchlets more or less densely hairy, glabrescent or not, if glabrous or nearly so the inflorescence different; fruits hairy. 48
- 48 a Petiole 2–11(13) mm long; sepals erect; petals suberect; style hairy in lower half. Whole area **D. madagascariense**
- b Petiole 0–3(5) mm long; sepals erect to reflexed; upper part of petals often curved; style usually glabrous 49
- 49 a Inflorescence up to ca 25-flowered; pedicel usually slender, (1.5)3–5(10) mm long; leaves usually with a cordate to subcordate base. Western Central Africa **D. dewevrei**
- b Inflorescence up to 4-flowered; pedicel stiff, up to 1.5 mm long; leaves rounded to cuneate at base. S.E. Cameroun. **D. oliganthum**
- 50(43) a Hispid liana or lianescent shrub with hollow branchlets; stipules, bracts and bracteoles slender, usually curved; flowers large (up to 10 mm long) arranged in up to 20-flowered inflorescences; petals hairy inside, usually black when dry. Western Central Africa south of Cameroun **D. chalotii**
- b Above characters not associated. 51
- 51 a Upper part of pedicel ca as long as the reflexed sepals, at least as long as the lower part. Whole area **D. parvifolium**
- b Upper part of pedicel shorter than the lower part, when equal at most half as long as the sepals, or 0, or flowers sessile or nearly so, or joint in pedicel absent 52
- 52 a Thin hispid liana or lianescent shrub with solid branchlets and sessile inflorescence of 1–3 flowers only; sepals spreading; petals glabrous inside, lobes flat, spreading; petals and stamens distinctly united at base. N.W. Gabon **D. geminostellatum**
- b Above characters not associated. 53
- 53 a Petals distinctly lobed, the lobes completely hairy outside 54
- b Petals distinctly lobed or not, the lobes glabrous outside or apical part glabrous outside 55

- 54 a Inflorescence a subumbel, flowers distinctly stalked; petiole (4)6–9(15) mm long, the blade 1.5–2 times as long as wide. Cameroun **D. reticulatum**
 b Inflorescence a subglobose head, flowers sessile or nearly so; petiole (2)4–7 mm long, the blade 2.5–3 times as long as wide. Gabon **D. ruficeps**
- 55 a Bracts and bracteoles 3–5(6) mm long, ca as long as or longer than the stout pedicels; young vegetative parts barbate by a furry or hirsute indumentum; leaves usually cordate at base, above with prominent midrib and main lateral nerves. Cameroun, Gabon. . . . **D. barbatum**
 b Above characters not associated. 56
- 56 a Pedicels without a joint; flowers persistent 57
 b Pedicels jointed; flowers, at least partly, caducous 58
- 57 a Stipules 1–5(6) mm long; leaves (4)10–16(24) × (1.5)3.5–6(12) cm with 8–12(16) pairs of main lateral nerves; sepals 1.5–2.5 mm long; petals (3)4–6 mm long. Whole area **D. glomeratum**
 b Stipules (4)8–17(22) mm long; leaves (15)20–35(42) × (6)7–11(14) cm with (10)11–14(16) pairs of main lateral nerves; sepals 3–5 mm long; petals 4.5–8 mm long. Western Central Africa **D. pulchrum**
- 58 a Fruits glabrous, if sparsely puberulous then 3(4)-lobed and 1-seeded 59
 b Fruits hairy, if sparsely so not as above 61
- 59 a Leaves glabrous or nearly so, leaf margin revolute at the extreme base and more or less covering large glands beneath; fruits 3(4)-lobed, 1-seeded. Cameroun, Gabon, northern Angola (Cabinda) **D. integripetalum**
 b Leaves different; fruits when lobed more than 1-seeded 60
- 60 a Leaves drying greenish to pale-brown, (8)11–15(18) × 3.5–6(9) cm, midrib glabrous above or nearly so; petals (2.5)3.5–4.5 mm long; pistil (3.5)4–5.5 mm long. Gabon, Congo, western Zaïre **D. bodyi**
 b Leaves drying dark-brown to black, (3)8–12(15) × (1)3–4(5) cm, midrib always distinctly hairy above; petals 2.5–3(3.5) mm long; pistil 3–4(4.5) mm long. S.E. Cameroun **D. cymulosum**
- 61 a Branches when freshly cut exuding a reddish slime turning dark-brown to black in drying; leaves usually coriaceous, glabrous or rather soon glabrescent; petals entire to emarginate, at base distinctly united with stamens into a 0.5–2.5 mm long tube. Whole area . . . **D. crassifolium**
 b Above characters not associated. 62
- 62 a Flowers ca 3 mm long; stamens distinctly shorter than petals and united with them, the anthers almost sessile on tube. Cameroun, Gabon **D. melanocladum**
 b Petals and stamens free or nearly free from each other, if distinctly united the flowers much longer 63
- 63 a Flowers in glomerules or fascicles (some inflorescences of a specimen

- may be very shortly stalked and/or branched) 64
- b Flowers in distinctly branched and/or distinctly stalked inflorescences 67
- 64 a Petals and stamens slightly spreading at base, upper parts usually curved inwards; petal lobes flat or nearly so. Western Central Africa **D. dewevrei**
- b Petals and stamens erect without incurved upper parts; petal lobes concave 65
- 65 a Style hairy in lower half. Whole area **D. madagascariense**
- b Style glabrous in lower half or nearly so 66
- 66 a Leaf acumen with a distinct mucro, if not the leaf blade beneath at least with distinct, large (0.2–0.7 mm diam.) glands along midrib, especially near base and/or on the acumen or top (sometimes hidden by indumentum). Whole area **D. heudelotii**
- b Leaf acumen usually rounded or obtuse, without a distinct mucro; glands usually smaller. Whole area **D. staudtii**
- 67 a Style hairy in lower half; sepals (1)1.5–2.5(3) mm long. Whole area **D. madagascariense**
- b Style glabrous in lower half, or with a very few hairs only; sepals (2.5)3–6(7) mm long 68
- 68 a Petal lobes distinct, concave, not incurved to inflexed. Cameroun, eastern Zaïre **D. dewildei**
- b Petal lobes flat or nearly so, often incurved or folded one over the other, or petals emarginate 69
- 69 a Lianescent shrub or liana; fruit obovoid, velutinous, firmly walled, endocarp filmy. Angola, Zaïre **D. ruhlandii**
- b Erect shrub or tree; fruits subellipsoid to subglobose, velutinous to tomentellous, usually echinate to tuberculate or rugose-wrinkled, rarely smooth, wall itself rather thin, endocarp pergamentaceous, fibrous 70
- 70 a Petals 5–6.5 mm long; stamens (4.5)5–6.5(7) mm long; pistil 6–7.5 mm long. Western Central Africa **D. barteri**
- b Petals and stamens 3–4 mm long; pistil 3–4.5 mm long. Eastern Zaïre **D. stuhlmannii**

KEY III: EAST AFRICAN AND SOUTH (SUB)TROPICAL AFRICAN SPECIES

- 1 a Pistil glabrous; fruits glabrous; plants glabrous or nearly so. S.E. Tanzania **D. braunii**
- b Pistil, at least the ovary, hairy; fruits hairy at least partly; plants usually hairy, at least young parts 2
- 2 a Stipules, at least some of them, pinnately or palmately lobed, at least dentate, or completely palmately or pinnately divided, usually long persistent 3
- b Stipules simple, entire or nearly so, or early caducous 6

- 3 a Indumentum of ovary short-erect-hairy (velutinous), if hairs longer and more flexible than not waved. S.E. Tanzania, N.E. Mozambique **D. edule**
 b Indumentum of ovary like cotton-wool, i.e. with waved or strongly curled hairs, either white or dirty brown 4
- 4 a Flowers with erect or slightly spreading sepals. Zambia **D. bangii**
 b Flowers with reflexed sepals 5
- 5 a Petiole (3)4–10(15) mm long, (6)12–20(30) mm long when united with stalk of inflorescence; leaves (7)12–25(53) × (2.5)5–11(21) cm. Western Uganda **D. angolense**
 b Petiole 1–3(10) mm long, also when united with stalk of inflorescence; leaves 5–15(18) × (2)3–7(10) cm. Coastal area of S. Kenya, Tanzania, and N. Mozambique **D. mossambicense**
- 6 a Indumentum of ovary short-erect-hairy (velutinous), if hairs longer and more flexible than not waved 7
 b Indumentum of ovary like cotton-wool, i.e. with waved or strongly curved hairs, either white or dirty brown 13
- 7 a Petals entire, with stamens united into a 0.5–2.5 mm long tube; stems and thick branches exuding a pale reddish slime, dark-red to black when dry. Western Tanzania **D. crassifolium**
 b Petals lobed or emarginate, not or very shortly united with stamens; stems and thick branches without exudate 8
- 8 a Petiole 2–4 mm long; leaves usually cordate at base, sometimes obtuse, both sides with rather long, subappressed hairs; inflorescence sessile or nearly so. S.E. Tanzania, N.E. Mozambique. **D. edule**
 b Petiole usually longer, if not leaves cuneate at base; other characters not associated 9
- 9 a A rhizomatous suffrutex, annually sprouting from a woody, largely subterranean base. N.E. Zambia, Angola, S.W. Africa, Zimbabwe, Botswana, South Africa **D. cymosum**
 b Trees, shrubs or lianas 10
- 10 a Sepals (1)1.5–2.5(3) mm long; petals (0.2)1–2(3) mm split, the lobes concave 11
 b Sepals 3–5(6) mm long; petals emarginate or up to 1 mm split, lobes flat, often inflexed 12
- 11 a Petals (1.7)2.5–4(5.5) mm long, (0.5)1–2(3) mm split; stamens and pistil at least as long as the petals, usually longer, (2)2.5–6(7) mm long and (1.7)2.5–6(9) mm long respectively. Uganda, Kenya, Tanzania, Zimbabwe, Mozambique . **D. madagascariense** var. **madagascariense**
 b Petals 1.7–2 mm long, 0.2–0.5 mm split; the stamens almost as long as the petals, 1.5–1.7 mm long, the pistil distinctly shorter, 1–1.2 mm long. Kenya, Tanzania. **D. madagascariense** var. **brevistylum**
- 12 a Lianescent shrub or liana (rarely tree-like?); leaves, at least when young, sparsely hairy, rather soon glabrous or nearly so; inflorescences often grouped on leafless axillary shoots or leafless parts of such

- shoots, distinctly 3–4 times branched, usually many flowered; fruits obovoid, velutinous, firmly walled, endocarp filmy not fibrous. Kenya, Tanzania **D. ruhlandii**
- b Shrub or tree; leaves, at least when young, rather densely hairy, especially so beneath, long persistent on midrib above; inflorescences usually single in the leaf axil, more compact, indistinctly branched or basally once distinctly so, up to ca 40-flowered; fruits subellipsoid to subglobose, velutinous to tomentellous, usually echinate to rugose-wrinkled, rarely smooth, wall itself rather thin, endocarp pergamentaceous, fibrous, finely striate inside. Tanzania, Mozambique **D. stuhlmannii**
- 13(6) a Flowers arranged in a sessile to subsessile subumbellate inflorescence with slender, up to 15 mm long, pedicels, with 3–6 mm long upper parts. Uganda, W. Tanzania. **D. ugandense**
- b Flowers not arranged as above; pedicels much shorter 14
- 14 a Inflorescence a glomerule or fascicle, up to 5-flowered; flowers with 5.5–7.5 mm long petals and 7–8 mm long stamens; stipules rather long persistent, (3)7–14(17) × 1–3 mm. S.E. Tanzania . **D. macrocarpum**
- b Inflorescences different, at least more flowered; flowers smaller; stipules usually smaller 15
- 15 a All or nearly all flowers of a specimen with 2-locular ovaries and 2-lobed styles. S.W. Kenya, N.E. Tanzania **D. zenkeri**
- b All or nearly all flowers of a specimen with 3-locular ovaries and 3-lobed styles 16
- 16 a Petals and stamens 1.5–2.5 mm long, the pistil 1–2 mm long. S.E. Kenya, N.E. Tanzania **D. eickii**
- b Petals, stamens, and/or pistil longer 17
- 17 a Petals inside hairy below the lobes. 18
- b Petals inside glabrous below the lobes. 20
- 18 a Leaves usually papery, hairy above. S. Angola, Zambia, S.W. Africa, Zimbabwe **D. rhodesicum**
- b Leaves coriaceous, if hairy above then only so on the main nerves. Kenya, Tanzania, Mozambique 19
- 19 a Leaves never completely glabrous beneath but usually shortly pubescent all over the lower surface, margins usually strongly revolute; peduncle (4)6–11(13) mm long; petals 2.5–3.5 mm long, less than 1 mm split. S.E. Kenya, Tanzania **D. arenarium**
- b Leaves glabrous beneath or sparsely, shortly appressed-haired on midrib and main lateral nerves, margins not or only slightly revolute; peduncle 2–5 mm long; petals (4) 4.5–5.5(6) mm long, 1–1.5 mm split. S.E. Tanzania, Mozambique **D. barbosae**
- 20 a Inflorescence very shortly stalked (1–3 mm), branched into a few to several, many flowered, spreading scorpioid arms; sepals 1.5–2 mm long. S.E. Kenya **D. fadenii**

- b Inflorescence a normal compound dichasium, usually with much longer peduncle; sepals 2.5–5 mm long 21
- 21 a Plants densely hairy all over, leaves not glabrescent. S. Angola, Zambia, S.W. Africa, Zimbabwe **D. rhodesicum**
- b Plants glabrous or glabrescent, if densely hairy only so on young parts. Kenya, Mozambique. 22
- 22 a Branchlets grey-hairy; leaves (2)4–8 × 1–3(4) cm; peduncle of inflorescence (2)4–5(9) mm long. Mozambique. **D. deflexum**
- b Branchlets brown-hairy; leaves (5)9–14(20) × 3–6(8) cm; peduncle of inflorescence (0)5–20 (50) mm long. S.E. Kenya. . . **D. fruticosum**

KEY IV: SPECIES OF MADAGASCAR AND THE COMORES

- 1 a Petals distinctly bilobed 2
- b Petals entire, at most emarginate 3
- 2 a Pedicel above articulation 1–1.5 mm long; sepals reflexed; ovary shortly velutinous **D. chlorinum**
- b Pedicel above articulation 0–0.5(1) mm long; sepals erect or nearly so; ovary soft-hairy. **D. madagascariense**
- 3 a Leaves very unequal-sided at base. **D. virchowii**
- b Leaves not or only slightly unequal sided at base 4
- 4 a Indumentum of ovary like cotton wool 5
- b Indumentum of ovary absent or ovary very shortly velutinous. . . . 6
- 5 a Sepals usually reflexed in mature flowers; petals (2)2.5–3.5 mm long; pistil (2.5) 3–4 mm long **D. bojeri**
- b Sepals erect in mature flowers; petals 3.5–4.5 mm long; pistil 5.5–8 mm long **D. vondrozanum**
- 6 a Flowers 2–2.5 mm long **D. rufum**
- b Flowers 5–7 mm long **D. leucosia**

ADDITIONS, CORRECTIONS AND EMENDATIONS TO THE PREVIOUS PARTS III-VIII
PUBLISHED IN 1973-1982, IN ALPHABETICAL ORDER.

D. albidum Chev. ex Pellegr.

This species has in 1974 been collected near Mampong-Akwapim in Ghana by A. A. ENTI under number *F. E. 1224*.

D. barbosae Torre

As could be expected, this species so far only known from N.E. Mozambique has recently been collected in the Lindi District in S.E. Tanzania (coll.: *Magogo & Rose Innes RRI 397 (K)*).

D. braunii Engl. & Krause

When treating this species (BRETELER, 1973: 103) mature fruits were unknown. Recent material from the Lindi District in S.E. Tanzania (coll.: *Magogo & Rose Innes RRI 383* (K)) has mature fruits which are described below.

Fruits orange, 1-seeded, glabrous, obovoid-ellipsoid, beaked, 4.5 cm long (beak of 1.5 cm inclusive), 1.5–2 cm diam.; mesocarp juicy (?); endocarp pergamentaceous, glabrous and finely striate inside. Seed ovoid, 2.5 × 1–1.5 cm, glabrous, testa thin.

