

# A synoptic revision of *Dacryodes* (*Burseraceae*) in Africa, with a new species from Central Africa

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**Summary.** A synoptic revision is presented for the genus *Dacryodes* Vahl in Africa. The studies are based on examination of herbarium material. Eighteen species are recognised, including two not well known due to poor material. The new species *Dacryodes villiersiana* Onana is described and illustrated. The conservation status of the species is discussed following the categories and criteria of IUCN (2001).

**Key Words.** Africa, *Burseraceae*, conservation, *Dacryodes*, key, revision, synopsis.

## Introduction

In the course of research on the species of *Dacryodes* Vahl in Africa (Onana 1998, 2003, 2006 (published 2007); Onana & Cheek 2003), it emerged that no revision of the genus has been carried out since Lam (1932a, b). A review of the genus in Africa is presented here. In the course of producing this paper, specimens were studied from BM, BR, G, K, P, WAG and YA.

## The genus *Dacryodes* in Africa

The approximately 70 species of the genus *Dacryodes* are distributed in the humid tropical forests of SE Asia (16 species), tropical Africa (18 species, this paper) and tropical America (22 species and in addition 14 undescribed according to Daly & Martínez 2003). The 18 species recognised from Africa belong to the section *Pachylobus* (G. Don) H. J. Lam (Lam 1932a, b). These are all Guineo-Congolian in distribution except the Zambezian outlier *D. trapnellii* Onana. Lower Guinea has 13 species: *D. buettneri* (Engl.) H. J. Lam, *D. camerunensis* Onana, *D. ebatom* Aubrév. & Pellegr., *D. edulis* (G. Don) H. J. Lam, *D. heterotricha* (Pellegr.) H. J. Lam, *D. igaganga* Aubrév. & Pellegr., *D. klaineana* (Pierre) H. J. Lam, *D. ledermannii* (Engl.) H. J. Lam, *D. letestui* (Pellegr.) H. J. Lam, *D. macrophylla* (Oliv.) H. J. Lam, *D. normandii* Aubrév. & Pellegr., *D. tessmannii* (Engl.) H. J. Lam, and *D. villiersiana* Onana. These occur in evergreen and semi-deciduous forest. In the Congolian area, four species occur: *D. bampsiana* Pierlot, *D. leonardiana* Pierlot, *D. osika* (Guillaumin) H. J. Lam and *D. pubescens* (Vermoesen) H. J. Lam. The

richest countries for *Dacryodes* are Gabon (twelve species), Cameroon (nine or ten species) and Equatorial Guinea (six species). Only one of the African species is widely cultivated (*D. edulis*). Four species are still incompletely known due to the paucity of collections (*D. ebatom*, *D. tessmannii*, and *D. villiersiana*) or due to specimens that have been lost and which have an imprecise diagnosis (*D. fuscus* (Engl.) H. J. Lam). Fieldworkers are thus urged to take any opportunity to obtain and preserve more fertile material of this still incompletely known genus.

Pierlot (1997) provided the only previous key to all the African species of *Burseraceae* with fleshy fruits, including *Dacryodes*. His key is based on material with fruits only. New keys are presented below. Complete material is not available for some species, so the keys are tentative and less than ideal. They are based on observations of the herbarium specimens and data, including partial and regional keys, from protologues and flora accounts (Aubréville 1962; Chevalier 1917; Don 1832; Engler 1893, 1896, 1899, 1910, 1931; Ficalho 1884; Guillaumin 1908; Hooker f. 1849; Hoyle & Dunkley 1934; Keay 1958; Onana 1998, 2003, 2006 (2007); Onana & Cheek 2003; Pellegrin 1931, 1934; Pierlot 1996, 1997; Troupin 1958).

Synonyms are cited. When I have included as synonyms names of which I have not seen the type (s), I have followed earlier workers cited above.

The indumentum is very variable. A variety of hairs are found: simple hairs or glandular, ferruginous stellate hairs (with long or short branches, sometimes scaly), ferruginous sessile or stipitate multifid hairs. Density also varies: either tomentose, dense, sparse or scattered.

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The indumentum of the lower surface of the leaflets is useful to distinguish species. Most species have a glabrescent lamina with scattered stellate or scaly hairs (*Dacryodes bampsiana*, *D. camerunensis*, *D. ebatom*, *D. klaineana*, *D. leonardiana*, *D. macrophylla*, *D. osika*, *D. tessmannii* and *D. trapnellii*). Two species have a dense indumentum of stellate hairs (*D. buettneri* and *D. pubescens*), one has a dense but caducous indumentum of scaly hairs and sessile multifid (*D. heterotricha*). In one species, dense stellate hairs are restricted to the principal nerves (*D. ledermannii*). Sparse to simple and stellate hairs are mixed on three species (*D. edulis*, *D. igaganga* and *D. letestui*) and stipitate multifid hairs appear on the leaflets of one species (*D. normandii*).

The indumentum of the flowers of African *Dacryodes* is one of the most important species characters. They can be divided into four groups based on the indumentum of the disc and ovary: first, those with a glabrous disc and ovary (*D. bampsiana*, *D. edulis*, *D. heterotricha*, *D. ledermannii*, *D. leonardiana*, *D. letestui*, *D. macrophylla*, *D. osika* and *D. pubescens*); second, those with glabrous disc and tomentose ovary (*D. igaganga*, *D. klaineana*, *D. normandii*, *D. tessmannii*, *D. trapnellii* and *D. villiersiana*); third, that with tomentose disc and glabrous ovary (*D. buettneri*), and fourth that with both disc and ovary tomentose (*D. camerunensis*).

Two fruits types are evident. In the first type, the fruits are oblong, the stone with thin membranous-cartilaginous entire (lacking pores or scutellum) endocarps. One locule is fertile, while the sterile one totally disappears (*Dacryodes buettneri*, *D. edulis*, *D. ledermannii*, *D. letestui*, *D. osika* and *D. pubescens*). In the second type, the fruits are globose and sometimes more or less apiculate, the stone with thin hard-cartilaginous endocarps which have two or three pores. Of the two locules, the fertile one is large, and the sterile one persistent but reduced under a inconspicuous scutellum ("écusson" of Aubréville, 1962) (*D. bampsiana*, *D. camerunensis*, *D. ebatom*, *D. klaineana*, *D. leonardiana*, *D. macrophylla* and *D. trapnellii*) or a conspicuous scutellum (*D. heterotricha*, *D. igaganga* and *D. normandii*). In both types, there is a single seed, with two deeply lacinate cotyledons, each cotyledon with five fleshy lobes.

The habitat of the African species of *Dacryodes* is lowland evergreen forest, except for *D. leonardiana* and *D. bampsiana*, which occur in montane evergreen forest, while *D. trapnellii* is the only species to occur in swamp forest. Most of the species usually appear to occur as isolated individuals or in low densities (e.g. *D. buettneri*, *D. heterotricha*, *D. klaineana* and *D. pubescens*).

The Congo basin in Central Africa and the Guinean Atlantic forest in West Africa are the main areas of distribution of *Dacryodes*. These forests, especially the latter, have been degraded by human activities such as agriculture and logging. Since the Earth summits in Rio in 1992 and Johannesburg in 2002 (or Rio + 10), several conservation programmes have been addressing the sustainable management of this habitat and so there has been a reduction of threat, especially in the forest reserves of the Congo basin. The conservation status of each species is assessed using the categories and criteria of the Red List of UICN version 3.1 (2001), taking into account this situation.

Economically, *Dacryodes buettneri* and *D. klaineana* are timber trees of secondary importance. However, the local use for *Dacryodes* is principally the edible fruit of all the species. These can be divided into two groups: those which need to be boiled before being eaten (although they are appreciated uncooked by parrots and monkeys), and those that do not. The first are rich in energy, fibre, protein, vitamin C and mainly lipid, as shown by the analyses for *Dacryodes edulis* (Ucciani & Busson 1963; Tchendji *et al.* 1981; Omati & Okiy 1987). The second, edible uncooked, are sucked. They are sweet or slightly sour when ripe. Although no analysis of the juice has been carried out, it is presumed that they are rich in sugar. The red colour of the juice of *D. macrophylla* is presumed to indicate a high concentration of iron, believed to be useful in treating anaemia (pers. obs.).