D. brazzae Pellegr. = **D. librevillense** Pellegr. See p. 38.

D. choristilum Engl.

Recent collections from Gabon included small flowered *D. choristilum* specimens. As has been done before in other species (*D. crassifolium*, *D. dewevrei*, *D. heudelotii*, *D. lujae*, *D. madagascariense*) these specimens are classified in a separate variety. The two varieties can be keyed out as follows:

Petals (1.5)2.5–4 mm long, 1–2.5 mm split; stamens and pistil (2)2.5–4(5) mm and 2–4.5 mm long respectively **D. choristilum** var. **choristilum**

Petals 1.5–2 mm long, 0.5 mm split; stamens and pistil 1–1.5 mm and 1 mm long respectively **D. choristilum** var. **louisii**

D. choristilum Engl. var. **louisii** Bret. var. nov.

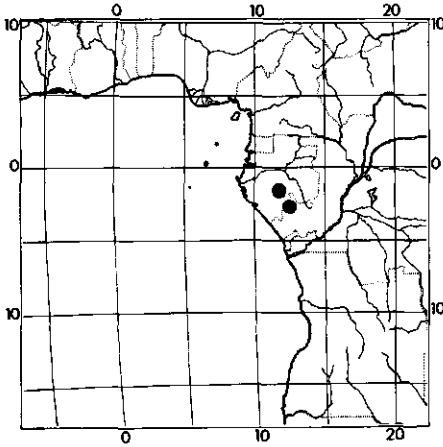
Map 2

Haec varietas a *D. choristilum* var. *choristilum* differt floribus parvis staminibus petalisque maximaliter aequilongis et pistillo distincte brevioribus.

Type: Gabon, Chaillu Massif, 15 km Mimongo-Mbigou Rd, Naguila Mt, alt. 760 m, *J. J. de Wilde, Arends, Bouman, Karper and Louis 519*, fl. (holotype: WAG); 20 km E. of Mimongo, Songou Mt., alt. 1020 m, *Louis, Breteler and de Bruijn 1002*, fr. (paratype: WAG). Congo, near Kouyi, *Sita 4120* (paratype: WAG).

Besides the small flowers which are in fact the only sound character to distinguish this new variety, the type material has shorter petioles and larger fruits than previously seen in this species. Consequently the species description (BRETELER, 1978: 12) has to be emended as follows:

Change the length of the petiole into: 1–11(18) mm, the length of the petal incision into 0.5–2.5 mm, the stamen and pistil length into 1–4(5) mm and 1–4.5 mm respectively, the fruit length into 1.5–5 cm; add after fruit diam.: Beaked or not, sometimes stipitate; replace in the description of the fruit indumentum 'villous' by 'velutinous'; change the seed measurements into 30 × 15 mm.



MAP 2. *D. choristilum* var. *louisii*.

***D. fadenii* Bret. sp.nov.**

Fig. 3 Map 3

Liana. Rami cortice brunneo vel nigro, lenticellati. Ramuli tomentelli, glabrescentia. Folia elliptica, subtus persistens puberulo-tomentelli, costis et nervis lateralibus principalibus utrinque 6–8 impressis. Inflorescentiae basi pauci – vel pluribrachiatae, brachiis patentibus, multifloris, scorpioides. Sepala suberecta vel patentia, 1.5–2 mm longa. Petala 3–3.5 mm longa, 1 mm fissa, glabra. Stamina petalis aequilonga. Pistillum 3-merum, ovario villosa. Endocarpium intus villosum.

Type: Kenya, Kilifi District, Chasimba, *R. B. & A. J. Faden, J. B. Gillett & N. Gachathi 77/416* (holotype: WAG; isotype: K, US; other duplicates (not seen) in B, BR, C, EA, F, MO, P, PRE, UPS).

Diagnostic characters. Woody climber with dark-brown to black, lenticellate branches and tomentellous, glabrescent branchlets. Leaves elliptic, persistently short-hairy beneath, midrib and the 6–8 pairs of main lateral nerves impressed above. Inflorescence branched near base into a few to several, many flowered, spreading, scorpioid arms. Sepals suberect to spreading, 1.5–2 mm long. Petals 3–3.5 mm long, 1 mm split, glabrous. Stamens as long as the petals. Pistil 3-merous, ovary villous. Endocarp long hairy inside.

Description. Woody climber. *Branches* dark-brown to black, lenticellate. *Branchlets* tomentellous, glabrescent. *Stipules* rather long persistent, entire, narrowly triangular to subulate, (1)2–5(6) mm long, hairy as branchlets. *Leaves*: petiole subterete, (2)3–4(6) mm long, tomentose; blade papery, elliptic, 2–2.5 times as long as wide, (4)6–11 × (2)3–5 cm, rounded to obtuse and often somewhat unequal sided at base, top acutish to rounded, mucronate or not, or obscurely shortly acuminate, midrib and the 6–8 pairs of main lateral nerves impressed

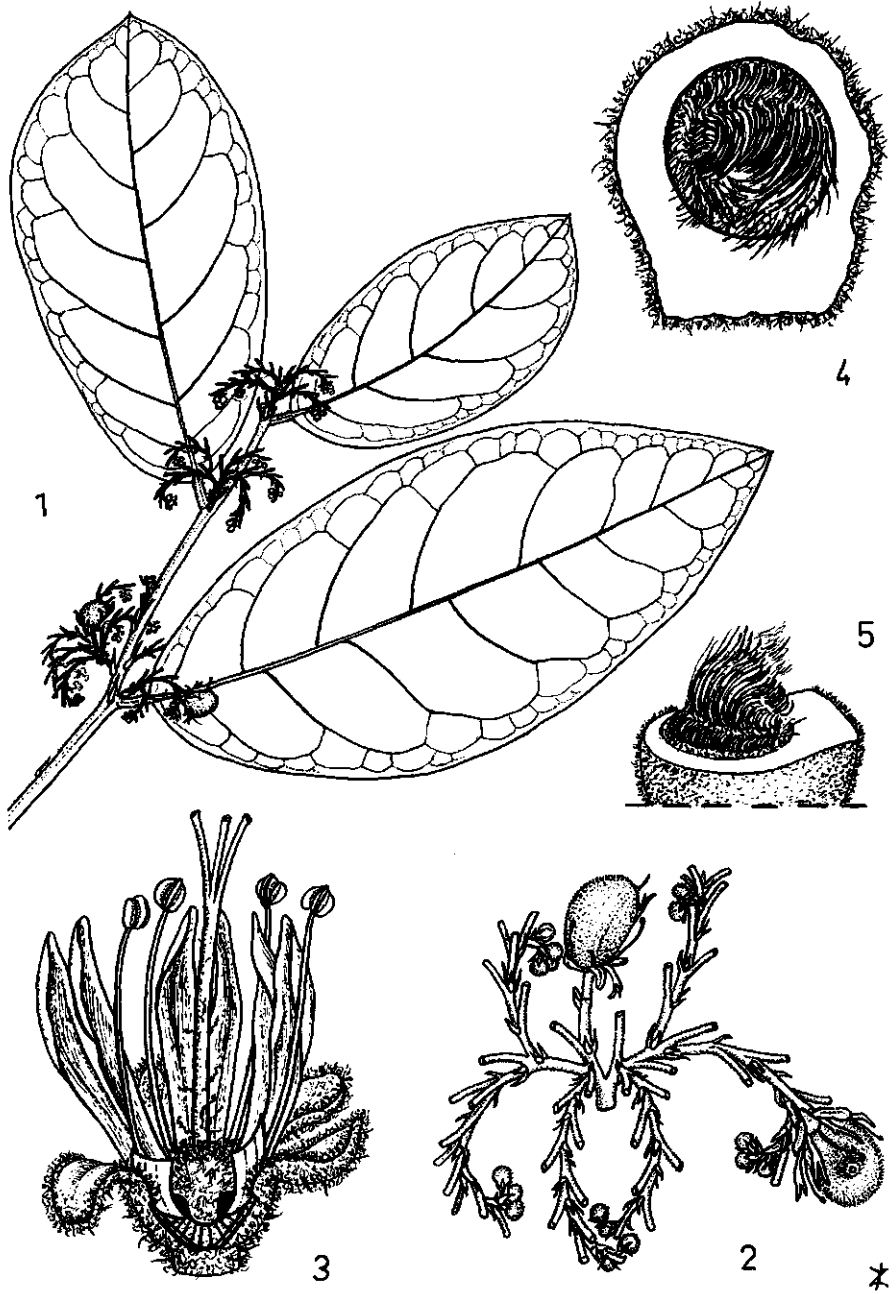
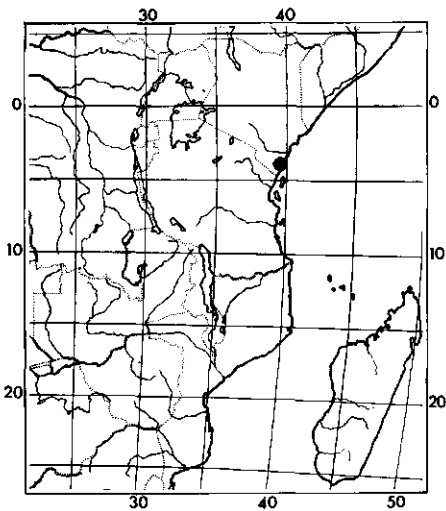


FIG. 3. *D. fadenii*: 1. branchlet with inflorescences, $\frac{1}{2}\times$; 2. inflorescence with some flowerbuds and young fruits, $2\frac{1}{2}\times$; 3. flower partly, $15\times$; 4. fruit in cross section (seed removed) showing hairy endocarp, $10\times$; 5. part of fruit (seed removed) with protruding hairs, $7\times$ (1-5. R. B. & A. J. Faden, Gillett & Gachathi 77/416).

above, prominent beneath; densely tomentose above when young, soon glabrescent, beneath persistently short-hairy all over, more densely so on main nerves; glands absent. *Inflorescence* branched near base into a few to several many flowered, spreading, scorpioid arms, tomentellous; peduncle 1–3 mm long; bracts and bracteoles narrowly triangular, 0.5–1.5 mm long. *Pedicel* 2–4 mm long, tomentellous, the upper part at most 0.5 mm long. *Sepals* suberect to spreading or even some more or less reflexed, ovate-oblong, 1.5–2 × ca 1 mm, tomentellous outside and on apical part inside. *Petals* suberect, oblong to narrowly obovate in outline, 3–3.5 mm long, 1 mm split, glabrous both sides, at base very shortly adnate to filaments. *Stamens* suberect, as long as the petals, glabrous; anthers small, ca 0.3 mm long. *Staminodes* subquadrate to transversely oblong, 0.5 × 0.5–0.2 mm, slightly bilobed, glabrous or hairy at base inside. *Pistil* 3-merous, 3.5–4 mm long; ovary villous, style glabrous or with a few hairs in basal part, apically distinctly lobed. *Fruits* (only immature fruits seen) subglobose to obovoid, slightly laterally compressed, tomentose; endocarp densely long-hairy inside. *Seeds* glabrous.

Distribution: Only once collected in Kenya (see type).

Ecology: Limestone outcrops.

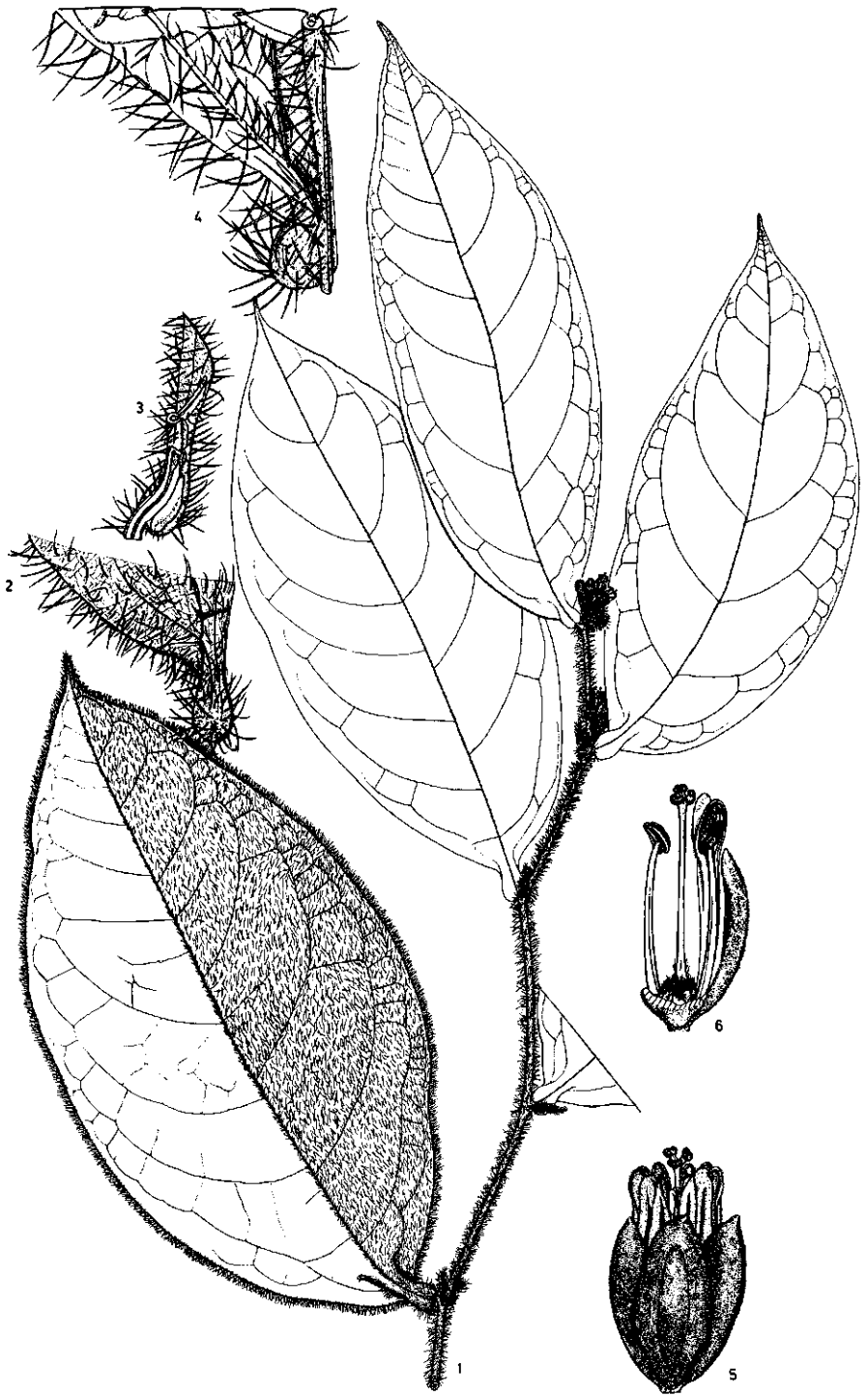


MAP 3. *D. fadenii*.

***D. gassitae* Bret., sp. nov.**

Fig. 4 Map 4

Liana tenuis, hispida. Stipulae subulatae, 5–9 mm longae. Folia elliptica, 15–21 × 7–10 cm, basi bimarsupinata, acuminata, omnibus hispida. Inflorescencia 12–34 florifera, subsessilia, compacta. Flores 7–8 mm longi. Sepala erecta.



Petala breviter biloba. Ovarium 3-loculare, velutinum. Fructus ignotus.

Type: Gabon, 50 km S.E. of Achouka (0.17 S, 11.55 E), *Louis, Breteler and De Bruijn 761* (holotype: WAG).

Diagnostic characters. Slender hispid liana. Stipules subulate, 5–9 mm long. Leaves elliptic, 15–21 × 7–10 cm, bimarsupiate at base, acuminate at top, hispid both sides. Flowers 7–8 mm long arranged in rather compact, subsessile, 12–34-flowered inflorescences. Sepals erect. Petals shortly bilobed, sparsely pubescent on upper half both sides. Ovary 3-locular, velutinous.

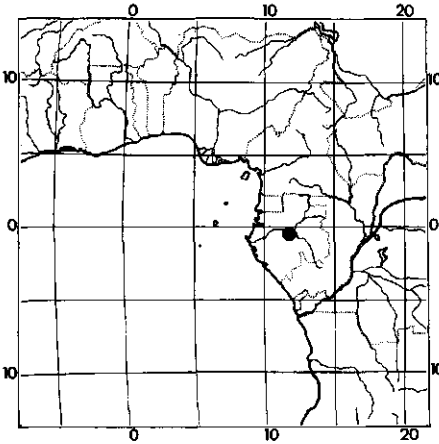
Description. Slender liana. *Stem* with intruding phloem, sparsely lenticellate. *Branches* and branchlets long hispid-hairy mixed with short curled hairs. *Stipules* subulate, rather early caducous, 5–9 mm long, hairy as branchlets. *Leaves*: petiole subterete, ca 4 mm long, hairy as branchlet; blade elliptic, ca twice as long as wide, 15–21 × 7–10 cm, narrowed at base into 2 distinct pouches (bimarsupiate) more or less hiding the petiole from above, acutely acuminate at top, the acumen 0.5–1 cm long, with 7–9 main laterals each side of midrib, hispid both sides, usually mixed with short, often curled hairs on midrib, main laterals and margin, glands rather small, dispersed, beneath only. *Inflorescence* subsessile, rather indistinctly or once distinctly branched, or more or less 2–4 armed, 12–34 flowered, velutinous, in the basal part often mixed with some long hispid hairs; peduncle at most 4 mm long; bracts and bracteoles triangular, 1–6 mm long, velutinous outside, puberulous inside. *Pedicel* up to 5 mm long, velutinous, the upper part 0. *Flowers* 7–8 mm long. *Sepals* erect, concave, ovate-elliptic, 5.5–6 × 4 mm, top acutish, more or less ribbed and velutinous outside, tomentellous inside. *Petals* erect, at base 0.5–1 mm united with stamens, oblong, 6.5–7 mm long, 0.5 mm split, sparsely pubescent on upper half both sides, lobes concave. *Stamens* erect, as long as the petals or slightly shorter, glabrous; anthers 1 mm long connective distinct. *Staminodes* subquadrate, ca 0.5 × 0.5 mm, rather thick, glabrous. *Pistil* 3-merous, 7 mm long; ovary velutinous, style glabrous shortly 3-lobed apically; stigmas rather large, reniform. *Fruits* unknown.