Aubréville (1962: 65) stated that the best characters to distinguish the species of African *Dacryodes* are on the stone. In observation, the stone of the six species with membranous endocarp are similar and cannot be distinguished from each other. On the contrary, the present author states that the best characters are on the inflorescences and flowers and secondary on the leaves.

### Key to the African species of *Dacryodes*, specimens with leaves and flowers

- |     |   |                        |
|-----|---|------------------------|
| 1.  | Disc glabrous .....   | 2                      |
| 1'. | Disc tomentose .....  | 16                     |
| 2.  | Ovary glabrous .....  | 3                      |
| 2'. | Ovary tomentose-stellate .....  | 11                     |
| 3.  | Pseudostipules present .....  | 5. <i>D. edulis</i>    |
| 3'. | Pseudostipules absent .....   | 4                      |
| 4.  | Leaves 8 – 12-jugate .....  | 14. <i>D. osika</i>    |
| 4'. | Leaves 2 – 6-jugate .....   | 5                      |
| 5.  | Lamina hairy below with simple hairs, leaflets cuspidate to cuspidate-acuminate; inflorescences dark-brown .. | 11. <i>D. letestui</i> |

- 5'. Lamina without simple hairs, leaflets not cuspidate, inflorescences ferruginous . . . . . 6  
 6. Mixed sessile multifid and scaly-stellate hairs on lamina below, mixed glandular and sessile multifid hairs on inner surface of petals . . . . . **6. D. heterotricha**  
 6'. No multifid hairs, petals glabrous on inner surface . . . . . 7  
 7. Lamina tomentose below, stellate hairs with long branches . . . . . **15. D. pubescens**  
 7'. Lamina not tomentose below, stellate hairs with short branches . . . . . 8  
 8. Lamina tomentose stellate on midvein only below . . . . . **9. D. ledermannii**  
 8'. Lamina glabrescent with stellate hairs below . . . . . 9  
 9. Petiolule swollen, lamina rounded at the apex or very shortly acuminate . . . . . **12. D. macrophylla**  
 9'. Petiolule not swollen, lamina acuminate at the apex . . . . . 10  
 10. Leaves always 3 – 4-jugate . . . . . **10. D. leonardiana**  
 10'. Leaves very often 2-jugate . . . . . **1. D. bampsiana**  
 11. Petiole winged, scaly hairs on lamina . . . . . **7. D. igaganga**  
 11'. Petiole not winged, no scaly hairs. . . . . 14  
 12. Leaves with dense stipitate multifid hairs on the rachis and veins of leaflets below. . . . . **13. D. normandii**  
 12'. Leaves glabrescent with stellate hairs, no stipitate multifid hairs. . . . . 13  
 13. Inflorescences in large panicles, lateral flowers alternate in cymes. . . . . **18. D. villiersiana**  
 13'. Inflorescence spiciform, lateral flowers subopposite to opposite in cymes . . . . . 14  
 14. Cymes sessile . . . . . **8. D. klaineana**  
 14'. Cymes pedunculate . . . . . 15  
 15. Glandular hairs on outer surface of the sepals . . . . . **17. D. trapnellii**  
 15'. No glandular hairs on outer surface of the sepals. . . . . **16. D. tessmannii**  
 16. Ovary glabrous, lamina tomentose stellate below, base very asymmetric . . . . . **2. D. buettneri**  
 16'. Ovary tomentose stellate, lamina glabrescent with stellate hairs below, base slightly asymmetric . . . . . **3. D. camerunensis**

**NOTE.** Flowers are unknown for *Dacryodes ebatom*.

### Key to the African species of *Dacryodes*, specimens with leaves and fruits

1. Fruit oblong, endocarp thin membranous-cartilaginous, scutellum absent, one locule . . . . . 2  
 1'. Fruit globose or ovoid, endocarp thin hard-cartilaginous, scutellum present, two unequal locules . . . . . 7  
 2. Lamina stellate tomentose below . . . . . 3  
 2'. Lamina not tomentose below . . . . . 4  
 3. Lamina lanceolate, asymmetric, hairs with short branches . . . . . **2. D. buettneri**  
 3'. Lamina oblong, symmetric, hairs with long branches . . . . . **15. D. pubescens**  
 4. Pseudostipules present . . . . . **5. D. edulis**  
 4'. Pseudostipules absent . . . . . 5  
 5. Leaves 8 – 12-jugate . . . . . **14. D. osika**  
 5'. Leaves 2 – 6-jugate . . . . . 6  
 6. Lamina cuspidate to acuminate - cuspidate at the apex, with dense to sparse simple hairs below . . . . . **11. D. letestui**  
 6'. Lamina not cuspidate at the apex, stellate tomentose often on midrib vein only below . . . . . **9. D. ledermannii**  
 7. Scutellum conspicuous . . . . . 8  
 7'. Scutellum inconspicuous . . . . . 10  
 8. Endocarp smooth, lamina with mixed scaly-stellate and sessile multifid hairs . . . . . **6. D. heterotricha**  
 8'. Endocarp rough . . . . . 9  
 9. Stipitate multifid hairs on rachis and lamina below . . . . . **13. D. normandii**  
 9'. No stipitate multifid hairs, mixed simple and stellate hairs on the leaves . . . . . **7. D. igaganga**  
 10. Stone subglobose, not apiculate, swollen at opposite sides, with two apical pores . . . . . **4. D. ebatom**  
 10'. Stone elliptic to oblong, apiculate, with three pores, two apical and one basal . . . . . 11  
 11. Fruit with glabrous epicarp . . . . . 12  
 11'. Fruit with dense to sparse stellate hairs on epicarp . . . . . 14  
 12. Fruits globose to slightly oblong, with a persistent perianth; petiole and petiolule smooth, lamina rounded at the apex or very shortly acuminate . . . . . **12. D. macrophylla**

- 12'. Fruits not globose, petiole and petiolule rough with transversal twisted rings, lamina acuminate . . . . . 13  
 13. Fruit mucronate, endocarp canaliculate, leaves 2-jugate . . . . . **1. D. bampsiana**  
 13'. Fruit apiculate, endocarp not canaliculate, leaves 3 – 4-jugate . . . . . **10. D. leonardiana**  
 14. Lamina always small, up to 12 × 4.5 cm . . . . . **3. D. camerunensis**  
 14'. Lamina usually larger than 12 × 4.5 cm, up to 35 × 18 cm . . . . . 15  
 15. Petiolule swollen, lamina strongly asymmetric, one side rounded, the other side cuneate . . . **8. D. klaineana**  
 15'. Petiolule not swollen, lamina slightly asymmetric, the two sides rounded, one side shorter . . . . .  
 . . . . . **17. D. trapnellii**

**NOTE.** Fruits are unknown for *Dacryodes villiersiana*.

## Synopsis of the African species

**1. *Dacryodes bampsiana*** Pierlot (1996: 366). Type: Zaire [Congo (Kinshasa)], Distr. des Lacs Edouard et Kivu, Kashebere, alt. 1300 m, fr. no date, *Michelson* 233 (BR!).

**DISTRIBUTION.** Congo (Kinshasa).

**HABITAT.** Lowland to montane evergreen forest. Altitude range: 650 – 1950 m.

**COLLECTIONS EXAMINED. CONGO (KINSHASA):** Type; Distr. forestier Central: Meshe, R. Ndarikwa, sterile Oct. – Nov. 1942, *Michelson* 233 (BR), 290 (BR); District des Lacs Edouard et Kivu, Tshinganda, 1950, evergreen mountain forest, fr. July 1959, *Pierlot* 3203 (BR).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. CONGO (KINSHASA):** bukobe, bukoi, bukowe (kitembo & kirega); musukubokota, satwase (kirega).

**USE.** None recorded.

**CONSERVATION.** *Dacryodes bampsiana* is here assessed as EN B1a (Endangered, zone of occurrence less than 5000 km<sup>2</sup>, and present in less than five localities) due to the fact that the species exists only in the east of Congo (Kinshasa) with only three specimens collected from three localities.

**2. *Dacryodes buettneri*** (Engl.) H. J. Lam (1932a: 202; 1932b: 337); Aubréville (1962: 69); De Saint Aubin (1963: 39); Vivien & Faure (1985: 54); Wilks & Issembé (2000: 154). Type: Gabon, *Büttner* 451 (holotype B†). Neotype: Gabon, logging site of CBG, c. 5 km beyond checkpoint Divangui, fl. 29 Oct. 1990, *van Nek* 141 (holoneotype YA!, isoneotype LBV, WAG). **Chosen here.**

*Canarium buettneri* Engl. (1893: 101). Type: *Büttner* 451 (holotype B†).

*Pachylobus buettneri* (Engl.) Engl. (1896: 243). Type as *Canarium buettneri* Engl.

*Dacryodes fraxinifolius* (Engl.) H. J. Lam (1932a: 202). Type: Spanish Guinea [Equatorial Guinea], 15 Feb. 1908, *Tessmann* 203b (holotype B†, isotype K!).

*Pachylobus fraxinifolius* Engl. (1910: 142). Type: Spanish Guinea [Equatorial Guinea], *Tessmann* 203b (holotype B†, isotype K!).

*Pachylobus buettneri* (Engl.) Engl. var. *cinera* A. Chev. (1917: 116). Type: Gabon, 23 July 1912, *Chevalier* 26514 (holotype P!).

**DISTRIBUTION.** Cameroon, Congo (Brazzaville) according to Descouings (1961: 16), Gabon, and Equatorial Guinea.

**HABITAT.** Lowland evergreen forest. Altitude range unknown.

**SELECTED COLLECTIONS EXAMINED. CAMEROON** (total: 7): S Nkoulaze (35 km S Bengbis), fl. 17 March 1962, *Letouzey* 4553 (BR!, WAG!, YA!); Nkono 60 km on the road Djoum – Oveng, sterile 15 Nov. 1966, *Mezili* 42 (YA!); Akonékýé (65 km S Ebolowa), fr. 11 Sept. 1989, *Onana* 398 (YA!). **GABON** (total: 20): Type; 5 – 15 km NNW Ndjolé, fr. 14 Nov. 1991, *Bretelex & Jongkind* 10487 (WAG!, YA!); between Mouila and Yeno, fl. July date unknown, *Bretelex, Lemmens & Nzabi* 8190 (WAG!); Libreville, fr. 1899, *Klaine* 1450 (P!); S Medounou, fl. 16 Sept. 1985, *Leeuwenberg* 13558 (K!, WAG!); Tchibanga, fl. Sept. – Nov. 1907, *Le Testu* 1155 (P!); Ogooué-Lolo, 21 km from Lastoursville to Koula-Moutu (0°56'S 12°35'E), fr. 23 Nov. 1988, *van der Maesen, Louis & De Bruijn* 5787 (YA!, WAG!); Moyen Ogooué, 8 km ENE Bellevue, sterile 8 April 1994, *Wieringa & Haegens* 2691 (WAG!, YA!). **EQUATORIAL GUINEA:** Bata – Nienfang, about km 35 near R. Comaya fl. 18 Dec. 1994, *Carvalho* 5748 (P!); Nkolendangan, near Makonanam, fl. 15 Feb. 1908, *Tessmann* B203 (K!).

**COMMERCIAL NAME.** Ozigo.

**LOCAL NAMES. CAMEROON:** assia (bulu, fang, ntumu). **GABON:** assia (fang), mossigou (mitsogo, bavoungou, bapounou, echira), nsia (bakota), ozigo (mpongoué). **EQUATORIAL GUINEA:** Ashia (fang).

**USES.** Timber. Fruit edible boiled.

**CONSERVATION.** *Dacryodes buettneri* is here assessed as VU B1b (iii). This reflects the fact that the quality and extent of its habitat are reduced due to logging and agriculture outside of the forest reserves.

**NOTE.** The neotype was selected because it was made near the type locality, is representative of the species and is fertile of good quality.

**3. *Dacryodes camerunensis*** *Onana* 2006 (2007: 572). Type: Cameroon, South Province, Nkoemvone 14 km on the road from Ebolowa to Ambam (2°49'N 11°08'E), secondary forest on bank of the Seng R., male fl. 29 Nov. 1975, *de Wilde J. J. F. E.* 8666 (holotype YA! isotypes BR!, K!, WAG!).

*Dacryodes klaineana* auct. non (Pierre) H. J. Lam (1932a: 202; 1932b: 337), *sensu* Aubréville (1962: 81) *pro parte* quoad specimens *Le Testu* 7537, 7592, 9387 & 9406.

**DISTRIBUTION.** Cameroon, Congo (Brazzaville) and Gabon.

**HABITAT.** Lowland evergreen and moist semi-deciduous forest. Altitude range: 400 – 550 m.

**COLLECTIONS EXAMINED. CAMEROON:** Type; South Province, 16 km on the road Ebolowa to Minkok (2°57'N 11°15'E), altitude 680 m, fl. 30 May 1975, *de Wilde J. J. F. E.* 8263 (BR!, K!, WAG!, YA!). **CONGO (BRAZZAVILLE):** Pool Region, Andzo, Brazzaville, Oct. 1965, *Bouquet* 1806 (P!). **GABON:** Ogooué - Lolo province: 30 km E Lastoursville, fl. 29 Nov. 1991, *Breteler & Jongkind* 10819 (YA!); Lastoursville, fl. Oct. 1929, *Le Testu* 7537 (BR!, P!); Lastoursville, fl. Oct. 1929, *Le Testu* 7592 (BR!, P!); Woleu Ntem Province: Mbolenzore, fl. Nov. 1933, *Le Testu* 9387 (BR!, P!); Oyem, fl. Nov. 1933, *Le Testu* 9406 (BR!, P!); Oveng, fl. 7 Nov. 1986, *Reitsma J. M. & B.* 2546 (P!, WAG!); Oveng, fl. 7 Nov. 1986, *Reitsma J. M. & B.* 2556 (P!, WAG!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAME.** None recorded.

**USE.** Fruit edible uncooked.

**CONSERVATION.** *Dacryodes camerunensis* is here confirmed as VU B1ab (iii) following *Onana* 2006 (2007).

**4. *Dacryodes ebatom*** *Aubrév. & Pellegr.* (Aubréville 1962: 89). Type: Gabon, Ogooué Province, Lambaréné region, Akoré mostly in Poto-Poto, fr. 15 Jan. 1954, *Fuillery* s.n./S.R.F. 1280 (P!).

**DISTRIBUTION.** Gabon.

**HABITAT.** Lowland evergreen forest. Bank of R. Ooguoé. Altitude range: 400 – 550 m.

**COLLECTION EXAMINED. GABON:** Type.

**COMMERCIAL NAMES.** None recorded.

**LOCAL NAMES. GABON:** ebatom (fang)

**USE.** Fruit probably edible.

**CONSERVATION.** *Dacryodes ebatom* is here assessed as being critically endangered CR B1ab (iii) + 2ab (iii). The only collection known was made on a single plant

in one locality. No further collections are known to have come to light in the last forty years.

**NOTE.** The flowers of *Dacryodes ebatom* are unknown.

**5. *Dacryodes edulis*** (G. Don) H. J. Lam (1932a: 202, 1932b: 337); Exell & Mendonça (1951: 304); Keay (1958: 696, 1989: 337); Troupin (1958: 139); Aubréville (1962: 81); De Saint Aubin (1963: 46); Wilks & Issembé (2000: 150). Type: St Thomas [São Tomé], sterile, pseudostipules 2 May 1889, *Don* s.n. (K!).

*Pachylobus edulis* G. Don (1832: 89). Type: St Thomas [São Tomé], *Don* s.n. (K!).

*Canarium? edule* Hook. f. (1849: 285). Type as *Pachylobus edulis* G. Don.