Distribution: Only once collected in Gabon (see type).

Ecology: Rain forest.

Notes. This species has been named after DR. JEAN NOEL GASSITA, former head of the Gabonese National Research Organisation (CENAREST), to honour his efforts to promote the botanical exploration of his country and in establishing a national herbarium at Libreville.

FIG. 4. *D. gassitae*: 1. flowering branchlet, × ½; 2-4. detail of leaf base: 2. from above, 1 ×; 3. cut lengthwise, 1 ×; 4. from beneath, 2 ×; 5. flower, 4 ×; 6. flower partly, 4 × (1-6. *Louis, Breteler & de Bruijn 761*).



MAP 4. *D. gassitae*.

It is difficult to indicate the position of *D. gassitae* among the African species. By its indumentum of the vegetative parts, its stipules and inflorescences it seems to be close to *D. chalotii*. Many characters of the flower, like sepals, petals, stamens, and stigma indicate affinity with *D. thollonii*, but ovary indumentum does not. Mature fruits may clarify its position.

D. heudelotii* (Planch. ex Oliv.) Baill. var. *heudelotii* & var. *ndongense

As described the fruits of *D. heudelotii* may be prominently veined. A recent collection from Gabon, south of Booué in the 'Région des Abeilles' (Louis, Breteler & De Bruijn 703 – WAG) shows fruits with a densely, irregularly, narrowly ridged to tuberculate skin. The same taxon has been collected in the same area in flower and fruit (Louis, Breteler & De Bruijn 743 – WAG). It is somewhat doubtful whether these specimens have to be placed in var. *heudelotii* or in var. *ndongense*. The flowers are small, having petals, stamens, and pistils of 2.5 mm length which means that they should be classified as var. *ndongense*. According to the fruits, however, the specimens are better placed in var. *heudelotii*, as even strongly nerved fruits have never been observed in var. *ndongense*. Moreover, the soft-hairy indumentum of the vegetative parts, although of minor importance, fits better in var. *heudelotii* than in var. *ndongense*. For these reasons the two specimens have been identified as *D. heudelotii* var. *heudelotii*.

***D. librevillense* Pellegr.**

When treating this species and *D. brazzae*, it has been stated that both species are very closely related, but that in absence of sufficient material, especially of *D. librevillense*, these two species, simultaneously published by PELLEGRIN, were maintained separate. More material with flowers and nearly mature fruits has been collected recently in Gabon in the 'Région des Abeilles' (Louis, Breteler

& De Bruijn 664, 742 – WAG). This material has been compared accurately with the already available material of both species. As a result the two taxa cannot be maintained as separate species and are here united under the name *D. librevillense* Pellegrin.

D. madagascariense Poir. var. **madagascariense**

In the 'Région des Abeilles', the part of Gabon south of Booué, the forests proved to be extremely rich in Dichapetalum species (see also *D. gassitae* sp. nov.). There two specimens of *D. madagascariense* var. *madagascariense* (Louis, Breteler & De Bruijn 707 & 773 – WAG) were collected with narrowly ridged to tuberculate fruits, more or less like those of *D. heudelotii* mentioned above. Similarly strongly nerved fruits had already been observed in *D. madagascariense* var. *madagascariense* as well, but never strongly ridged to tuberculate ones.

D. pedicellatum Krause

The pistil of this species has been mentioned as 2 (–4)-merous in the description, but as 3 (–4)-merous under the diagnostic characters. The last statement is correct, 2-merous pistils have not been recorded so far.

D. potamophilum Bret. sp. nov.

Fig. 5 Map 5

Liana cylindrico ligneo profunde lobato provisum. Ramuli breviter pubescentes. Petiolus (2)3–5(6) mm longus. Folia ovato-elliptica 4–11(17) × (2)3–5(6) cm, basi late rotundata usque cordata, apice rotundata vel interdum obscure acuminata, juvenilia sparse pubescentis, nervis principalibus utrinque prominentibus. Inflorescentia sessilis vel fere sessilis, ramosa, multiflora, breviter pubescens. Sepala reflexa. Petala suberecta usque patentia, 2–3 mm longa, 0.5–1.5 mm fissa, staminibus pistilloque aequilonga. Ovarium villosum, stylis liberis vel fere liberis. Fructus ignotus.

Type: Gabon, Ivindo R. near Mayibout I, periodically inundated forest, Breteler & J. J. F. E. de Wilde 604 (holotype: WAG).

Diagnostic characters. Liana with a deeply lobed woodcylinder. Branchlets rusty to pale-brown short-hairy. Petiole (2)3–5(6) mm long. Leaves ovate-elliptic, 4–11(17) × (2)3–5(6) cm, broadly rounded to cordate at base, rounded rarely obscurely acuminate at top, sparsely hairy when young, main nerves prominent both sides. Inflorescence sessile or nearly so, branched, many flowered, rusty to pale-brown short-hairy. Sepals reflexed. Petals suberect to spreading, 2–3 mm long, 0.5–1.5 mm split, as long as stamens and pistil. Ovary villous, styles free or nearly so. Fruits unknown.

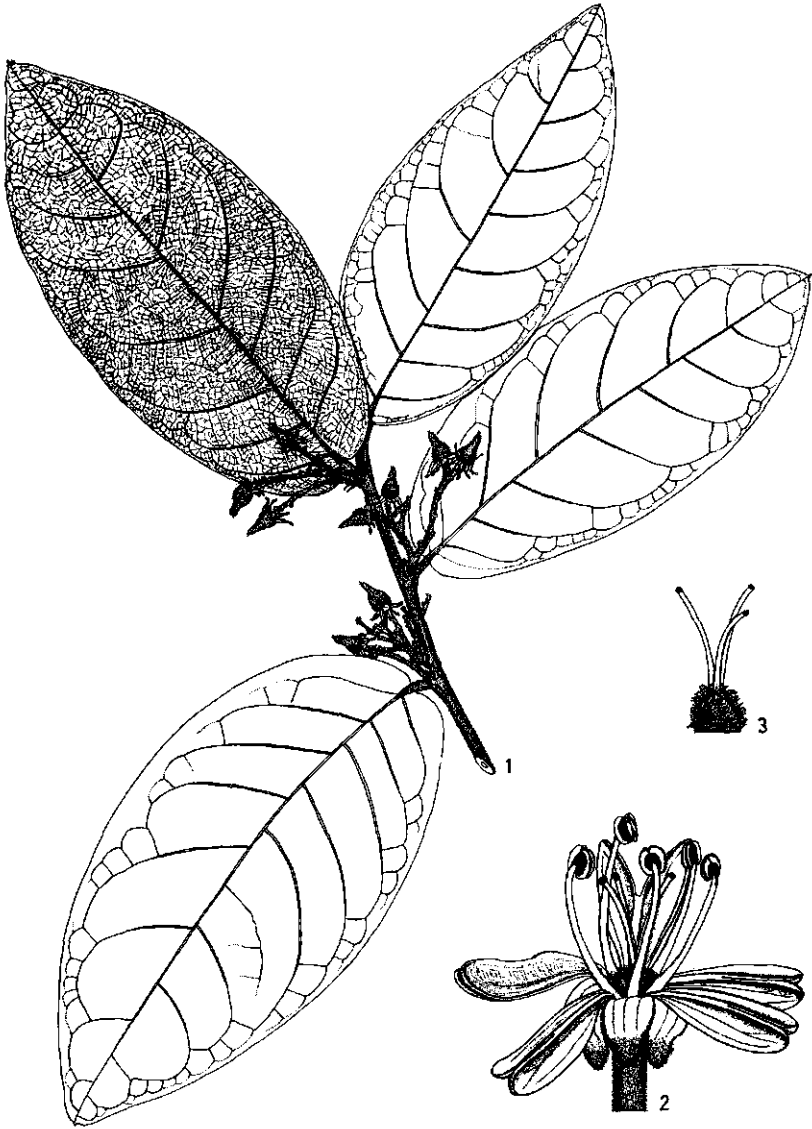


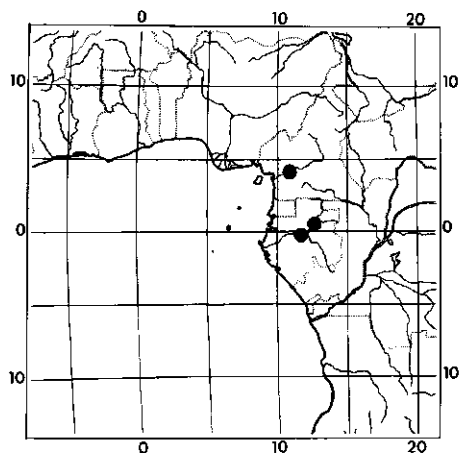
FIG. 5 *D. potamophilum*: 1. branchlet with immature fruits, $\frac{2}{3} \times$; 2. flower, $8 \times$; 3. pistil, $8 \times$ (1. Louis, Breteler & de Bruijn 588; 2-3. Breteler & J. J. de Wilde 604).

Description. Liana. *Stems* with a deeply lobed woodcylinder; lenticels usually distinct, more or less in 5 rows. *Branches* greyish to pale-brown, sparsely lenticellate, glabrous or glabrescent. *Branchlets* rusty to pale-brown short-hairy. *Stipules* early caducous or not, narrowly triangular, 1–3 mm long, hairy as

branchlet. *Leaves*: petiole subterete to semiterete, somewhat grooved above, (2)3–5(6) mm long, hairy as branchlet; blade papery to coriaceous, ovate-elliptic, 1.5–2(3) times as long as wide, 4–11(17) × (2)3–5(6) cm, sparsely rusty hairy on main nerves and margin when young, soon glabrescent, broadly rounded to obtuse to cordate at base, usually rounded (sometimes emarginate) and often mucronate at top, rarely acuminate and then not distinctly so, midrib and the 5–9 pairs of main laterals prominent both sides, margin slightly revolute or not; glands both sides, more numerous beneath, rather distinct, dispersed. *Inflorescences* sessile or nearly so (peduncle up to 3 mm long), 3–5 times distinctly branched, many flowered, rusty to pale-brown short-hairy; bracts and bracteoles minute, ovate-triangular, up to ca 0.5 mm long. *Pedicel* up to ca 3 mm long, rusty short-hairy, the upper part at most 0.5 mm long. *Sepals* reflexed, shortly united at base, ovate-oblong to narrowly triangular, 1.5–2.5 × 0.5–0.8 mm, rusty tomentose outside, glabrous or with some short hairs on apical part inside. *Petals* suberect to spreading, at base very shortly adnate to filaments, narrowly obovate to elliptic in outline, 2–3 mm long, 0.5–1.5 split, glabrous or with a very few hairs just below split outside, lobes concave, rounded to acutish apically. *Stamens* suberect, 2–3 mm long, glabrous; anthers up to 0.5 mm long, connective distinct or not. *Staminodes* subquadrate to transversely oblong, up to 0.2 × 0.2 mm, glabrous. *Pistil* 3–4-merous, 2–3 mm long; ovary villous; styles 3–4, free, or partly united, slightly curved, glabrous; stigma small. *Fruits* (only young fruits seen) 1(–3?)-seeded, velutinous, distinctly beaked, beak curved or not.

Distribution: Cameroun, Gabon.

Ecology: Riverine forest.



MAP 5. *D. potamophilum*.

Specimens examined.

CAMEROON. 70 km S.S.W. of Bafia, border of Sanaga R., *Letouzey 9806* (P, WAG).

GABON. 7 km S.W. of Makokou, border of Ivindo R., *Breteler 7623* (WAG); 7643 (WAG); Invindo R. near Mayibout I, periodically inundated forest, *Breteler & J. J. F. E. de Wilde 604* (WAG, type); along Offoué R. near Achouka, *Louis, Breteler & De Bruijn 588* (WAG).

Note. This species has, so far, only been collected on riverbanks, hence its epithet *potamophilum*. It is related to *D. choristilum* by its kind of inflorescence and its flowers with free or nearly free styles. It differs from *D. choristilum* by the leaves and by the different habitat. They may be distinguished as follows:

Leaves elliptic-obovate, usually tapering to a cuneate or narrowly rounded base, acuminate at top rarely not so **D. choristilum**

Leaves ovate-elliptic, broadly rounded to obtuse or cordate at base, top rounded, rarely acuminate and then not distinctly so **D. potamophilum**

D. rudatisii Engl.

This species, hitherto only known from S.E. Nigeria and S.W. Cameroun, has now been collected in N.W. Gabon, ca 15 km S. of Cocobeach along Ntoum road in primary forest (coll. *J. J. F. E. de Wilde c.s. 731* – WAG).

D. witianum Bret.

When this species was treated its fruits were unknown. However, recent collections from Gabon included material with mature fruits which are described below.

Fruits 1–2-seeded, obtuse both ends, tomentellous, orange at maturity; 1-seeded fruits: subglobose to slightly ellipsoid, slightly laterally compressed, 1.5–2 × 1.5–2 cm; exocarp firm, 0.5–1 mm thick; mesocarp juicy, 3–6 mm thick; endocarp woody, up to 0.5 mm thick, rugose outside, smooth and glabrous inside. Seeds subellipsoid, laterally compressed, up to 1.5 × 1 × 0.8 cm, seedcoat thin, brown, glabrous.

Fruiting specimens: 20 km S.E. of Sindara, *Louis, Breteler & De Bruijn 1212* (WAG); 32 km S.E. of Sindara, *Louis, Breteler & De Bruijn 1377* (WAG).

UNIDENTIFIED MATERIAL, POSSIBLY NEW TAXA

Although almost all sterile or incomplete material of *Dichapetalum* could be identified beyond doubt, a few specimens remain unnamed. Some of them may represent new taxa or may be new records for large areas and therefore they are discussed below.

When treating *D. corrugatum*, a synonym of *D. unguiculatum* (BRETILER, 1978:

23) the specimens *Breteler* 6434, 6469, and 6904 (WAG), all with woodsamples, were kept separate. *Breteler* 6306 (WAG), also from Gabon but without wood-sample, belongs to the same taxon. Since then material with flowers and/or fruits which may elucidate the identity of these specimens has not been collected.

Chapman 1290 (COI, SRGH) was longtime the first and only specimen of *Dichapetalum* from Malawi that had been examined. It was collected in the Nchisi Forest, Kota Kota, on the west side of Lake Malawi. The small flower buds of it have been analyzed. This proved that it represents the genus *Dichapetalum* but the flower characters together with those of the leafy branchlets do not fit any known species. Better material is required to see whether a new species is involved. Recently a second specimen (*F. Dowsett-Lemaire* 600), this time completely sterile, has been examined at K. It has been collected in the same forest and certainly belongs to the same species.

Vollesen in MRC 4919 (K) from S.E. Tanzania is sterile. It fits best in *D. edule* from that area, but some differences, especially as regards indumentum and leaf nervation, withhold me from placing it there without further evidence.

Crosse-Upcott 137 (K), collected in the Kilwa District, is another unidentified specimen from S.E. Tanzania. Although the specimen is in flower, I have not been able to identify it. It shares some characters of *D. edule* of that area and of *D. deflexum* from Mozambique.

REVISION OF TAPURA

HISTORY OF THE GENUS

Tapura was described by AUBLET in 1775 who based it on *T. guianensis*, the most common species in America. On this continent 21 species are now recognized by PRANCE, the revisor of the American *Dichapetalaceae*.

OLIVER described the first African species in 1868, namely *T. africana* from Fernando Po. Initially ENGLER used the same name for an East African species in 1895, but in an appendix to the same paper he changed the name into *T. fischeri*. This same species was described once more in 1915 by DE WILDEMAN naming it *T. lujae*. PELLEGRIN is in 1922 the author of a third African species named *T. letestui* from Gabon. From this country and adjacent Congo HALLÉ & HEINE in 1967 described two new species *T. bouquetiana* and *T. neglecta*. This was followed in 1970 by *T. ivorensis* published by the present author and at present by *T. carinata*, once more from Gabon and adjacent Congo.

DESCRIPTION OF THE GENUS

Tapura Aublet, 1775: 126, pl. 48; De Jussieu, 1789: 419; De Candolle, 1825: 58; Endlicher, 1840: 1105; Bentham & Hooker, 1862: 341; Oliver, 1868: 344; Baillon, 1874: 141; Engler, 1896: 351; Pellegrin, 1913: 579; Hutchinson & Dalziel, 1928: 321; Engler & Krause, 1931: 10; Hauman, 1958-a: 347; Keay, 1958: 433; Torre, 1963: 328; Hutchinson, 1964: 219; Hallé & Heine, 1967: 43; Prance, 1972: 49; Punt, 1975: 43.

Type species: *T. guianensis* Aubl.

Rohria Schreber, 1789: 30. Type species: *R. schreberi* Gmelin (= *T. guianensis* Aubl.).

Dischizolaena (Baillon) Van Tieghem, 1903: 230. Basionym: *Tapura* section *Dischizolaena* Baillon, 1873: 112. Type species: *T. capitulifera* Baill.

Gonypetalum Ule, 1906: 174. Type species: *G. juruanum* Ule (= *T. juruana* (Ule) Rizzini).

Trees or shrubs. *Stipules* entire, caducous. *Leaves* petiolate, usually acuminate. *Inflorescences* usually compact, pedunculate or not, the peduncle free or adnate to petiole. *Flowers* zygomorphic, (4–)5-merous, bisexual, pedicel articulate. *Sepals* unequal, free or nearly so. *Petals* partly united with the stamens into a distinct tube, unequal, 1–2 distinctly longer and bicuculate apically, the others usually entire or nearly so. *Stamens* 2–3 fertile, 3–2 without anther. Basal staminodes (or disc lobes) united or not, wanting with the large petals. *Pistil* 2–3-merous; ovary hairy or not; style slender, often curved or noded, hairy in upper part, 2–3-lobed apically. *Fruits* (only partly known) 1–3-seeded; exocarp dehiscent or not; mesocarp juicy or mealy; endocarp woody to pergamentaceous. *Seeds* with or without endosperm.

Distribution: Tropical America and tropical Africa.

Notes. There are 7 species recognized in Africa and 21 in America. The most primitive species with 5 equal petals and 5 fertile stamens, occur in America, the most advanced ones with 2 fertile stamens only, are African. Of the African species *T. fischeri* has a large distribution, and *T. ivorensis* is only known from Eastern Ivory Coast and Western Ghana. The remaining 5 species are confined to Western Central Africa, all occurring in Gabon. Some species (*T. carinata*, *T. letestui*, *T. neglecta*) are only known from a single or only two collections while their fruits have still to be collected. It is expected that *T. fischeri* may occur in Gabon and that further exploration of this country may yield further new species (see also p. 61: *Tapura* sp.).

SECTIONAL ARRANGEMENT

In the genus 4 sections have been distinguished, two are based on American species and two others accommodate each a single African species.

The two American sections, the type section *Tapura* and the section *Dischizolaena* Baillon, are commented upon by PRANCE (1972: 50). PRANCE does not adopt any sections in American *Tapura* 'since there are no clear cut divisions'. The distinction between these American sections, namely 5 fertile stamens in section *Dischizolaena* and 3 in section *Tapura* is, according to PRANCE, bridged by *T. colombiana*, a species with 4 fertile stamens.

Both African sections are based on species with one large petal and two, rarely three, fertile stamens, which characters are not found in American *Tapura*. It concerns ENGLER's (1895: 235) *Trispermium* with type species *T. fischeri* and HALLÉ & HEINE's (1967: 44) *Laratapura* based on *T. bouquetiana*. According to ENGLER his section is characterized by flowers which are mostly 4-merous with one large petal and 2 fertile stamens, rarely 5-merous with 2 large petals and 3 fertile stamens. However, all the flowers of *T. fischeri* which have been analyzed for this revision are 5-merous, have one large petal and 2, rarely 3, fertile stamens (see also note p. 61).

HALLÉ & HEINE (l.c.) produced a key to all sections and to the African species of the genus. The section *Dischizolaena* is not represented in Africa. *T. africana*, *T. letestui*, and *T. neglecta*, are placed in the section *Tapura*. *T. ivorensis* also clearly belongs to it. In their key the authors separate the section *Laratapura* and *Trispermium* as follows:

Corolla with 3 bilobed petals (one large) and 2 entire petals; peduncle of inflorescence adnate to petiole (at least half the petiole length) and always shorter than it section **Trispermium**

Corolla with 1 bilobed petal and 4 smaller, entire ones; peduncle of inflorescence free from petiole and always longer than it section **Laratapura**

Laratapura, with its only species *T. bouquetiana*, is quite distinct from all other species which is supported by a distinct pollen type allotted to it by PUNT (1975: 45). According to the same author, however, *T. fischeri* is not different from African species of section *Tapura*, while *T. ivorensis* is placed in another separate pollen type of its own.

The new species *T. carinata*, will fit into section *Trispermium* as demonstrated in the key given above. This is very acceptable, as *T. fischeri* is in the author's opinion the closest relative.

In this revision the sections reviewed above are not adopted, because it is felt, that prior to this, a critical comparison of the African species with the American ones is necessary. For such an investigation knowledge of the evolution of the staminal tube in *Dichapetalaceae* seems to be basic.

KEY TO THE AFRICAN SPECIES

- 1 a Peduncle of inflorescence free from petiole or inflorescence sessile in the leaf axil 2
- b Peduncle of inflorescence adnate to petiole 3
- 2 a Inflorescence slender stalked; flowers 5–6 mm long; fertile stamens 2. Gabon, Congo **T. bouquetiana**
- b Inflorescence sessile in leaf axil; flowers 4–5 mm long; fertile stamens 3. Gabon **T. neglecta**
- 3 a Flowers 2.5–3.5 mm long. West, Central, East and Southern Africa **T. fischeri**
- b Flowers at least 4.5 mm long. 4
- 4 a Sepals distinctly keeled. Gabon, Congo **T. carinata**
- b Sepals not keeled 5
- 5 a Young leaves without a sparse cobwebby indumentum beneath. Ivory Coast, Ghana. **T. ivorensis**
- b Young leaves with a sparse cobwebby indumentum beneath. Eastern Nigeria, Cameroun, Gabon, Congo 6
- 6 a Leaves with 3–5(8) pairs of main lateral nerves; flowers 4.5–7 mm long with up to 3 mm long pedicels; petals up to 5 mm long, not geniculate. Eastern Nigeria, Cameroun, Gabon **T. africana**
- b Leaves with 6–7 pairs of main lateral nerves; flowers 7–8 mm long, sessile or nearly so; petals 7–7.5 mm long, geniculate. Gabon, Congo **T. letestui**

T. africana Oliv.

Fig. 6, 7 Map 6

T. africana Oliver, 1868: 344; Engler, 1896: 351; Pellegrin, 1913: 648; Engler, 1915: 849; Hutchinson & Dalziel, 1928: 325; Keay, 1958: 439; Keay c.s., 1960: 327; N. Hallé & Heine, 1967: 44; Breteler, 1970: 14; Punt, 1975: 44; Breteler, 1982: 1.

Type: Equatorial Guinea, Fernando Po, *Mann 1161* (holotype: K; isotypes: LE, P).

Diagnostic characters. Tree to 20 m or more, up to 100 cm diam. Branchlets appressed-short-hairy, glabrescent. Stipules usually early caducous. Leaves papery to coriaceous, obovate-elliptic, (6)9–20(22) × 3–8(10) cm, cuneate, rarely rounded at base, acuminate, with 3–5(8) pairs of main lateral nerves, sparsely hairy, glabrescent. Flowers subumbellate, inflorescence indistinctly branched, peduncle adnate to petiole. Pedicel up to ca 3 mm long. Flowers 4.5–7 mm long. Petals 2 large and bicuculate, 3 smaller. Fertile stamens 3. Pistil 3-merous, ovary shortly velutinous. Fruits ellipsoid, 3–3.5 × 1–1.5 cm, minutely velutinous.

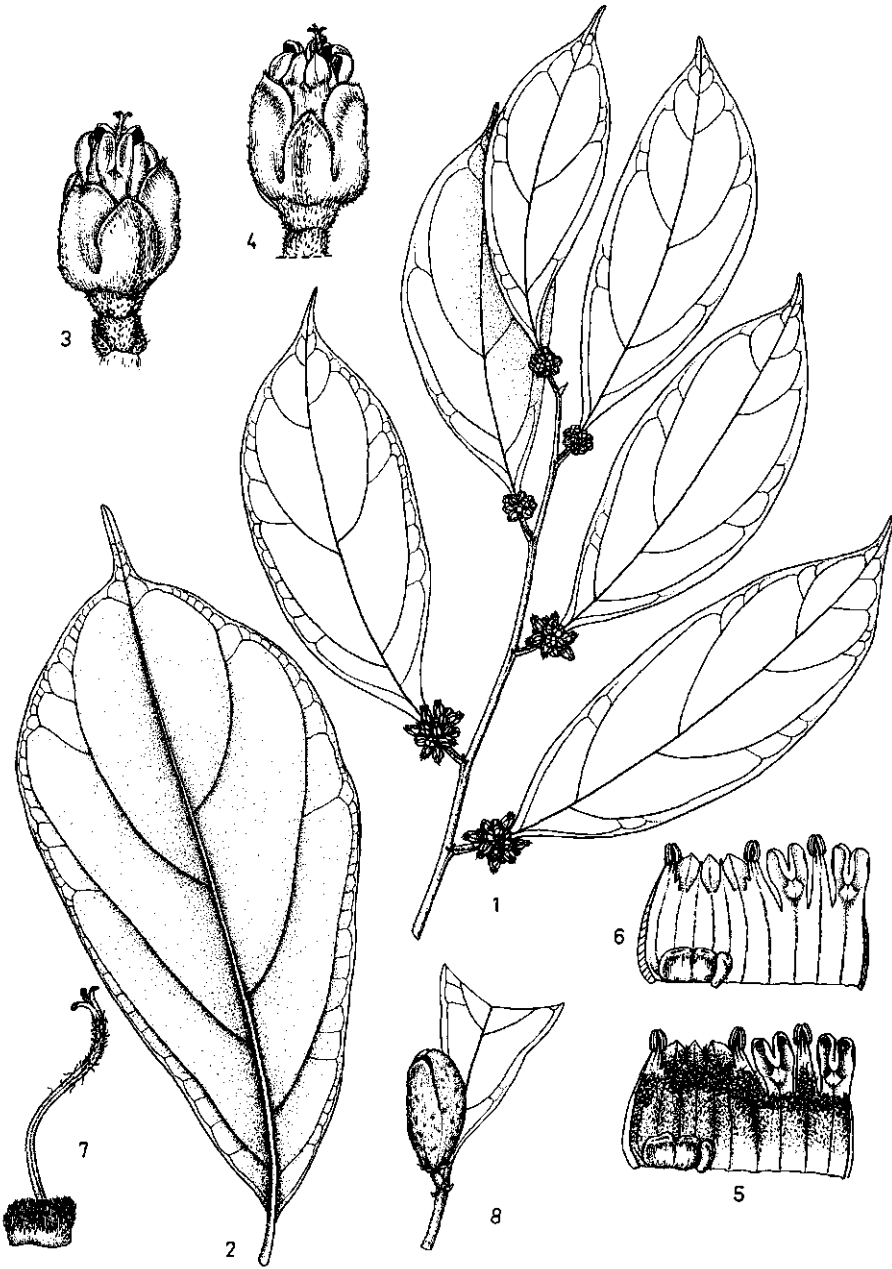


FIG. 6. *T. africana*: 1. flowering branchlet, $\frac{1}{2}\times$; 2. large leaf beneath, $\frac{1}{2}\times$; 3. flower abaxially, with bracteoles, $5\times$; 4. flower adaxially, $5\times$; 5. staminal tube with basal glands, $5\times$; 6. as 5 but without indumentum, $5\times$; 7. pistil, $8\times$; 8. leaf-base with 1-seeded fruit, $\frac{1}{2}\times$ (1, 3-7. van Meer 1553; 2. van Meer 1460; 8. Leeuwenberg 9910).

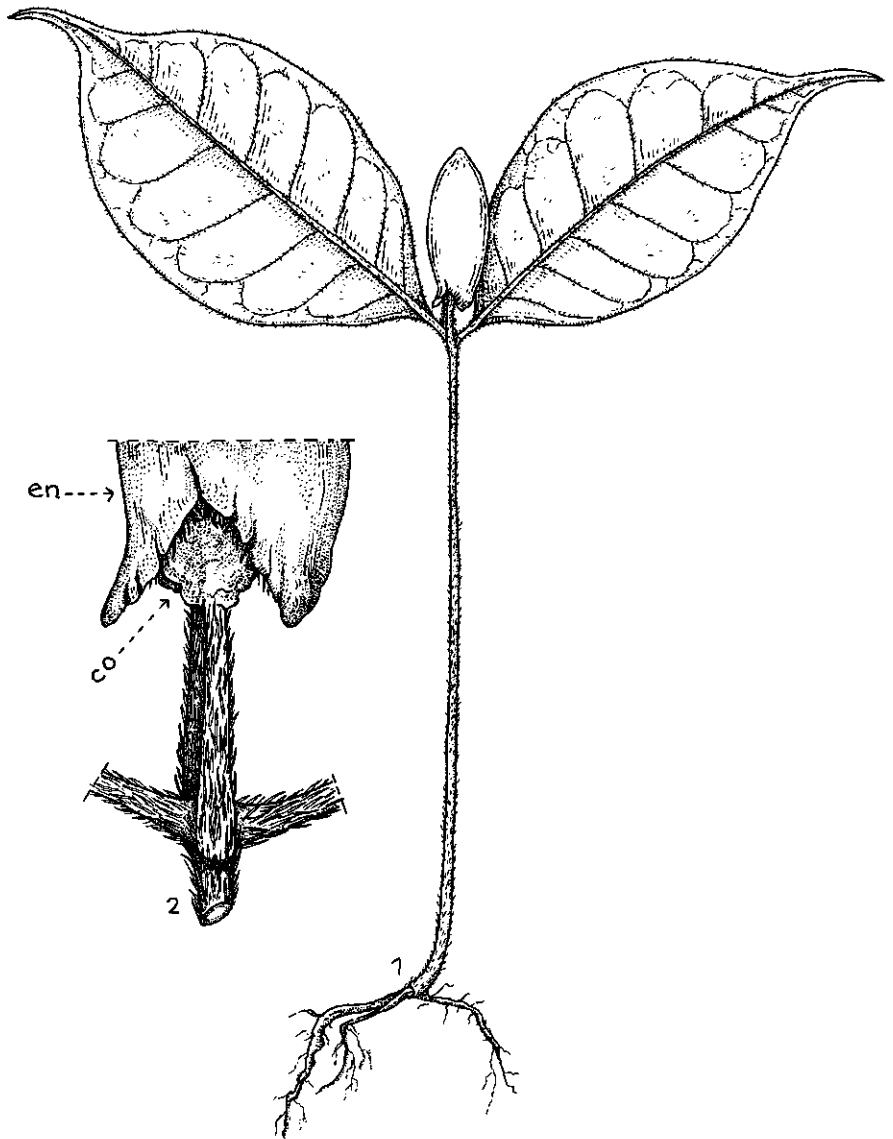
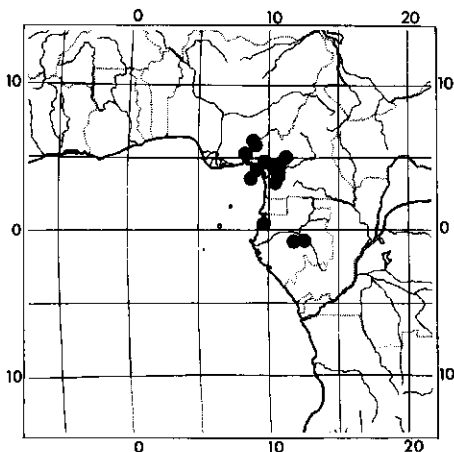


FIG. 7. *T. africana*: 1. seedling, $\frac{1}{2} \times$; 2. detail of first node (en = endocarp, co = cotyledon) $5 \times$ (1-2. Thomas 2470).