*Pachylobus saphu* (Engl.) Engl. (1896: 243). Type: Cameroon. Barombi, 1888, *Preuss* 362 (holotype K!)

*Canarium saphu* Engl. (1893: 100). Type: Cameroon, *Preuss* 362 (holotype K!).

*Pachylobus edulis* G. Don var. *preussii* Engl. (1899: 365).

Type: Cameroon. Victoria [Limbe], no date, *Preuss* s.n. (holotype B†).

*Pachylobus edulis* G. Don var. *mubafo* (Ficalho) Engl. (1899: 365; 1931: 451). Type: ? Cabinda, 2 Sept. 1885 *Welwitsch* 4483 (LISU); *ibid.*, Sept. 1886, *Welwitsch* 4483 (LISU).

*Canarium mubafo* Ficalho (1884: 115). Type: ? Cabinda, 1885 or 1886, *Welwitsch* 4483 (LISU). Cited as synonym for *Pachylobus edulis* G. Don.

*Canarium mansfeldianum* Engl. (1910: 137). Type: Cameroon, Ossidje [Mamfe], no date *Mansfeld* 27 (holotype B†).

*Pachylobus edulis* G. Don var. *sylvestris* A. Chev. (1917: 120). Type: Gabon, Sept. 1912, *Chevalier* 26651 (holotype P!).

*Pachylobus albiflorus* Guillaumin (1909a: 18); Aubréville (1948: 345) Type: Gabon, Libreville, sterile, *Klaine* 48 (P!). Nom. illeg. See Note 1 below.

*Dacryodes edulis* (G. Don) H. J. Lam var. *parvicarpa* Okafor (1983: 255). Type: Nigeria, Imo State Asanga-Ohafia, *Okafor* EFG 4126 (Herbarium not indicated). **synon. nov.** See Note 2 below.

**DISTRIBUTION.** Cabinda, Cameroon, Central African Republic, Congo (Brazzaville), Congo (Kinshasa), Gabon, Ghana (introduced according to specimen *Enti* 1325); Equatorial Guinea, Nigeria, and São Tomé.

**HABITAT.** Lowland evergreen forest and semi-deciduous forest, also cultivated. Altitude range: 100 – 550 m.

**SELECTED COLLECTIONS EXAMINED. CABINDA:** Chilungo, fl. July 1919, *Gossweiler* 6661 (K!, P!); Maiombe Portuguese [Cabinda], fl. 9 July 1881, *Welwitsch* 4483 (K!, P!); no locality, fl. *Dawe* 100 (K!). **CAMEROON** (total: 46): 5 km S of Kribi, fr. 12 Nov. 1968, *Bos* 3254 (BR!, YA!, WAG!), Dschang, fl. 16 March 1970, *Dang* 372 (YA!); 12 km on the road from Ebolowa to

Ambam, fl. 10 Sept. 1974, *de Wilde J. J. F. E.* 7527 (WAG!, YA!); Bafang, fl. Jan. 1939, *Jacques-Félix* 2910 (P!); Gimбири, Grand Pol (Bertoua), sterile 5 March 1960, *Letouzey* 3213 (P!, YA!); Victoria [Limbe], fl. Oct. 1929, *Mailland* 382 (K!); 4 km on the road Yaoundé – Mbalmayo, fl. 14 Sept. 1953, *Mpom* 50 (YA!); Kumba, fr. June 1987, *Nemba & Thomas* 468 (MO, YA!); Yaoundé, Nkolbisson, fl. 2 March 1989, *Onana* 310 (YA!); Bipindi, fl. 1904, *Zenker* 2703 (G!, K!, P!, WAG!). **CENTRAL AFRICAN REPUBLIC:** Berberati, fl. March 1963 B.P.F.A. 2662 (P!). **CONGO (BRAZZAVILLE):** Matoto forest, sterile 13 Feb. 1965, *Bouquet* 1255 (P!); Mossendjo, fl. 18 May 1965, *Bouquet* 1336 (P!); Brazzaville, sterile 25 July 1912, *Chevalier* 27243 (P!). **CONGO (KINSHASA)** (total: 23): Mvuazy, fr. 27 Oct. 1948, *Devred* 367 (K!); Yangambi, fl. Oct. 1948, *Gilbert* 8346 (K!); Epulu, fl. 15 April 1982, *Hart* 272 (K!); Equateur, Ipeko, fl. Aug. 1930, *Lebrun* 973 (K!); no locality, fl. 1931, *Lebrun* 2649 (P!); Kivu, c. 110 km on the road Kavumu – Walikale, I.R.S.A.C. forest reserve, fl. 6 Aug. 1957, *Troupin* 3965 (K!); Equateur, Eala, fl. 29 May 1919, *Vermoesen* 2366 (K!, P!). **GABON** (total: 7): 16 km along the road Lastoursville – Moanda, fl. 23 Sept. 1978, *Breteler & de Wilde J. J. F. E.* 757 (BR!, K!, WAG!); Libreville, fr. 21 Feb. 1896, *Klaine* 36 (P!); Tchibanga, fl. Sept. 1907, *Le Testu* 1172 (K!); 7 km E Mvoum, fr. 31 Oct. 1983, *Louis, Breteler & De Bruijn* 211 (P!, WAG!). **GHANA:** 1.6 km from Angona to Dixove, fr. 19 May 1974, *Enti* 1325 (K!); 3 km N Dixove, sterile 12 Nov. 1982 *Hepper* 7496 (K!). **EQUATORIAL GUINEA:** No locality, fl. April 1908, *Tessmann* 346 (K!). **NIGERIA** (total: 12): Okumu forest reserve, fl. 23 Feb. 1948, *Brenan* 9104 (G!, K!, P!); Sapoba, fl. 15 Feb. 1932, *Kennedy* 2135 (K!); Ibadan, fl. 14 Jan. 1975 *Lowe* 2835 (K!); Benin City, fl. 12 July 1906 *Unwin* s.n. (K!); no locality, sterile Aug. 1907 *Thomson* s.n. (P!). **SÃO TOMÉ:** Type; near San Thomé, fl. 8 Sept. 1905 *Chevalier* 13734 (K!, P!); S. Vicente, sterile 26 Dec. 1948, *Santo* 14 (K!). See Note 3 below. **COMMERCIAL NAME.** Safou, African plum (referring to the fruit).

**LOCAL NAMES. CABINDA:** mubafo, n'bafo (common).

**CAMEROON:** assa (bassa, bulu, beti); assamingoum (ewondo for wild individuals); che (bafang); ekiop (dschang); tchou (baganté); sa (beti); youom (bamoun). **GABON:** atanga (mpongwé), olem (fang); busch butter tree (common, english); safoutier (common, french). **SÃO TOMÉ:** safu (common).

**USE.** Fruit edible boiled. This is the best known and most consumed fruit of the genus *Dacryodes* in Africa.

**CONSERVATION.** *Dacryodes edulis* is here assessed as LC. This reflects the fact that the extent of occurrence is very large (more than 20,000 km<sup>2</sup>, from West to Central Africa), and that it is widespread and relatively common in a habitat that is not believed to be under threat in the near or medium future.

**NOTES.** 1. The name *Pachylobus albiflorus* is illegitimate because it was first published for the specimen *Jolly*

161, now recognised as a heterotypic synonym for *Dacryodes klaineana*.

2. Okafor (1983) described the variety *Dacryodes edulis* var. *parvicarpa*. The herbarium where the type was deposited is not cited. The main characters used in the key to distinguish the new variety from the type (the shape and dimensions of fruit, and the architecture of the habit) are horticultural, not systematic. So far, no specimen of *D. edulis* with big fruit has been collected in the wild, except on subsponaneous trees at the location of ancient villages. In addition, the size of fruit tends to be more reduced, similar in size to those in the wild, on old domesticated individuals, and those growing on degraded sterile soil (for example in Sa'a area (80 km N of Yaoundé, Cameroon) where the soil is known to be very poor by famers and soil scientists (pers. obs.)).