Description. Tree up to at least 20 m tall and 100 cm diam., densely branched and often lowly so. *Bole* often fluted, irregularly or not. *Bark* rather smooth. *Slash* white, turning yellow quickly. *Wood* whitish. *Branches* glabrous

or glabrescent. *Branchlets* appressed-short-hairy, glabrescent. *Stipules* usually early caducous, appressed, ovate-triangular, (1)2–5(7) mm long, densely appressed-silky hairy outside, nearly glabrous inside. *Leaves*: petiole subterete to semi-terete, usually grooved above, (2)5–10(17) mm long, not grooved and (6)10–15(30) mm long when united with peduncle, appressed-short-hairy; blade papery to coriaceous, obovate-elliptic, 2–3(3.5) times as long as wide, (6)9–20(22) × 3–8(10) cm, cuneate rarely rounded at base, gradually to abruptly acuminate at apex, the acumen 0.5–2(2.5) cm long, rounded apically, sparsely subappressed-hairy on midrib and the 3–5(8) pairs of main lateral nerves both sides as well as the basally revolute margin, glabrescent, very soon so above, beneath also with some arachnoid indumentum; midrib and main laterals more or less plane above, prominent beneath; glands usually few, both sides or beneath only, small, rather well dispersed, but beneath somewhat concentrated near base. *Inflorescence* subumbellate-flowered, indistinctly branched or basally once, more or less, distinctly so, subappressed-short-hairy, up to ca 50-flowered; peduncle usually completely or nearly completely adnate to and ca as long as petiole, rarely free from petiole; bracts and bracteoles ovate-triangular, 1–2 mm long. *Pedicel* up to ca 3 mm long, the upper part up to ca 0.5 mm long. *Flowers* 4.5–7 mm long. *Sepals* free, unequal, ovate-elliptic to obovate, rather thick, concave, 1.5–3 × 1–2 mm, the 2 outer distinctly smaller, the 3 inner somewhat asymmetric, glabrous to puberulous outside, the margin ciliate, glabrous inside. *Petals* up to 5 mm long, with stamens united into a 2–4 mm long tube with free apical parts, deeper split at the side of the fertile stamens, glabrous to sparsely puberulous on upper part of tube and somewhat extending on free parts outside, more densely hairy on upper part inside; free apical part of 2 major petals 0.5–0.7 mm split, bicuculate, that of the 3 minor petals shorter, entire, hairy inside. *Stamens* 3 fertile, 2 without anther, the fertile ones equalling the large petals or slightly longer, the two lateral ones at one side (proximal to minor petals) provided with a small, subacute lobe; anthers ca 0.5 mm long, with a very distinct, often muriculate connective; the sterile filaments usually distinct, acute, hairy inside. *Basal staminode(s)* thick, more or less united, semi-annular, somewhat cupular, wanting with the large petals, 0.6–0.8 mm high, glabrous. *Pistil* 3-merous, 4–5.5 mm long; ovary depressed subglobose, densely shortly velutinous; style glabrous in lower, hairy in upper part, 3-lobed apically, the lobes up to ca 0.5 mm long; style often bent and by its hairs attached to tube opposite the fertile stamens. *Fruits* 1(–3?)-seeded, narrowly ellipsoid, rounded both ends, 3–3.5 × 1–1.5 cm, minutely velutinous, like fine sandpaper to the touch; exocarp thin; mesocarp firm, juicy 2.2–3 mm thick; endocarp thin, pergamentaceous, more or less smooth, finely striate, and glossy inside. *Seeds* narrowly ellipsoid, acute both ends, ca 20 × 5 mm, brown, glossy; testa rather firm. *Seedling* with epigeal germination. *Hypocotyl* ca 10 cm long, appressed-pubescent. *Cotyledons* with distinct, 5–8 mm long petioles, enclosed by endocarp, lifted above the first pair of opposite leaves. First leaves elliptic, cuneate at base, acuminate at top, pubescent, densely so on petiole, less so on midrib and main laterals beneath, only sparsely so on remaining parts, with sparse arachnoid



MAP 6. *T. africana*

hairs on lower surface. Epicotylar stem part between attachment of cotyledons and node bearing the first pair of opposite leaves indistinct.

Distribution: Eastern Nigeria, Cameroun, Equatorial Guinea, Gabon.

Ecology: Rain forest.

Specimens examined.

NIGERIA. Aboabam, Afi F.R., *Latilo* FHI 30976 (K); 30978 (FHI, K); near Orem, Oban Group F.R., *Latilo & Oguntayo* FHI 70535 (K, WAG); *van Meer* 1353 (WAG); 1460 (WAG); 1553 (WAG).

CAMEROUN. Cross R. North F.R., ca km 250 Ikom-Mamfe, *Latilo* FHI 31829 (K); km 11 Nkong-samba-Loum, Bakaka Forest, *Leeuwenberg & Breteler* 8763 (WAG); 8772 (WAG); 3 km E. of Yingui, *Leeuwenberg* 9133 (WAG); km 11 Nkongsamba-Loum, *Leeuwenberg* 9634 (WAG); 9910 (WAG); 30 km S.W. of Ndikiniméki, *Letouzey* 10867 (P); 3 km E. of Yingui, *Letouzey* 10951 (= *Leeuwenberg* 9133) (P, WAG); 30 km N.W. of Eséka, *Letouzey* 12351 (P); 20 km N. of Bipindi, *Letouzey* 12819 (WAG); Victoria, *Maitland* 611 (BR, K, WAG); 611 bis (K, WAG); 614 (BR, K); 38 km N. of Bafia, Ngoro Mt., *Ngamenikanga* 101 (P, WAG); sin.loc., *Preuss* 1234 (B, BREM, M); 5 km S. of Kumba, *Thomas* 2190 (MO); near Kumba, *Thomas* 2470 (WAG); *Thomas* 3449 (MO, WAG); *Winkler* 1281 (Z).

EQUATORIAL GUINEA. Fernando Po, *Mann* 1161 (K, LE, P, type).

GABON. Near Libreville, Mondah Forest, *Breteler* 7669 (WAG); *Louis c.s.* 837 (WAG); Malendé, *Le Testu* 7821 (BM, BR, P, WAG); Divinda, *Le Testu* 8573 (BM, BR, P, WAG).

Notes. The description of the seedling given above is based on *Thomas* 2470 consisting of 4 seedlings. The label of this material gives no reference to mother-material, so it is difficult to be sure whether these seedlings are indeed from *T. africana*. Careful investigation of the material, especially of the shape and texture of the endocarp as well as the leaf indumentum (sparse arachnoid hairs) leads to the conclusion that these seedlings almost certainly belong to *T. africana*. It is remarkable that this *Tapura* species produces seedlings with a distinct hypocotyl and without a distinct stem part between attachment of cotyledons and first leaves. In *Dichapetalum* at least as known from ca 20 species, the hypocotyl is absent, i.e. germination is hypogeal, and when the first leaves are oppo-

site they are well separated from the node bearing the cotyledons (see BRETELER 1973: 29). In these *Tapura* seedlings the apical bud is, as it seems, protected by the two subparallel petioles of the cotyledons, which petioles are just sufficiently stalked to give room to the first opposite pair of leaves.

T. bouquetiana N. Hallé & Heine

Fig. 8 Map 7

T. bouquetiana N. Hallé & Heine, 1967: 45; Punt, 1975: 45.

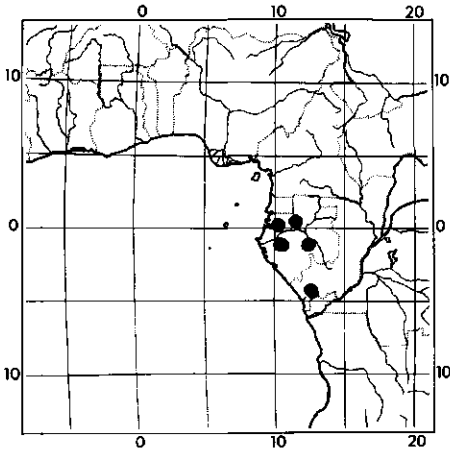
Type: Gabon, La Lara, *Le Testu* 9348 (holotype: P; isotypes: BR, K, WAG).

Diagnostic characters. Shrub or treelet. Branchlets glabrous. Stipules minute, with nectar glands. Leaves papery, obovate-elliptic, (6)9–14 × (2)3–4(6) cm, glabrous, cuneate to rounded at base, acuminate, with distinct (4)5–7 pairs of main lateral nerves. Inflorescence a slender stalked, glabrous, few-flowered, loose head, peduncle free from petiole. Flowers yellow, ca 6 mm long. One large petal, 2 fertile stamens. Fruits glabrous.

Description. Shrub or treelet up to ca 10 m tall and 10 cm diam. *Branches* greyish-brown, glabrous, lenticellate or not. *Branchlets* glabrous. *Stipules* minute, ovate-triangular to transversely oblong, up to 1.5 mm diam., the margin with nectar secreting glands, the apex often with a few stiff hairs. *Leaves:* petiole subterete, grooved or canaliculate above, (1)2–6(10) mm long, glabrous to appressed-short-hairy above, glabrescent; blade papery, obovate-elliptic, 2–3(3.5) times as long as wide, (3)5–14 × (1)2–5(6) cm, glabrous, cuneate to rounded at base, acuminate at apex, the acumen (0.5)1–2.5 cm long, rounded to somewhat acutish apically; midrib and the (4)5–7 pairs of main lateral nerves plane to slightly prominent above, prominent beneath, the blade slightly bullate between the main laterals or not, margin often slightly revolute; glands present or not, few, small, beneath only, at some distance alongside the margin. *Inflorescence* single in the leaf axil or sometimes grouped on very short to normal leafless axillary shoots, subcapitate, rather indistinctly branched, slender stalked, up to 9-flowered, glabrous; peduncle (0.2)1–3.5(4.5) cm long; bracts and bracteoles minute, ovate-triangular to transversely oblong, up to ca 1 × 1 mm, often much smaller, glabrous, the margin with nectar secreting glands. *Pedicel* up to 3 mm long, slightly curved or not, the lower part up to 2 mm long, the upper part up to 1 mm long. *Flowers* yellow, 5–6 mm long. *Sepals* appressed, free, very unequal in size, slightly so in shape, the outer much smaller, subcircular to broadly ovate, 2–4 × 2–3 mm, concave, the inner ones strongly so, glabrous except for the sparsely and finely ciliate margin. *Petals* with stamens united into a 2.5–3 mm long, firm tube, with free apical parts; tube glabrous outside except apically, inside hairy in upper part; free part of large petal 0.7–1 mm split, bicuculate, glabrous inside except at base, outside and especially on margin short-hairy; small petals 4, the free part ovate-triangular, sparsely hairy both sides, the two lateral ones (proximal to fertile stamens) sometimes very slightly bicu-



FIG. 8. *T. bouquetiana*: 1. flowering branchlet; 2. stipule; 3. petiole; 4. detail of leaf venation; 5. inflorescence; 6. flower; 7. flower diagram; 8. flower cut lengthwise; 9. outer sepal; 10. inner sepal; 11. staminal tube outside; 12. staminal tube inside; 13. details of anther; 14. basal staminode; 15. basal staminode from above; 16. ovary cut lengthwise; 17. detail of style and stigma; 18. immature fruit (1-18. *Le Testu* 6392). For measurements see description.



MAP 7. *T. bouquetiana*.

culate apically. *Stamens* 2 fertile; anthers almost sessile on tube with slightly unequal thecae, 1 mm long, the connective very distinct, muriculate, at base strongly papillate; free parts of sterile filaments 5, subtriangular, geniculate, densely hairy. *Basal staminode* one, across large petal, semiannular to horseshoe shaped, glabrous, ca as high as ovary, depressed apically. *Pistil* 2–3-merous, 4–5 mm long; ovary semiglobose, glabrous; style exerted, slightly curved, sparsely hairy in upper part, apically very shortly 2–3-lobed, lobes papillate. *Fruits* (only immature fruits seen) glabrous.

Distribution: Gabon, Congo.

Ecology: Rain forest, semi deciduous forest.

Specimens examined.

GABON. 50 km S.E. of Lambaréné, *Breteler* 5740 (BR, K, P, WAG); Ahimé on upper Komo R., *Chevalier* 26897 (BR, P); Fougamou, *Le Testu* 6392 (BR, P, WAG); Koulamoutou, *Le Testu* 8459 (P, WAG); La Lara, *Le Testu* 9348 (BR, K, P, WAG, type); 7 km E. of Mvoum, *Louis, Breteler & de Bruijn* 244 (WAG), 261 (WAG); 5 km S.E. of Ekouk, *Louis, Breteler & de Bruijn* 312 (WAG); La Lara R. crossing Mitzic-Medouneu Rd., *Louis, Breteler & de Bruijn* 445 (WAG); Oveng, ca 40 km S.W. of Mitzic, *J. & B. Reitsma, Breteler & Louis* 914 (WAG).

CONGO. M'Vouti, *Bouquet* 1896 (BR, K, P, WAG).

Tapura carinata Bret. sp. nov.

Fig. 9 Map 8

Frutex ad 20 m altus. Ramuli breviter subappresse-pilosi. Folia chartacea, obovata, basi obtusa vel cordata, sparse pilosa, glabrescentia. Inflorescentia 3–25 florifera, subappresse-pilosa; pedunculus petiolo adnatus. Sepala carinata. Petala cum staminibus in tubum bilabiatum connata; tubus intus annulo distincto strigoso ornatus. Stamina fertilia 2, labio inferiore lateraliter adnata; stamina sterilia (0)1–2. Staminiodium basale unicum. Pistillum 3-merum, ovarium glabrum. Fructus ignotus.

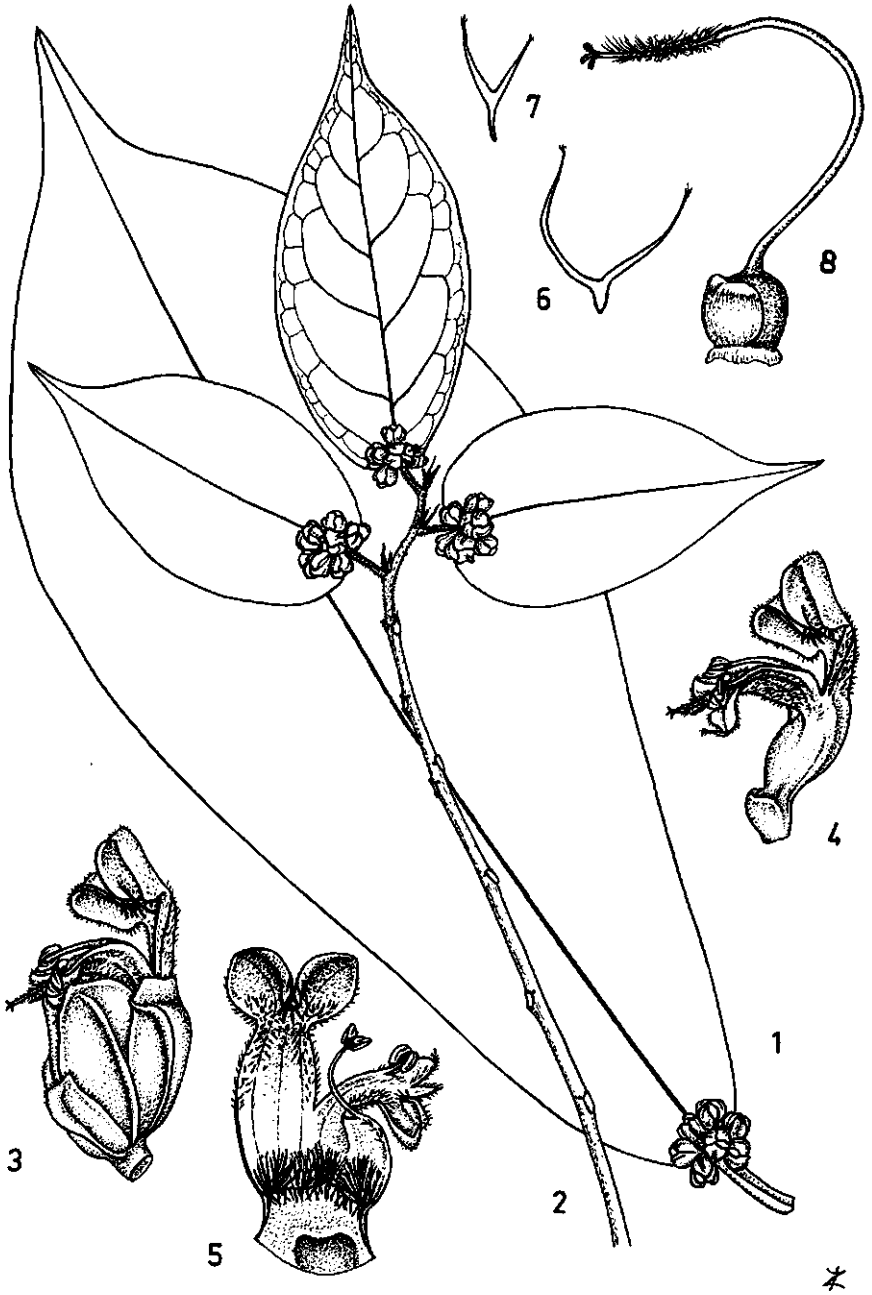
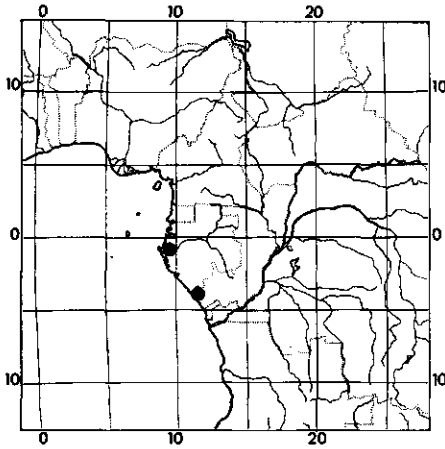


FIG. 9. *T. carinata*: 1. large leaf with inflorescence, 1 ×; 2. flowering branchlet with small leaves, 1 ×; 3. flower, 5 ×; 4. flower without calyx, 5 ×; 5. staminal tube with basal staminode, 5 ×; 6-7. sepals in cross section, 10 ×; 8. pistil with basal staminode, 10 × (1. *Sita* 3630; 2-8. *Pobeguïn s.n.*).