3. Most of the specimens were collected from planted or subsponaneous trees.

4. In their notes on *Dacryodes*, Daly & Martínez (2003: 269) state that the fruit surface of *D. edulis* is pubescent with stellate hairs. In *D. edulis*, the ovary is glabrous (see the key of material with leaves and flowers above), and so the fruit is always glabrous. The fruit covered by stellate hairs was misidentified as *D. edulis*, it must be another species.

**6. *Dacryodes heterotricha* (Pellegr.) H. J. Lam (1932a: 202, 1932b: 337); Aubréville (1962: 75); De Saint Aubin (1963: 41). Type:** Gabon, Tchibanga, Nyanga, fl. 3 Feb. 1915, *Le Testu* 2007 (holotype P!).

*Pachylobus heterotricha* Pellegr. (1921: 448 & 1924: 2).

Type: Gabon, *Le Testu* 2007 (holotype P!).

*Dacryodes ferruginea* (A. Chev.) H. J. Lam (1932a: 202).

Type: Gabon, Tchibanga, fr. 23 Sept. 1919, *Le Testu* 1621 (P!).

*Pachylobus ferrugineus* A. Chev. ex Pellegr. (1924: 50).

Type: Gabon, *Le Testu* 1621 (P!).

**DISTRIBUTION.** Gabon and Congo (Brazzaville).

**HABITAT.** Lowland evergreen forest. Altitude range unknown.

**COLLECTION EXAMINED. CONGO (BRAZZAVILLE):** Bouenza forest, sterile 17 Nov. 1964, *Bouquet* 794 (P!); forest on the road to Mayéyé, fr. 2 May 1965, *Bouquet* 1275 (P!); Madingou km 40, sterile 17 Aug. 1961, *Chevalier* 27559 (P!). **GABON:** Type; Tchibanga, fr. 23 Sept. 1919, *Le Testu* 1621 (P!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. CONGO (BRAZZAVILLE):** safoukala (common). **GABON:** abete (bakailai), mouganga (bayaka, bapoumou), moumbamba (echira, mitsogo, baviya, bavili).

**USE.** Fruits edible boiled or uncooked.

**CONSERVATION.** There is at present inadequate data to make an assessment of the conservation status of

*Dacryodes heterotricha*, and it is here given the category DD. This reflects the fact that the last collection known was made thirty years ago, and that the distribution and abundance of the species is not known. More research in the field is needed.

**7. *Dacryodes igaganga*** Aubrév. & Pellegr. (1962: 80); De Saint Aubin (1963: 40); Wilks & Issembé (2000: 148). Type: Gabon, Environ Egolani, lac Oghémoué, fr. Sept. 1912, *Chevalier* 26655 (holotype P!). *Pachylobus edulis* G. Don var. *glabra* A. Chev. (1917: 117). Type as *Dacryodes igaganga* Aubrév. & Pellegr. **synon. nov.** See note below.

**DISTRIBUTION.** Cabinda, Cameroon, Gabon, and Guinée Equatoriale.

**HABITAT.** Lowland evergreen forest. Altitude: 500 m.

**COLLECTIONS EXAMINED. CABINDA:** Chiluangou, fl. 1919, *Gossweiler* 7085 (K!), 7950 (K!). **CAMEROON:** South province: Mvila Division, 7 km NE Ebom (3°07'N 10°45'E), Altitude 500 m, fl. Aug. 1996 or Feb. 1997, *Parren* 106 (YA!); *ibid.*, sterile, no date, *Parren* 186 (KRIBI!). **GABON:** Type; Haute Ngounyé, fl. June 1927, *Le Testu* 6504 (BR!, P!, WAG!); Mbelale, between Ogooué and Cameroon, fl. 25 May 1933, *Le Testu* 9160 (P!); Lopé reserve, sterile June 1986, *Le Testu* 2379 (WAG!); Ikoy station, sterile Oct. 1956, S.R.F.G. 1716 (P!); 5 km from Divanguï, fr. Oct. 1990, *Van Neck* 150 (WAG!); Ogooué-Maritime, Rabi-Kounga, fl. 23 May 1992, *Wieringa & Nzabi* 1034 (WAG!, YA!); Rabi-Kounga, 4 km N “checkpoint Charlie”, fl. 25 May 1992, *Wieringa & Nzabi* 1043 (WAG!, YA!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. GABON:** igaganga (massango), adzome, essassia (fang), géyuméyumé, eyomédiomé (mitsogo) and diganga (bavoumgou).

**USE.** Fruit edible boiled.

**CONSERVATION.** *Dacryodes igaganga* is here assessed as NT. This reflects the fact that the extent of occurrence is too large (more than 20,000 km<sup>2</sup>), being from Cameroon to Cabinda, for the species to qualify as threatened. It is widespread and relatively common in a habitat that has many protected areas.

**NOTE.** *Pachylobus edulis* var. *glabra* is a homotypic synonym for *Dacryodes igaganga* because the type specimen *Chevalier* 26665 was first identified as a variety of *Pachylobus edulis*, now a synonym of *Dacryodes edulis*. This doubtful identification had led many biologists to consider *Dacryodes igaganga* as the wild variety of *D. edulis*, and so caused confusion among these two different species.

**8. *Dacryodes klaineana*** (Pierre) H. J. Lam (1932a: 202, 1932b: 337); Normand (1955: 191); Keay (1958: 696); Aubréville (1959: 140; 1962: 78); Irvine (1961: 551);

Keay *et al.* (1964: 255); Kunkel (1965: 86); Voorhoeve (1965: 80); Burkill (1985: 308); Vivien & Faure (1985: 62); Wilks & Issembé (2000: 144). Type: Gabon, Libreville, fl. Oct. 1895, *Klaine* 230 (holotype P!).

*Santiriopsis klaineana* Pierre (1896: 1281). Type: Gabon, *Klaine* 230 (holotype P!).

*Pachylobus klaineanus* (Pierre) Engl. (1899: 366). Type as *Santiriopsis klaineana* Pierre.

*Dacryodes barteri* (Engl.) H. J. Lam (1932a: 202). Type: Niger, no date, *Barter* 1775 (holotype K!).

*Pachylobus barteri* Engl. (1899: 366). Type: Niger, *Barter* 1775 (holotype K!).

*Dacryodes afzelii* (Engl.) H. J. Lam (1932a: 202). Type: Sierra Leone, no date, *Afzelius* s.n. (holotype B†).

*Pachylobus afzelii* Engl. (1899: 366). Type: Sierra Leone, *Afzelius* s.n. (holotype B†).

*Pachylobus albiflorus* Guillaumin (1909a: 18); Type: Côte d'Ivoire, no date *Jolly* 161 (P!).

*Dacryodes dahomensis* (Engl.) H. J. Lam (1932a: 202). Type: Dahomey [Benin], near Cotonou, no date, *Chevalier* 277 (B†). Nom. illeg. See note below.

*Pachylobus dahomensis* Engl. *pro parte* quoad specimen *Chevalier* 277 (1910: 138). Type: Dahomey [Benin], *Chevalier* 277 (B†). Nom. illeg.

*Dacryodes zenkeri* (Engl.) H. J. Lam (1932a: 202, 1932b: 307). Type: Cameroon, S Mimfia near Bipindi, fl. March 1908, *Zenker* 3779 (holotype K!).

*Pachylobus zenkeri* Engl. (1910: 138). Type: Cameroon, *Zenker* 3779 (holotype K!).

*Pachylobus deliciosus* (A. Chev. ex Hutch. & Dalziel) Pellegr. (1934: 714). Type: Côte d'Ivoire, young fr. 30 Dec. 1909 *Chevalier* 22683 (holotype P!, isotype K!).

*Haematostaphis delociosa* (A. Chev. ex Hutch. & Dalziel) Pellegr. (1931: 441). Type as *Sorindeia deliciosa* A. Chev. ex Hutch. & Dalziel.

*Sorindeia deliciosa* A. Chev. ex Hutch. & Dalziel (1928: 27). Type: Côte d'Ivoire, *Chevalier* 22683 (holotype P!, isotype K!).