Type: Gabon, 'Bas Ogowé, arbuste de sous-bois', *Pobeguin s.n.* (holotype: P; isotype: WAG).

Diagnostic characters. Shrub to 20 m tall. Branchlets subappressed-short-hairy. Leaves papery, obovate, rounded to cordate at base, sparsely hairy, glabrescent. Inflorescence 3–25-flowered, subappressed-hairy, peduncle completely adnate to petiole. Sepal keeled, strongly unequal in size and shape. Petals and stamens united into a bilabiate tube with one large bicuculate petal in upper lip and 2–3 smaller petals in lower lip, the tube inside with a distinct ring of stiff, suberect hairs. Fertile stamens 2, laterally attached to lower lip; sterile stamens (0)1–2. Basal staminode 1. Pistil 3-merous, ovary glabrous, upper part of style bent over lower lip and by its indumentum attached to it. Fruits unknown.

Description. Shrub to 20 m tall. *Branchlets* subappressed-short-hairy. *Stipules* caducous, narrowly triangular, 1–5 mm long, appressed or not, subappressed-hairy. *Leaves:* petiole subterete to semiterete, grooved above or not, 2–5 mm long, 4–13 mm long when united with stalk of inflorescence, subappressed-hairy; blade papery, obovate, 2–3 times as long as wide, 5–17 × 2–7 cm, rounded to cordate at base, with rounded to acute, up to 1.5 cm long acumen apically, margin and nerves subappressed-hairy both sides or indumentum restricted to midrib both sides only, glabrescent, the midrib and the 5–6 pairs of main lateral nerves slightly prominent above, more distinctly so beneath; glands rather small, beneath only, a few near base and often a few in upper half alongside the margin. *Inflorescence* indistinctly branched or once distinctly so in older inflorescences, 3–25-flowered, subappressed-hairy; peduncle as long as petiole and completely adnate to it; bracts and bracteoles triangular-trullate, up to 1 mm long. *Pedicel* up to 2 mm long, hairy as inflorescence, the upper part at most 0.5 mm long. *Sepals* 5, free or nearly so, strongly unequal in size and shape, the outer much smaller than the inner, concave inside, firmly keeled (carinate) outside, the keel central to almost marginal, subovate-elliptic to obovate in outline, 3–4 × 1–3 mm, short-hairy on margin and sparsely so on keel. *Petals* 3–4, with stamens united into a bilabiate tube, laterally deeper split than adaxially or abaxially; tube 4 mm long, at base bulging over the single basal staminode, slightly noded in apical part, glabrous outside or only appressed-short-hairy towards the lips, inside with a distinct ring of stiff suberect hairs; upper lip (1 large petal), bent over mouth of tube, bicuculate 1–1.5 mm split, appressed-short-hairy outside, less hairy so inside especially the lobes; lower lip (2–3 petals) more or less hairy as upper lip, the two lateral petals usually bicuculate, ca 1 mm split with unequal lobes, the fourth, adaxial petal present or not, narrowly triangular apically. *Stamens* 2 fertile, 2–1(0) sterile; fertile stamens laterally attached to lower lip, free part of filament ca 0.5–1.5 mm long, anthers broadly elliptic, ca 1 mm long, connective distinct, muriculate; free part of sterile filaments narrowly triangular, ca 1 mm long, shortly pubescent. *Basal staminode* 1, adaxial, transversely oblong to broadly obcordate ca 0.5 × 1 mm,



MAP 8. *T. carinata*.

rather thick, glabrous. *Pistil* 3-merous; ovary and lower part of style glabrous, upper part bent over lower lip and by its hairs attached to it, lobes ca 0.5 mm long. *Fruits* unknown.

Distribution: Gabon, N.W. Congo.

Ecology: Rain forest.

Specimens examined.

GABON. Lower Ogooué R., *Pobeguïn s.n.* (P, WAG, type).

CONGO. N'gongo R., *Sita 3630* (IEC, P, paratype).

Note. This species is very distinct by its bilabiate flowers with a remarkable ring of hairs in the tube. The epithet '*carinata*' refers to the strongly keeled sepals.

***Tapura fischeri* Engl.**

Fig. 10 Map 9

Tapura fischeri Engler, 1895: 235,423; 1896-a: 351; 1912-b: 445; 1915: 849; Engler & Krause, 1931: 11; Robijns, 1948: 434; Brenan & Greenway, 1949: 131; Andrews, 1952: 107; Keay, 1958: 439; Hauman, 1958-a: 347; Keay c.s., 1960: 327; White, 1962: 185; Ross, 1972: 219; Punt, 1975: 44.

Type: Tanzania, Kagehi, *Fischer 282* (holotype: B†; lectotype: K).

Tapura fischeri Engler var. *pubescens* Verdcourt & Torre, in Torre, 1962: 69; Torre, 1963: 328; Gonçalves, 1980: 104. Type: Moçambique, Mossurize, *Simao 1173* (holotype: EA; isotype: LISC).

Tapura lujae De Wildeman, 1915: 101 (as *T. lujai*); Hauman, 1958-a: 348. Type: Zaïre, Cataractes, *Luja 149* (holotype: BR).

Dichapetalum dummeri Moss, 1928: 123. See Breteler, 1978: 62 for full details.

Dichapetalum corradii Chiovenda, 1952: 232. See Breteler, 1978: 23 for full details.

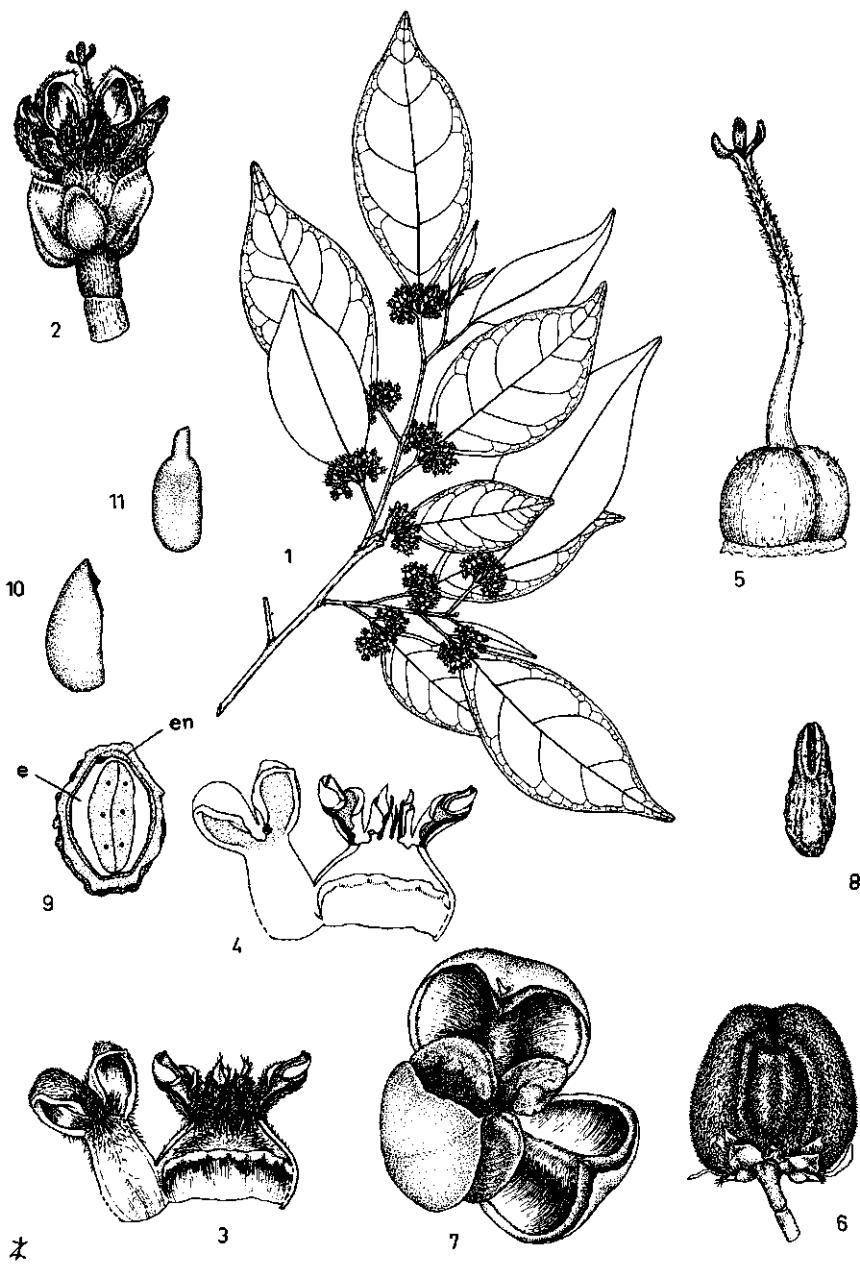


FIG. 10. *T. fischeri*: 1. flowering branchlet, $\frac{1}{2} \times$; 2. flower, $10 \times$; 3. staminal tube with basal staminode, $10 \times$; 4. as 3. without indumentum; 5. pistil, $20 \times$; 6. 2-seeded fruit, $5 \times$; 7. dehiscent 3-seeded fruit, $5 \times$; 8. pyrene, $5 \times$; 9. pyrene in cross section (en = endocarp, e = endosperm), $10 \times$; 10. seed, lateral view, $5 \times$; 11. embryo with exserted radicle, $5 \times$ (1. Geerling & Bokdam 2538; 2-5. Semsei 1887; 6, 8-11. Wagemans 2157; 7. Carr 906).

Diagnostic characters. Shrub to much and often lowly branched small tree, up to ca 20 m tall and 45 cm diam. Bark grey-brown. Sapwood whitish. Branchlets more or less subappressed-hairy. Stipules soon caducous. Leaves papery, elliptic to obovate, (2)4–10(16) × (1)2–5(7) cm, with 4–7(8) pairs of main lateral nerves, glabrous to hairy, glabrescent or not. Inflorescence up to 35-flowered, peduncle partly to completely adnate to petiole, sometimes free. Flowers 2.5–3.5 mm long. Flower tube with 1 large bicuculate petal and usually 2 fertile stamens. Pistil 3-merous, ovary glabrous to densely hairy. Fruit 1–3-seeded, ovoid to ellipsoid, up to 5 × 4 mm, glabrous to densely hairy, dehiscent.

Description. Shrub to much and often lowly branched small tree, up to ca 20 m tall and 45 cm diam., branches often horizontal or even drooping. *Bark* grey-brown, rather smooth. *Sapwood* whitish, soon turning yellow or darker on exposure. *Branches* grey-brown, glabrous or nearly so, often minutely lenticellate. *Branchlets* more or less subappressed-hairy, often soon glabrescent. *Stipules* triangular, usually narrowly so, 1–5 mm long, subappressed-hairy, sometimes with glandular margin, soon caducous. *Leaves:* petiole semiterete to subterete, grooved above or not, (1)2–10(17) mm long, usually slightly longer when united with stalk of inflorescence than when not so, subappressed-hairy; blade papery, elliptic to obovate, (1.5)2–3(3.5) times as long as wide, (2)4–10(16) × (1)2–5(7) cm, cuneate to rounded and often unequal sided at base, usually shortly acuminate at top, the acumen rounded to acute, up to 1(2) cm long; midrib and the 4–7(8) pairs of main lateral nerves plane or slightly prominent above, more distinctly so beneath; glabrous to hairy and often soon glabrescent above, often more densely hairy beneath especially on midrib and main laterals, glabrescent or not, sometimes with persistent dots of hairs in the axils of main laterals; glands when present beneath only, usually a few, rather large, well dispersed, sometimes near base only. *Inflorescence* a subumbel, sometimes once or twice distinctly branched, up to ca 35-flowered, subglabrous to more or less densely subappressed-hairy; peduncle partly to completely adnate to petiole, sometimes free, (4)5–8(13) mm long; bracts and bracteoles ovate-triangular, up to 1(1.5) mm long. *Pedicel* up to 3(6) mm long, the upper part 0–0.5(1) mm long, usually glabrous. *Flowers* 2.5–3.5 mm long. *Sepals* erect, subappressed, free or nearly so, slightly unequal in shape, usually strongly so in size, suborbicular to ovate-elliptic, up to ca 1 × 1 mm, slightly concave, glabrous to sparsely hairy outside, usually glabrous inside, margin ciliate. *Petals* with stamens united into a 0.5–1(1.5) mm long, thin, glabrous to hairy tube with free apical parts; large, abaxial petal 2–2.5 mm long, basal part hyaline, upper part deflexed, pubescent outside, 0.5–1 mm split, lobes cuculate, slightly spreading; 2 lateral petals shorter, ca 2 mm long, 0.3–0.5 mm split, the lobes usually both cuculate, at least the abaxial longer lobe, appressed-pubescent outside; 2 adaxial petals often slightly shorter than lateral ones, apical part entire, narrowly triangular, 0.5–1 mm long, appressed-pubescent outside. *Fertile stamens* 2, rarely 3, equal to slightly shorter, rarely longer than large petal, long united with adjacent lateral petal, shortly so with large abaxial petal, free part of filaments up to ca

0.5(1) mm long, glabrous, anthers cordiform, ca 0.5 mm long, connective distinct or only slightly so, muriculate or not, sometimes slightly produced beyond the thecae apically; sterile stamens 1–3 (the adaxial one or the lateral ones may be wanting or rudimentary) the free part filiform, 0.5–1 mm long, pubescent. *Basal staminodes* united into an often lobulate ring around the ovary, open at the side of the large petal, rarely free, 0.3–0.7 mm high, glabrous, basally adnate to tube. *Pistil* 3-merous, rarely 2-merous, 2–3(3.5) mm long; ovary glabrous to densely hairy; style subappressed-pubescent in upper part, more sparsely so or glabrous in lower part, apically shortly (2)3-lobed, lobes usually unequal in length, papillate. *Fruits* ovoid to obliquely ellipsoid, sometimes subglobose, 1–3-seeded, more or less distinctly lobed when more than 1-seeded, glabrous to densely villous-tomentose, dehiscent, exposing the endocarp surrounded by some scarlet mesocarp; exocarp and mesocarp thin; endocarp bony, slightly rugose outside, glabrous and finely striate inside. *Seed* subellipsoid 3–4 mm long, 1–1.5 mm diam., rounded to acutish both ends with a thin, brown seedcoat. Embryo enveloped by a 0.2 mm thick layer of endosperm, cotyledons flat, ca 0.2 mm thick, radicle exerted.

Distribution: From Ivory Coast eastwards to Ethiopia and southwards to Natal. Not yet collected in Central African Republic, Gabon, Angola and Zambia.

Ecology: Semi deciduous to deciduous forest, gallery forest, dry evergreen forest, savannah woodland, savannah thickets, up to ca 1300 m altitude.

Specimens examined.

IVORY COAST. Daoukro region, *Aké Assi s.n.* (WAG); Aka-Komoékro, *Chevalier 22562* (P); Bouna Res., 9 km N. of Kakpin, *Geerling & Bokdam 2538* (WAG).

GHANA. Sin.loc., *Irvine 966* (K); Tan F.R., *Lloyd Williams 255* (K, WAG).

NIGERIA. Iwo-Oyo distr., Oba F.R., *Adebusyi FHI 40947* (K); Olokemeji, *Forest School FHI 27291* (K); Olokemeji F.R., *Jones, Keay & Onochie FHI 4922* (B, BR); *FHI 4926* (B, BR); Egbe distr., *Latilo FHI 26419* (FHI); *Okafor FHI 54691* (K); Ondo prov., Owo F.R., *Onochie FHI 33240*; Oloke-meji F.R., *Ross 145* (K).