*Pachylobus paniculatus* Hoyle in Hoyle & Dunkley (1934: 187). Type: Ghana, Kintampo, fl. Oct. 1932, *Vigne* 2535 (holotype K!).

*Dacryodes klaineana* (Pierre) H. J. Lam var. *lepidota* Aubrév. (1948: 344). Type: Côte d'Ivoire, fr. no date, *Aubréville* 1631 (holotype P!).

**DISTRIBUTION.** Benin, Cameroon, Congo (Brazzaville), Côte d'Ivoire, Gabon, Ghana, Equatorial Guinea, Liberia, Niger, Nigeria, and Sierra Leone.

**HABITAT.** Lowland littoral and transition forest. Altitude range: 100 – 700 m.

**SELECTED COLLECTIONS EXAMINED. CAMEROON** (total: 12): Nkolandom (2°48'N 11°10'E), fl. 12 Nov. 1974, *de Wilde J. J. F. E.* 7709 (K!, WAG!, YA!); S Kake 2, 10 km W Kumba on Mbongue road, fl. 7 April 1986, *Nemba & Thomas* 35 (BR!, K!, WAG!, YA!); Karume forest, E Mungo R. on Kumba – Mamfé road, fr. 7 May 1986,

*Nemba* & Thomas 67 (YA!); Okong (30 km W Yaoundé), fl. May 1996, *Onana* 418 (YA!); Mabeta (8 km E Limbe), fr. 8 July 1992 *Onana* 440 (YA!); Minfia, fl. March 1908, *Zenker* 3779 (K!). **CONGO (BRAZZAVILLE)**: Haute Loukéné, sterile 8 Oct. 1954, *Groulez* & *Molez* S.F.M.C. 23 (P!). **CÔTE D'IVOIRE** (total: 13): Banco forest, fr. 8 Dec. 1975, *Aké Assi* 13121 (P!); no locality, fl. 30 Oct. 1929, *Aubrville* 141 (K!, P!); Banco, fr. 22 Feb. 1962, *Bernadi* 8126 (K!); Kenema reserve, fl. 9 Sept. 1965, *Fox* 144 (K!); 56 km N Sassandra, fr. 23 Jan. 1959 *Leeuwenberg* 2548 (K!, P!, WAG!). **GABON** (total: 26): Type; Libreville, fl. 6 Sept. 1945, *Aubrville* 98 (P!); Haute Ngounyé, fl. Aug. – Sept. 1926, *Le Testu* 6099 (P!); Pointe Denis, fl. Aug. 1986, *Reitsma J. M. & B.* 2469 (WAG!). **GHANA** (total: 7): Benso, fl. Sept. 1951, *Andoh* FH 5566 (K!, P!); Awanade, fl. 24 Sept. 1954, *Darko* 1001 (K!); Kintampo, fl. 15 Dec. 1971, *Deaw* 483 (K!); Numia forest reserve, fr. 7 Nov. 1956, *Enti* FH 6482 (K!). **EQUATORIAL GUINEA**: Nzérékoré, fl. Sept. 1936, *Jacques-Felix* 1146 (P!). **LIBERIA**: no locality, sterile 17 Jan. 1965, *Adam* 20842 (K!); Gbanga, fl. 20 Sept. 1926, *Linder* 740 (K!). **NIGER**: no locality, fl. 1858, *Barter* 1775 (K!). **NIGERIA** (total: 5): Lokodja, fl. 25 Oct. 1908, *Dalziel* 189 (K!); Lagos, fl. no date, *Dalziel* 1400 (K!); Oluwa forest reserve, fr. 20 April 1943, *Symington* FHI 3387 (K!). **SIERRA LEONE**: Guara Chiefdom, Sembahum, fl. 30 Dec. 1950, *King* 301 (K!); Lalehum, fl. no date, *Samai* 401 (K!).

**COMMERCIAL NAME.** Adjouaba.

**LOCAL NAMES. CAMEROON:** nom atom (ewondo). **CÔTE D'IVOIRE:** adjouaba (common). **GABON:** abatom, nomeba (fang), mugninga (bapoumou).

**USE.** Timber (Vivien & Faure 1985). Fruit edible uncooked, pulp sweet and slightly sour.

**CONSERVATION.** *Dacryodes klaineana* is here assessed as NT. This reflects the fact that its extent of occurrence from Sierra Leone to Gabon is too large for the species to qualify now as threatened. However the population is being fragmented in threatened habitats due to the decline of the quality and area of their forests so that in the future, this species will probably qualify as threatened.

**NOTE.** Engler (1907) published *Pachylobus dahomensis* based on *Chevalier* 4441. Guillaumin (1910: 415) revealed that this specimen is not *Burseraceae*, but *Anacardiaceae*. *Sorindeia juglandifolia* (A. Rich.) Planch. ex Oliv. var. *dahomensis* Guillaumin. Engler then attempted to rebase *Pachylobus dahomensis* on *Chevalier* 277 (Engler 1910: 138), but this is not allowed by the Code. Lebrun & Stork (1992: 210) appear to have missed, or to be doubtful of Guillaumin's conclusion since they state "*Dacryodes dahomensis* (Engl.) H. J. Lam = ? *Anacardiaceae*". However if Guillaumin's illustration of *Chevalier* 4441 is examined, the characteristic venation of *Sorindeia* can be seen, including the intersecondary "collecting nerve" (see Breteler 2003: 96 Fig. 2C).

Unfortunately Lam made the transfer of the epithet to *Dacryodes* based on Engler's use of *Chevalier*

277, hence the illegitimate *Dacryodes dahomensis* (Engl.) H. J. Lam.

**9. *Dacryodes ledermannii* (Engl.) H. J. Lam (1932a: 202, 1932b: 337).** Type: Cameroon, Campo, date unknown, *Ledermann* 436 (holotype B†). Neotype: Cameroon, 12 km from Kribi, between Ebolowa road and Kienke reserve (2°53'N 9°59'E), fr. April 1969, *Bos* 4399 (holoneotype YA! isoneotypes K!, P!, WAG!). **Chosen here.** See note below.

*Pachylobus ledermannii* Engl. (1910: 141). Type: Cameroon, *Ledermann* 436 (holotype B†).

**DISTRIBUTION.** Cameroon and Gabon.

**HABITAT.** Lowland littoral forest. Altitude range: 100 – 300 m.

**COLLECTIONS EXAMINED. CAMEROON:** Neotype; 15 km N Kribi, fr. 4 Feb. 1969, *Bos* 3857 (K!, P!, WAG!, YA!); 34 km N Kribi, fr. 23 April 1970, *Bos* 6831 (K!, P!, WAG!, YA!). **GABON:** Libreville, fl. no date, C.T.F.T. 2004 (P!); Haute Ngounyé, fl. June – July 1927, *Le Testu* 6530 (BR!, K!, P!); Lastoursville, fl. May 1931, *Testu* 8815 (P!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAME.** None recorded.

**USE.** Fruit edible boiled.

**CONSERVATION.** *Dacryodes ledermannii* is here given the conservation assessment of EN B2ab (iii). The population is present in less than 5 localities, with an area of occupation of less than 500 km<sup>2</sup> in a threatened habitat, with an ongoing decline of the quality and extent of the habitat.

**NOTE.** The neotype was selected because it was made near the type locality, is representative of the species and is fertile of good quality.

**10. *Dacryodes leonardiana* Pierlot (1996: 363).** Type: Zaire [Congo (Kinshasa)], Distr. des Lacs Edouard et Kivu, Bitale, fr. Dec. 1955, *Pierlot* 1025 (holotype BR).

**DISTRIBUTION.** E Congo (Kinshasa).

**HABITAT.** Montane and submontane evergreen forest. Altitude range: (850 – ) 1000 – 1200 ( – 1750 m).

**COLLECTIONS EXAMINED. CONGO (KINSHASA):** Distr. des Lacs Edouard et Kivu, Bitale, km 48 road Kavumu – Buniakiri, Kalehe area, altitude 1730 m, 25 July 1959, *Pierlot* 3197 (BR, K!); Kilole, Bunyakiri area, altitude 1200 m, 24 April 1959, *Léonard* 3953 (BR, K!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAME.** Lukoshi (kitembo); Bukobe, Bukowe, Musukubakota (kirega).