CAMEROON. Doumpello, *Hedin 726* (P); 45 km E. of Yokadouma, *Letouzey 5036* (BR, P, WAG).

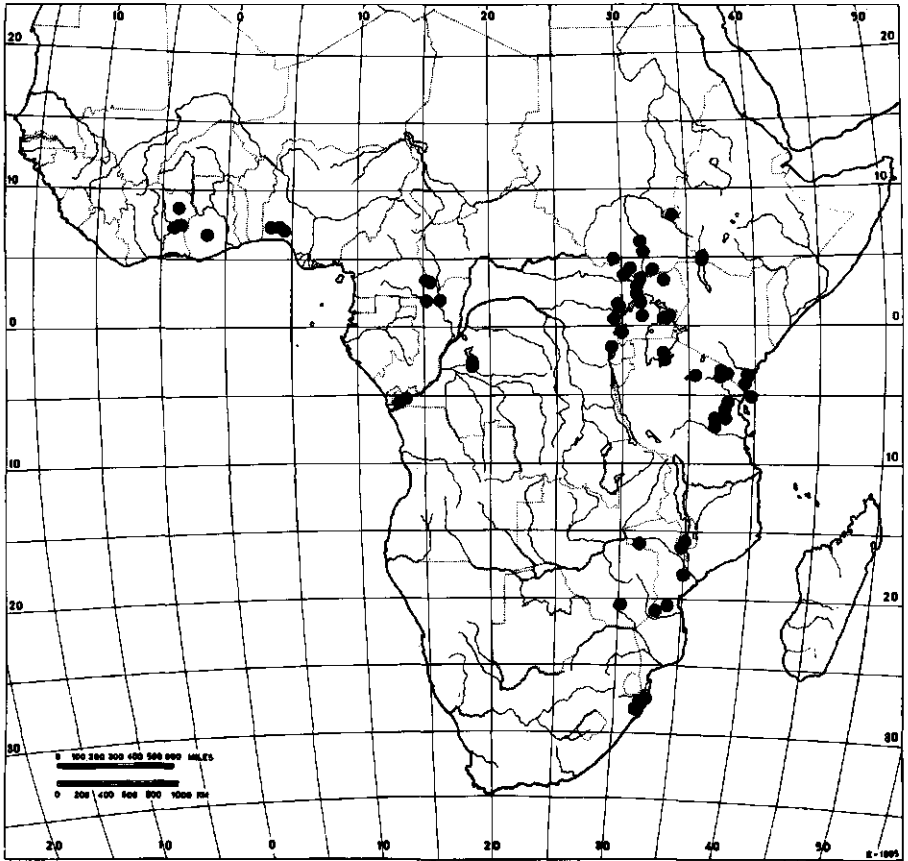
CONGO. 35 km N. of Ouessou, *Sita 808* (P, WAG); Bolozo region, *Sita 3424* (WAG).

ZAIRE. Mahagi Port, *Bamps 286* (BR); Kifuku, *Bequaert 2696* (BR); Irumu, *Bequaert 2791* (BR, K, WAG); Malitawa (Lesse), *Bequaert 3005* (BR); *3255* (BR); Beni, *Bequaert 3405* (BR); Lesse, *Bequaert 4141* (BR); Luki, *Breyne 4683* (WAG); Baniari, *J. de Wilde 147* (BR, WAG); Luki, *Donis 57* (BR); *1543* (BR, PRE); *2066* (BR, K); *2282* (BR, EA, K); Kurukwata, *Gérard 3134* (BR); Ahungbo, *Germain 5284* (BR, LISU); Bankaie, *Gilbert 14892* (BR); Ntolo-Ibaku, *Jans 888* (BR); Kibati, *Lebrun 4360* (BR, K); Cataractes, *Luja 149* (BR, type of *T. lujae*); Luki, *Maudoux 187* (BR, LISU, WAG); Kifuku, *Mildbread 2885* (UPS); Luki, *Nsimundele 175* (BR); Mahagi Port, *van der Ben 1326* (BR, K, M, SRGH); Luki, *Wagemans 730* (BR, LISC, WAG); *2157* (BR, LISC).

SUDAN. Meridi distr., *Andrews 1339* (K); Mongalla prov., *Aylmer 27/48* (K); Imatong Mts, Talanga, *Friis & Vollesen 508* (K); 6 km E. of Bor, *Lock 81/66* (K); Lado, *Yei R., Sillitoe 476* (K).

ETHIOPIA. Lower Omo R., *Carr & Brown 719* (BR, K); *Carr & Matolo 906* (K, WAG); Murle, Omo R., *Corradi 8401* (FI); *8402* (FI); *8403* (FI); *8404* (FI); Murle Lake, *Corradi 8400* (FI, WAG, lectotype of *Dichapetalum corradii*); *8405* (FI); *8406* (FI); *8407* (FI); *8408* (FI); *8409* (FI); 15–20 km S. of Abobo, *Friis, Woldu & Vollesen 2447* (K).

UGANDA. Panyimur, *Alonzi 16* (ENT); Mabira, *Dummer 3974* (BM, Z); Luala, *Dummer 3976*



MAP 9. *T. fischeri*.

(K); Mabira, *Dummer 4469* (BM, BR, type of *Dichapetalum dummeri*); Budongo Forest, *Eggeling 1158 (1283)* (EA, K); Rumogi near Koich R., *Eggeling 1828 (1652)* (BR, K); Chua distr., Madi Mt., *Eggeling 1735* (K); Okallo, *Eggeling 1934* (K); Budongo, *Eggeling 2289* (EA); Bunyoro, *Eggeling 3042* (EA, K); Budongo, *Eggeling 3076* (K); 3461 (EA); 3462 (EA); Bunyoro, *Karani 33* (EA, ENT); Budongo, *Myers 13616* (K); Maramagambo, *Synott 212* (ENT); Busoga distr., *Wood 57* (EA, ENT).

KENYA. Taveta, *Dale 3753* (BM, BR, EA, K, P); 14 km Kaldeni-Kilifi, *Faden & Evans 71/730* (K); Kwale distr., Diani forest, *Gillett & Kibuwa 19876* (K); Taveta, *Greenway 4476* (EA, K); *Polhill & Paulo 978* (BR, EA, K, P).

TANZANIA. Ukerewe Isl., *Conrads 5547* (BR, EA, K); 6248 (EA); Kagehi, *Fischer 282* (K, type); Ruhembe, *Goetze 404* (BM); *Goetze s.n.* (PRE); Rau forest, *Greenway 4526* (EA, K); Lake Manyara Nat. Park, *Greenway & Karani s.n.*, (K); *EAH 13606* (EA); near Moshi, *Lewis 7* (K); Rau forest, *Lewis 40* (K); 225 (K); Handeni distr., Misufini, *Semsei 569* (EA); Mtibwa F.R., *Semsei 855* (BR, EA, K); Kilosa distr., Kidadi, *Semsei 1016* (B, BR, K); Handeni distr., Romwe, *Semsei & Gane FH 2919* (BR, EA, K); Kilosa distr., Vigude, *Semsei 1068* (BR, EA, K); Mtibwa F.R., *Semsei 1426* (BR, K); 1887 (EA, K, WAG); Pemba, *Vaughan 473* (EA); 897 (EA); Zanzibar, *Vaughan 2036* (BM); Himo R., *Volkens 2170* (BM, BR, E, G, K, LE); Magombera F.R., *Vollesen 4151* (K); Morogoro R., *Wigg 1024* (EA, K); Rau F.R., *Wigg 1534* (EA, SRGH).

MALAWI. Blantyre, *Buchanan* 30 (E, K); Lengwe Game R., *Hall-Martin* 741 (K, SRGH); 744 (SRGH); 944 (K); 1211 (K, SRGH).

ZIMBABWE. Chiredzi distr., Sabi R., *Sherry* 302/71 (BR, K, P, SRGH, WAG).

MOZAMBIQUE. Inhafenga, *de Carvalho* 1178 (BR, LMU, WAG); between Tete and Lupata, *Kirk s.n.* (K, LISC); Inhamitanga, *Müller & Pope* 1901 (K); *Simao* 237 (LISC); Mossurize, *Simao* 1173 (EA, LISC, type of *T. fischeri* var. *pubescens*).

SOUTH AFRICA. Ubombo distr., *de Winter & Vahrmeyer* 8351 (K); Hlabisa distr., *Moll* 2835 (K); Lake Sibayi, *Moll* 4926 (K); 5011 (SRGH); 10 km W. of Mazengwenya, *Moll & Muller* 5699 (K); Hlabisa distr., *Strey* 5475 (PRE); Lake Sibayi, *Vahrmeyer* 561 (PRE); 719 (EA, K); 740 (K).

Notes. According to ENGLER (1896, 1915) and ENGLER & KRAUSE (1931) the two flowers depicted in figure 188, K-L, figure 401, K-L, and figure 4, K-L show a 5- and a 4-merous corolla respectively. Both flowers, however, have a 5-merous corolla. In part K, the flower has one large and 4 small bicuculate petals, while in part L one large and 2 small bicuculate petals with 2 entire petals are shown. The situation as depicted in part K has never been observed in the material used for this revision.

Tapura fischeri var. *pubescens* is based by the authors on more hairy specimens with 2 fertile stamens. Two fertile stamens is usual in *T. fischeri* (see cited figures above) and only rarely flowers with 3 fertile stamens are observed. The very hairy leaves and branchlets, and the more hairy flowers, indeed more so than generally seen in this species, do not justify a separate taxonomic status for this material, especially not when the more hairy material of the former *T. lujae* is taken into account as well (see below).

In the concept of *T. fischeri* as presented here, the ovary varies from completely glabrous to completely hairy, with all stages in between. The indumentum of the ovary usually vanishes completely in fruit, but it remains and does become even more dense in fruit in some specimens from Western Zaïre as well as in two other specimens, *Sita* 808 from adjacent Congo and *Letouzey* 5036 from S.E. Cameroun. HAUMAN (1958: 348) classified the Zaïre specimens with hairy fruits as *T. lujae*. In Hauman's key to distinguish between *T. fischeri* and *T. lujae*, glabrous ovaries and glabrous fruits lead to the former, hairy ovaries and hairy fruits to the latter. Although material bearing flowers and fruits at the same time is rather scarce, I noticed that hairy ovaries may produce glabrous fruits. The other character used by HAUMAN to distinguish between the two species is more or less of quantitative nature i.e. the hairiness of leaves and inflorescences. When all available material from Africa was examined it became clear that this character did not permit a satisfactory separation of *T. lujae* either. Considering this variation in characters, I am convinced that more material from Central Africa will reveal more intermediate specimens as regards ovary and fruit indumentum as well as regards the indumentum of leaves and inflorescences. Therefore *T. lujae* has been placed in synonymy of *T. fischeri*.

T. fischeri is the first species of the African *Dichapetalaceae* in which the seeds have distinct endosperm (see fig. 10-9). Also the embryo is slightly different in having a protruding radicle.

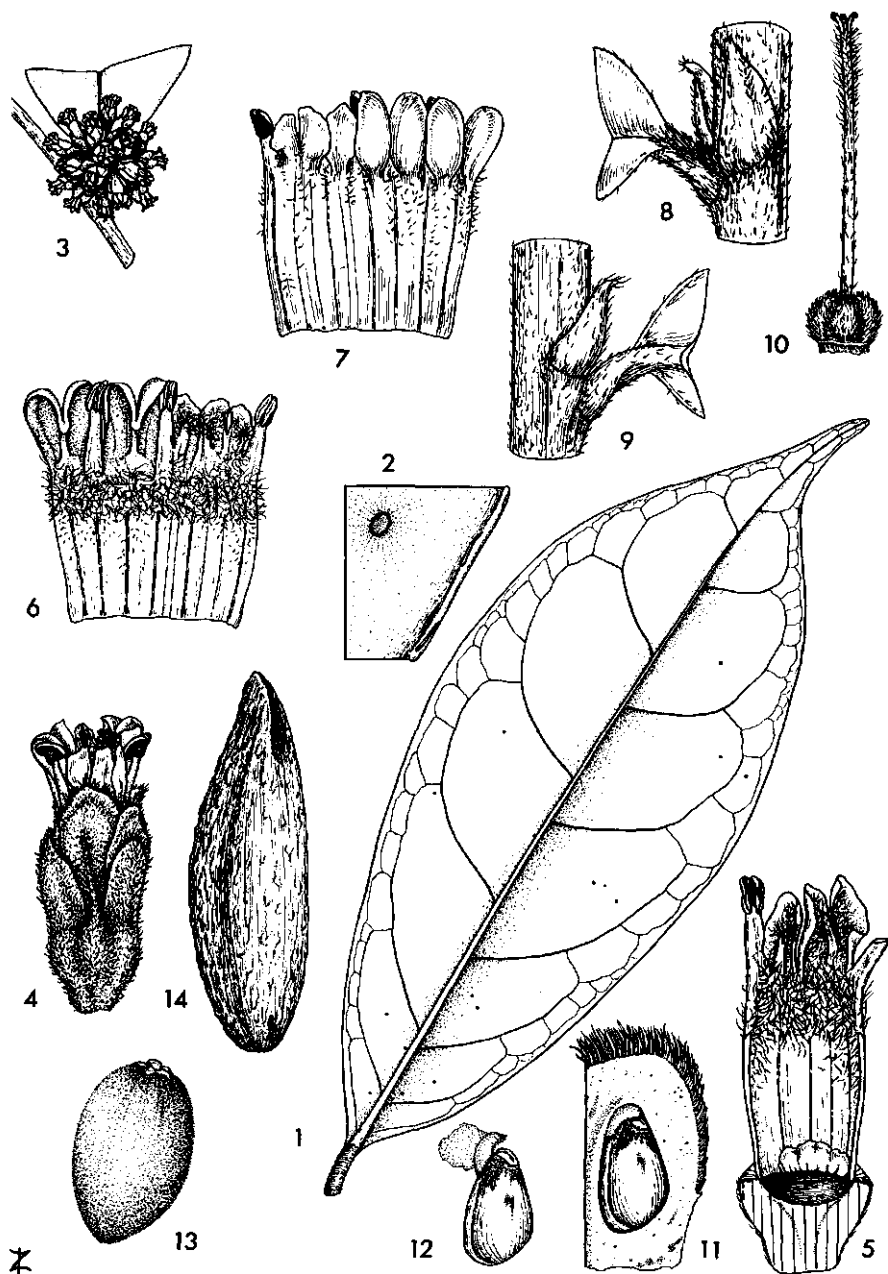


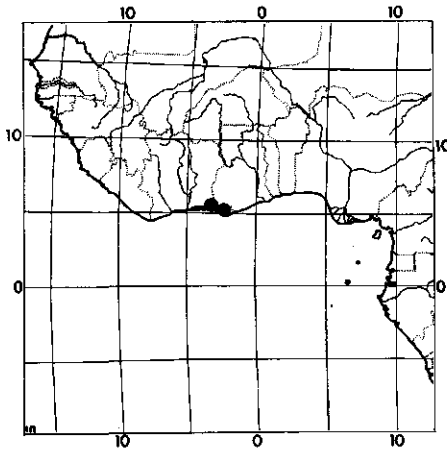
FIG. 11. *T. ivorensis*: 1. leaf beneath, $\frac{1}{2}\times$; 2. detail of leaf beneath with gland, $9\times$; 3. inflorescence, $\frac{1}{2}\times$; 4. flower, $4\frac{1}{2}\times$; 5. part of staminal tube with basal staminodes, $6\times$; 6-7. staminal tube both sides, $4\frac{1}{2}\times$; 8-9. stipules, $4\frac{1}{2}\times$; 10. pistil, $6\times$; 11. length cut ovary cell, $22\frac{1}{2}\times$; 12. ovule with obturator, $22\frac{1}{2}\times$; 13. fruit, $\frac{1}{2}\times$; 14. pyrene, $2\frac{1}{2}\times$ (1-2, 8-9, 13-14. *Breteler 5955*; 3-7, 10-12. *Breteler 5964*).

T. ivorensis Breteler, 1970: 12; Punt, 1975: 46; Hall & Swaine, 1981: 346.

Type: Ivory Coast, 5 km E. of Aboisso, *Breteler 5955* (holotype: WAG; isotypes: B, BR, EA, K, LISC, M, P, UCI, W, Z).

Diagnostic characters. Shrub to small tree. Branchlets appressed-puberulous, glabrescent. Stipules early caducous or not, subtriangular, 2–4 × 1–2 mm. Petiole canaliculate above. Leaf blade papery to coriaceous, obovate-elliptic, (8)12–17 × (3)5–8 cm, with 5–7(8) pairs of main lateral nerves, glabrous above, nearly so beneath. Inflorescence glomerulous, peduncle completely adnate to petiole. Flowers sessile or nearly so, ca 8 mm long. Fertile stamens 3. Pistil 3-merous, ovary velutinous. Fruit minutely velutinous.