**USE.** None recorded.

**CONSERVATION.** *Dacryodes leonardiana* is here assessed as EN B1a (Endangered, zone of occurrence less than 5000 km<sup>2</sup>, and present in less than five localities) due



to the fact that the species exists only in the East of Congo (Kinshasa) and that specimens are known from four localities.

**11. *Dacryodes letestui*** (Pellegr.) H. J. Lam (1932a: 202, 1932b: 337); Aubréville (1962: 84). Type: Gabon, Manzambi, fl. 4 Sept. 1915, *Le Testu* 2103 (holotype P!). *Pachylobus letestui* Pellegr. (1921: 447). Type: Gabon, *Le Testu* 2103 (holotype P!).  
*Dacryodes fusca* (Engl.) H. J. Lam (1932a: 202). Type: Cameroon, Nkolebundu, date unknown, *Ledermann* 783 (holotype B†). **synon. nov.** See note below.  
*Pachylobus fuscus* Engl. (1910: 140). Type: Cameroon, *Ledermann* 783 (holotype B†).

**DISTRIBUTION.** Cameroon (probably) and Gabon.

**HABITAT.** Lowland evergreen forest. Altitude range unknown.

**COLLECTIONS EXAMINED. GABON:** Type; Ogoue-Ovindo, between Okana and Montagne du Casque, fl. 9 Oct. 1983, *Floret, Louis & Mougazi* 1791 (P!); Cristal Mount, sterile 29 Aug. 1959, *Hallé* 885 (K!, P!); Mayombe Bayaka, Moupoukou, 29 Aug. 1915, *Le Testu* 2099 (K!, P!); Haute Ngounyé, fl. April 1925, *Le Testu* 5292 (K!); Haute Ngounyé, Issala, fl. April 1925, *Le Testu* 5297 (K!); Mbougou, fl. Oct. 1925, *Le Testu* 5526 (K!, P!); Région des abeilles, 15 km SE Achoula, fr. Nov. 1983, *Louis, Breteler & Bruijn* 677 (K!, WAG!), 45 km SW Ndendé, fr. Dec. 1983, *Louis, Breteler & Bruijn* 1182 (K!, WAG!); *ibid.*, fr. Dec. 1983, *Louis, Breteler & Bruijn* 1186 (BR!, K!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAME.** Mouvendo (common).

**USE.** Fruit edible boiled.

**CONSERVATION.** *Dacryodes letestui* is here assessed as VU B1ab (iii). This reflects the fact that the species is endemic to Gabon, with an area of occurrence of less than 20,000 km<sup>2</sup>, in less than ten localities and with an ongoing deterioration of the quality of its habitat due to deforestation.

**NOTE.** The type specimen of *Dacryodes fusca* was destroyed in B, and no original material survives. However, the description states that the apex of the leaflet is cuspidate-acuminate and the inflorescences are dark brown pilose. These characters appear only on specimens of *D. letestui* in Africa among the known species. But since the indumentum of the floral organs (petals, stamens and ovary) and the fruit are unknown, *D. fusca* will remain imperfectly known. The systematic position proposed in this paper is tentative and less than ideal.

**12. *Dacryodes macrophylla*** (Oliv.) H. J. Lam (1932a: 202, 1932b: 337); Aubréville (1962: 77); De Saint Aubin (1963: 47); Wilks & Issembé (2000: 144). Type:

Gulf of Guinea, [Gabon], Small Kobi Island, 1862, *Mann* 1854 (holotype K!, isotype K!).

*Canarium macrophyllum* Oliv. (1868: 327). Type: Gulf of Guinea [Gabon], *Mann* 1854 (holotype K!, isotype K!).

*Pachylobus macrophyllus* (Oliv.) Engl. (1910: 138). Type as *Canarium macrophyllum* Oliv.

*Pachylobus macrophyllus* (Oliv.) Engl. var. *brevipetiolutatus* Engl. (1910: 139). Type: Equatorial Guinea, Rio Muni, Essatuk, fl. 12 Sept. 1908, *Tessmann* 548 (holotype K!).

**DISTRIBUTION.** Cameroon, Gabon and Equatorial Guinea.

**HABITAT.** Lowland evergreen and semi deciduous forest. Altitude: 300 – 700 m.

**COLLECTIONS EXAMINED. CAMEROON:** Yaoundé, fl. 1946, *Letouzey* 1056 (P!); Nkongmeyos (50 km S Yaoundé), fr. June 1989, *Onana* 376 (YA!); Okong (30 km W Yaoundé), fl. May 1996, *Onana* 419 (YA!); Mendoum (19 km S Ebolowa), fr. 13 Feb. 1965, *Raynal J. & A.* 13394 (P!, YA!). **GABON:** Type; Komgo, fl. Sept. 1945, *Aubréville* 85 (P!); Oyem, fl. May 1936, *Le Testu* 9292 (BR!, P!); Ekouk, fr. 03 Nov. 1983, *Louis, Breteler & De Bruijn* 347 (P!, WAG!); no locality, fr. Dec. 1966, *Hallé* s.n. (P!). **EQUATORIAL GUINEA:** Essatuk, fl. 12 Sept. 1908, *Tessmann* 548 (K!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. CAMEROON:** atom, tom (fang, beti).

**USE.** Fruit edible uncooked, the pulp is sweet.

**CONSERVATION.** *Dacryodes macrophylla* is here assessed as VU B1a + 2ab (iii, v). This reflects the fact that the extent of occurrence is less than 20,000 km<sup>2</sup>, with an area of occupation of less than 2000 km<sup>2</sup>, the trees often isolated (population seriously fragmented) in a habitat that is under threat in the near or medium term future due to deforestation (many trees occur near villages or farms), and the reduction in numbers of mature individuals due to non-sustainability of collecting fruit, since the trees are often cut in the process.

**13. *Dacryodes normandii*** Aubrév. & Pellegr. (1962: 72); De Saint Aubin (1963: 43); Wilks & Issembé (2000: 148). Type: Gabon, Ntoum-Rogolié, fl. 14 Dec. 1950, S. R.S.F. 140 (= C.T.F.T. 6077) (holotype P!).

**DISTRIBUTION.** Congo (Brazzaville), Gabon, and Equatorial Guinea (Wilks & Issembé 2000: 148).

**HABITAT.** Lowland evergreen forest. Altitude range: 50 – 450 m.

**COLLECTIONS EXAMINED. GABON:** Type; Ngounié, sterile 17 Sept. 1947, *Normand* 221 (P!); Oveng, sterile May 1986, *Reitsma J. M. & B.* 2196 (K!); Lopé Reserve, fl. 1986, *Reitsma J. M. & B.* 2354 (K!); Ikoy km 18, fr. Oct. 1958, St Aubin S.R.F. 1977 (K!, P!). **CONGO (BRAZZAVILLE):** Mayombe, sterile no date, *Martin* s.n./ C.T.F.T. 708 (P!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. GABON:** ossabel (fang); diganga (bavoungou) and eyemediomé (mitsogho).

**USE.** Timber. Fruit edible boiled.

**CONSERVATION.** *Dacryodes normandii* is here assessed as VU B2a. This reflects the fact that the occupation area is less than 2000 km<sup>2</sup>, and that the population is present in less than ten localities.

**14. *Dacryodes osika*** (*Guillaumin*) *H. J. Lam* (1932a: 202, 1932b: 337). Type: Congo (Brazzaville), Congo & Oogoué rivers, fl. 15 – 23 June 1883, *Brazza* 39 (holotype P!).

*Pachylobus osika* *Guillaumin* (1908: 264). Type: Congo (Brazzaville), *Brazza* 39 (holotype P!).

*Dacryodes yangambiensis* *Louis ex Troupin* (1950: 119); *Descouings* (1961: 16). Type: Congo (Kinshasa), Distr. Forestier Central, Yangambi, *Louis* 908 (holotype B†).