Description. Shrub or small tree, up to ca 6 m. *Branches* brown, glabrous or glabrescent. *Branchlets* appressed-puberulous, glabrescent. *Stipules* narrowly to broadly subtriangular, 2–4 × 1–2 mm, appressed-puberulous, early caducous or not. *Leaves:* petiole (2)3–8(9) mm long, canaliculate above, subappressed-hairy, glabrescent; blade papery to coriaceous, obovate-elliptic, (8)12–17 × (3)5–8 cm, cuneate to rounded at base, gradually acuminate at top, the acumen (0.5)1–1.5(2) cm long, rounded; glabrous above, beneath with a few appressed hairs on the main nerves and along the margin, soon glabrescent; main lateral nerves 5–7(8) pairs, rather inconspicuous above, prominent beneath; glands few, scattered, beneath only. *Inflorescence* glomerulous, indistinctly branched, 1.5–2 cm diam., appressed-hairy; peduncle completely adnate to petiole; bracts and bracteoles small, triangular, appressed-hairy outside. *Pedicel* 0–1 mm long, lower part wanting, upper part 0–1 mm long. *Flowers* ca 8 mm long, sessile or nearly so. *Sepals* unequal, the two outer smaller, ovate-elliptic to obovate-elliptic, 3.5–5 × 1.5–4 mm, top rounded to acutish, shortly united at base, tomentose outside, glabrous inside. *Petals* 7 mm long, with the stamens united into a 3–5 mm long tube with free apical parts, deeper split at the side of the fertile stamens, sparsely pubescent outside, villous inside, mainly on upper part of tube; the free part of the two major petals 1 mm split, bicuculate, glabrous or nearly so; the 3 minor petals rather flat, rounded at top. *Stamens:* 3 fertile with 2–4 sterile filaments, the fertile ones equalling the large petals, anthers ca 1 mm long with very distinct, muriculate connective; the free part of the sterile filaments rather short, sometimes inconspicuous, densely villous at top. *Basal staminodes* 2–3, across the large petals, free to partly united, flat, ca 1 mm high, glabrous. *Pistil* 3-merous, 7.5–8 mm long, slightly longer than stamens; style glabrous or almost so in lower part, pubescent in upper part, 3-lobed apically, the lobes up to ca 1 mm long; ovary depressed-globose, sometimes slightly 3-lobed, velutinous. *Fruit* ovoid, laterally compressed 3 × 2 × 1.5 cm, 2(–3?)-seeded, yellow, minutely velutinous, finely scabrid to the touch; mesocarp slimy; endocarp bony, rugose outside, glabrous inside. *Seed* narrowly ellipsoid, 18 × 7 mm; testa brown, glossy, glabrous.



MAP 10. *T. ivorensis*.

Distribution: Eastern Ivory Coast, Western Ghana

Ecology: Rain forest.

Specimens examined.

IVORY COAST. 5 km E. of Aboisso, *Breteler 5955* (B, BR, EA, K, LISC, M, P, UCI, W, WAG, Z, type); 6 km E. of Aboisso, *Breteler 5964* (C, COI, E, FI, HBG, LISU, NY, P, PRE, UCI, WAG, WU).

GHANA. 4 miles N. Draw River F.R., *Hall & Abbiw, GC 44719* (WAG).

***T. letestui* Pellegr.**

Fig. 12 Map 11

T. letestui Pellegrin, 1922: 91 (as *T. Le Testui*); 1924: 59; N. Hallé & Heine, 1967: 44, 49; Punt, 1975: 44.

Type: Gabon, Inganga, *Le Testu 1742* (holotype: P; isotypes: BM, K, WAG).

Diagnostic characters. Tree. Branchlets subappressed-brown-hairy. Stipules early caducous. Leaves coriaceous, obovate-elliptic, (6)7–10(12) × (2)3–5 cm, cuneate at base, shortly acuminate apically, glabrous above, beneath with hairy midrib and with some whitish, arachnoid hairs on blade, with 6–7 pairs of main laterals. Flowers subumbellate-glomerate at base of leaf blade, ca 7–8 mm long. Sepals 2.5–3 mm long, appressed-pubescent outside. Petals subequal in length, two bicuculate, the three others narrower, entire. Fertile stamens 3. Pistil 3-merous.

Description. Tree up to at least 40 cm diam. *Branches* glabrous or glabrescent. *Branchlets* shortly, subappressed-brown-pubescent. *Stipules* early caducous, ovate-triangular, 2–4 mm long, hairy as branchlet. *Leaves:* petiole subterete to semiterete, grooved above, (1)3–5(7) mm long, not grooved and 6–9 mm long when united with peduncle, hairy as branchlet; blade coriaceous, obovate-

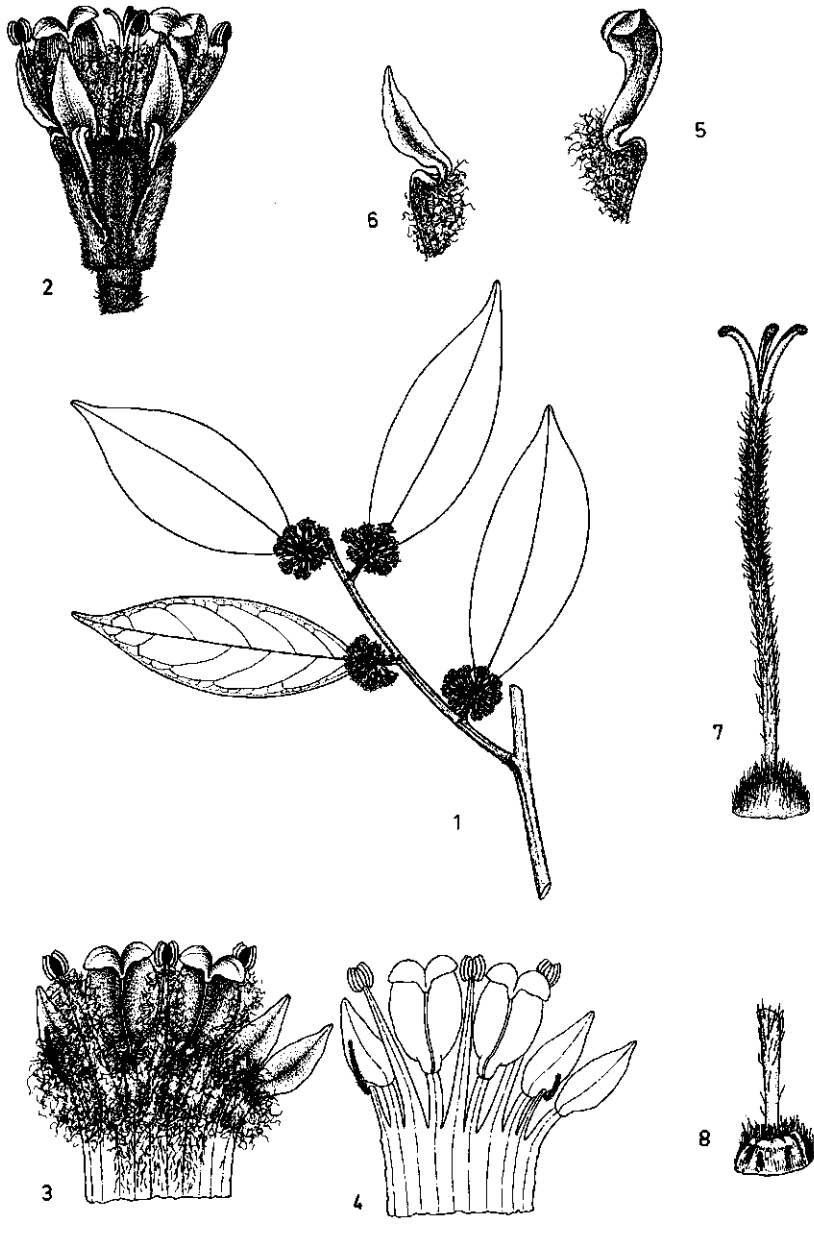
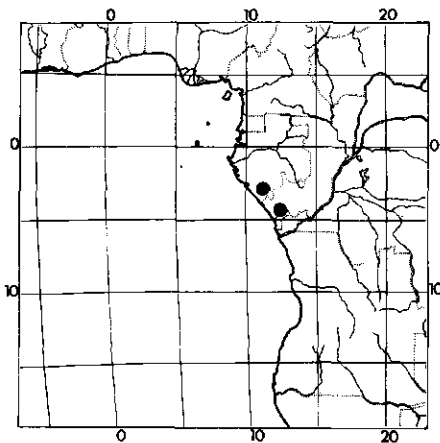


FIG. 12. *T. letestui*: 1. flowering branchlet, $\frac{1}{2} \times$; 2. flower, $5 \times$; 3. staminal tube inside, $5 \times$; 4. as 3, but without indumentum; 5. large petal lateral view, $5 \times$; 6. small petal lateral view, $5 \times$; 7. pistil, $10 \times$; 8. pistil partly with basal staminode(s), $10 \times$ (1-8. *Le Testu 1742*).

elliptic, 2–3 times as long as wide, (6)7–10(12) × (2)3–5 cm, cuneate at base, shortly acuminate at apex, the acumen up to 1 cm long, rounded apically, glabrous above, beneath with sparsely, subappressed-brown-pubescent midrib and with a loose, whitish, arachnoid, caducous indumentum on blade; midrib plane to slightly impressed above, prominent beneath, main laterals 6–7 pairs, rather thin, plane and rather indistinct above, slightly prominent beneath, margin slightly revolute; glands usually few, beneath only, mainly in lower part. *Inflorescence* subumbellate-glomerate-flowered, indistinctly branched, up to ca 10-flowered, subappressed-short-brown-hairy; peduncle as long as petiole and adnate to it; bracts and bracteoles subovate-triangular, concave, up to 1 × 1 mm, glabrous inside. *Pedicel* ca 1 mm long, the upper part ca 0.3 mm long. *Flowers* ca 7–8 mm long. *Sepals* suberect, ca free, subequal, the two outer slightly shorter, ovate-oblong, 2.5–3 × 1–1.5 mm, appressed-pubescent outside, glabrous inside. *Petals* subequal in length, 7–7.5 mm long, slender, thin, rather fragile, with stamens united into a 1–2 mm long tube with free, geniculate, apical parts, deeper split at the side of the fertile stamens; the two petals between the fertile stamens up to 1 mm split, bicuculate; 3 narrower petals entire; petals of both types long-hairy inside except for 2.5–3 mm length apically. *Stamens* 3 fertile, 2 without anther; fertile stamens up to 8 mm long, filaments flat, long-hairy inside, anthers rather flat, broadly ovate, ca 0.5 × 0.7 mm, with divergent thecae; sterile filaments filiform, 5–6 mm long, long-hairy, top often curved. *Basal staminode* 1 only (or a few united ones), across bicuculate petals, subquadrate to transversely oblong, up to 0.3 × 0.7 mm, glabrous. *Pistil* 3-merous, 5–7 mm long; ovary depressed subglobose, sparsely velutinous to more or less soft-erect-hairy; style pubescent, apically with 3, up to 1.5 mm long, glabrous lobes. *Fruits* unknown.

Distribution: Gabon, Congo.

Ecology: Semi deciduous forest.



MAP 11. *T. letestui*.

Specimens examined.

GABON. Inganga, *Le Testu 1742* (BM, K, P, WAG, type).

CONGO. Haute Loukéné, *Groulez-Morel, Service Forestier du Moyen Congo 34* (P) (see note).

Note. The only specimen from Congo is sterile and has therefore not been identified with complete certainty. The vegetative characters of this specimen, however, only fit this species.

***T. neglecta* N. Hallé & Heine**

Fig. 13 Map 12

T. neglecta N. Hallé & Heine, 1967: 47; Punt, 1975: 44.

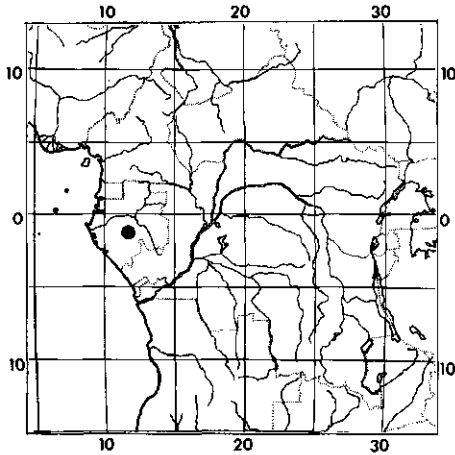
Type: Gabon, Mandji (Iboundji), *Le Testu 6090* (holotype: P; isotypes: BR, WAG).

Diagnostic characters. Shrub (or small tree?). Branchlets soon glabrescent. Stipules early caducous, ca 3 mm long. Petiole canaliculate above (4)6–9 mm long; blade coriaceous, obovate-elliptic, 7–12 × 2.5–5 cm, cuneate at base, shortly acuminate, glabrous or nearly so, glands beneath only. Inflorescence free from petiole, sessile or nearly so, usually compact. Flowers shortly stalked 4–5 mm long. Sepals thick, concave. Two large petals bicuculate apically, fertile stamens 3. Pistil 3-merous, ovary shortly velutinous.

Description. Shrub (or small tree?). *Branchlets* brownish, appressed-short-hairy when young, soon glabrescent. *Stipules* early caducous, narrowly triangular to lanceolate, ca 3 mm long. *Leaves:* petiole canaliculate above, (4)6–9 mm long, glabrous to sparsely short-hairy; blade coriaceous, obovate-elliptic, 7–12 × 2.5–5 cm, cuneate at base, shortly acuminate at top, the acumen rounded, 0.5–1 cm long, the leaf margin often slightly revolute; midrib and the 4–7 pairs of main lateral nerves plane above, prominent beneath; glabrous above, sparsely subappressed-hairy on midrib and main laterals beneath, sometimes with some arachnoid hairs between the main nerves as well; glands rather small, beneath only, mainly in lower half. *Inflorescence* axillary, free from petiole, sessile or nearly so, usually compact and rather indistinctly branched, consisting of few to several, subsessile to shortly stalked, subglobose, up to 10-flowered heads; axis of inflorescence very short to somewhat elongated, subappressed-pubescent; bracts and bracteoles narrowly triangular, up to ca 2 mm long, subappressed-pubescent. *Pedicel* up to ca 1.5 mm long, the lower part up to 0.5 mm long, appressed-short-hairy, the upper part 0.5–1 mm long, glabrous. *Flowers* 4–5 mm long. *Sepals* unequal, appressed or nearly so, thick, concave, ovate-elliptic, 2–3 × 1.5–2 mm, margin ciliate, sometimes with a few hairs outside. *Petals* 5 with the 5 stamens united into a 2.5 mm long tube, apical parts free, 1–1.5 mm long; tube sparsely short-hairy in upper part outside, the free parts glabrous, inside tomentose mainly so on upper part of tube and partly extending on free parts; large petals 2, with a 1.5 mm long, 0.5 mm split bicuculate apical part; the 3 minor petals with a narrowly triangular to lanceolate entire apical



FIG. 13. *T. neglecta*: 1. flowering branchlet; 2. terminal part of branchlet with stipules; 3. inflorescence; 4. bract; 5. flower diagram; 6. flower cut lengthwise; 7-8. outer and inner sepal, from outside, lateral view and cross section; 9-10. staminal tube outside and inside; 11. anther both sides; 12. upper part of style (1-12. *Le Testu 6090*). For measurements see description.



MAP 12. *T. neglecta*.

part. *Stamens* 3 fertile, 2 without anther; the fertile ones equalling the large petals, the two lateral ones at one side (proximal to minor petals) provided with a small, subacute lobe, anthers ca 0.5 mm long with a distinct, slightly muriculate connective, free part of sterile filaments narrowly triangular to lanceolate, apically hairy. *Staminode* 1, across the large petals, semi-annular, 0.7 mm high, glabrous. *Pistil* 3-merous, ca 5 mm long; ovary depressed, densely shortly velutinous; style usually curved or noddled, glabrous in lower part, hairy in middle and upper part, the apical part attached to the tube across the large petals, lobes 3, short, glabrous, exserted. *Fruits* unknown.

Distribution: Gabon.

Ecology: Rain forest.

Specimens examined.

Only known from the type.

Tapura sp.

There remains one unidentified specimen collected near the waterfalls in the Tchimbélé R., Crystal Mts, Gabon (*Breteler & J. J. de Wilde 49 – WAG*). This specimen, with leaves and very young inflorescences only, almost certainly represents the genus *Tapura* and probably belongs to a new species. The inflorescence is sessile or nearly so as in *T. neglecta*. From the latter the material differs, however, by its leaves which have 8–12 main lateral nerves on each side of the midrib instead of 4–7. More material is needed.

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