**DISTRIBUTION.** Congo (Brazzaville) and Congo (Kinshasa).

**HABITAT.** Lowland evergreen forest and forest gallery. Altitude range unknown.

**COLLECTIONS EXAMINED. CONGO (BRAZZAVILLE):** Type. **CONGO (KINSHASA):** Yangambi, vallée Lusambila, fr. 3 Aug. 1937, *Louis* 4323 (BR, P!); Dimonika, sterile 17 Nov. 1954, *Morel* 63 (P!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. CONGO (BRAZZAVILLE):** osika (batéké).

**CONGO (KINSHASA):** ibelesaw (turumbu), tsipotupatu (lulua).

**USE.** None recorded. Fruit probably edible.

**CONSERVATION.** *Dacryodes osika* is here assessed as EN B1ab(iii) + 2b(iii). This species is under threat due to the small extent of occurrence and area of occupation, the fragmented population which is present in less than five localities and the decline in extent and quality of its habitat. Furthermore, no collections are known that have been made in the last fifty years.

**15. *Dacryodes pubescens*** (*Vermoesen*) *H. J. Lam* (1932a: 202, 1932b: 337); *Troupin* (1958: 142). Type: Belgian Congo [Congo (Kinshasa)], Mayumbe, Temvo, fr. 1919, *Vermoesen* 1754 (holotype BR!, isotype P!).

*Pachylobus pubescens* *Vermoesen* (1923: 195). Type: Belgian Congo [Congo (Kinshasa)], *Vermoesen* 1754 (holotype BR!, isotype P!).

**DISTRIBUTION.** Cabinda, Congo (Brazzaville), and Congo (Kinshasa).

**HABITAT.** Lowland rain forest, disturbed forest and edges. Altitude range unknown.

**COLLECTIONS EXAMINED. CABINDA:** Mayombe, Portuguese west Africa, Nov. 1921, *Dawe* 215 (K!); Portuguese Maiombe, Chilungo, fr. 1919, *Gossweiler* 6027 (K!); Maiombe, fl. 1920, *Gossweiler* 6542 (K!); *ibid.*, fr. 1920

*Gossweiler* 6928, (K!). **CONGO (BRAZZAVILLE):** Mayombe, sterile 8 Aug. 1947, *Normand* s.n. (P!); Makabana, sterile 29 Aug. 1961, *Tisserand* 423 (P!). **CONGO (KINSHASA):** Moukoulaba, sterile April, no year, *Dibata* 134 (WAG!); Mayumbe: Luki, 12 Feb. 1949. *Donis* 2403 (BR!, P!); Province Leopoldville, Boma, Luki, fr. Nov. 1949, *Maudoux* 183 (K!); *ibid.*, fr. Oct. 1955 *Wagemans* 1060 (K!); Kouilou, fr. 18 Dec. 1922, *Sargos* 194 (P!).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. CABINDA:** chisafu (common). **CONGO (KINSHASA):** safu nkala (common in Mayumbe area).

**USE.** Fruit edible boiled.

**CONSERVATION.** On current evidence, *Dacryodes pubescens* appears restricted to Mayumbe area, with an extent of occurrence of less than 20,000 km<sup>2</sup>, in less than ten localities in a area where quality of the habitat has declined. We here assess its conservation status as VU B1ab(iii).

**16. *Dacryodes tessmannii*** (*Engl.*) *H. J. Lam* (1932a: 202, 1932b: 337). Spanish Guinea [Equatorial Guinea], Nkolendangan, fl. 13 April 1908, *Tessmann* 340 (holotype K!).

*Pachylobus tessmannii* *Engl.* (1910: 140). Type: Spanish Guinea [Equatorial Guinea], *Tessmann* 340 (holotype K!).

**DISTRIBUTION.** Cameroon, Central African Republic and Equatorial Guinea.

**HABITAT.** Lowland forest. Altitude range: 100 – 600 m.

**COLLECTIONS EXAMINED. CAMEROON:** Mengbwa (50 km SE Mbalmayo), fl. 14 May 1980, *Asonganyi* 56 (P!, YA!).

**CENTRAL AFRICAN REPUBLIC:** Haut-Oubangui, Yalinga, fl. 1920 – 1921, *Le Testu* 3805 (P!). **EQUATORIAL GUINEA:** Type.

**COMMERCIAL NAME.** None recorded.

**LOCAL NAMES. EQUATORIAL GUINEA:** angolongo (fang).

**USE.** None recorded.

**CONSERVATION.** *Dacryodes tessmannii* is here assessed as critically endangered CR B2ab (ii) (critically threatened, the population is seriously fragmented and there has been considerable reduction in the area of habitat of this species due to forest clearance). It seems to be rare and highly localised. This is illustrated by the fact that the only three collections are known from one locality in three different countries despite intensive botanical inventories there over several years: *Onana* (1998) for Cameroon, *Harris* (pers. comm.) for Central African Republic and *Wilks & Issembé* (2000) for Equatorial Guinea. The most recent collection was made in a highly populated area near a village where farming is the main activity and human disturbance of the flora is currently high. The extent of occurrence is more than 2000 km<sup>2</sup>. No further collections have come to light in the last twenty years.

**NOTE.** *Dacryodes tessmannii* is imperfectly known as the fruits are unknown.

**17. *Dacryodes trapnellii*** *Onana* in Onana & Cheek (2003: 219). Type: Northern Rhodesia [Zambia], Shiwa Ngandu, fl. 7 Aug. 1938, *Greenway* 5578 (holotype K!, isotypes EA, FHO).

**DISTRIBUTION.** Zambia.

**HABITAT.** Swamp forest and patches of mist forest. Altitude range unknown.

**COLLECTION EXAMINED. ZAMBIA:** Type; Shiwa Ngandu, fl. 3 Aug. 1938, *Greenway* & *Trapnell* 5571 (EA, FHO, K!); Western Province, Mpika Distr., 48 km (30 miles) from Shiwa Ngandu on Mpika road, *Angus* 856 (FHO, K!); Mwinilunga, fr. 12 Oct. 1955, *Holmes* 1259 (K!, NDO).

**COMMERCIAL NAME.** None recorded.

**LOCAL NAME.** None recorded.

**USE.** Fruit edible uncooked.

**CONSERVATION.** On current evidence, *Dacryodes trapnellii* appears restricted to northern Zambia. We here assess its conservation status as NT (near threatened) on the basis that the extent of occurrence (over 800 km from W to E) is too large for the species to qualify as threatened. The Mushitu forest habitat to which *D. trapnellii* appears restricted is widespread in northern Zambia and still survives in extensive tracts, so although the most recent collection we have seen was made nearly forty years ago, the conservation status may be unaffected. However, a more detailed assessment would be useful.

**18. *Dacryodes villiersiana*** *Onana* sp. nov. A *D. klaineana* (Pierre) H. J. Lam inflorescentiis paniculatis (non spicatis), cymis pedunculatis (non sessilibus) difert; a ceteris speciebus africanis generis ramulis ultimis inflorescentiae flores alternos (non oppositos) gerentibus distinguitur. Typus: Cameroon, fl. 26 March 1975, *de Wilde* J. J. F. E. 8115 (holotypus YA! isotypi BR!, K!, WAG!).

*Dacryodes klaineana* auct. non (Pierre) H. J. Lam (1932a: 202, 1932b: 337), *sensu* Aubréville (1962: 81) *pro parte* quoad specimens *Le Testu* 5859, 5958, 7717, 8925 & 9114.

Dioecious tree, trunk up to 75 cm in diameter. *Leaves* alternate, imparipinnate, 5–6 (–9)-jugate; petiole 7–9 cm long, slightly swollen at the base; rachis 13–14 (–29) cm long, both with sparse stellate hairs. Leaflets with petiolules up to 5–8 mm long (laterals) or 2–2.5 cm (terminal); lamina oblong to elliptic, 9–20 cm long, 3.5–7 cm wide; base asymmetric (with one side cuneate and the other rounded), glossy above when dry, and glabrescent with sparse stellate

hairs; below pubescent with stellate hairs; venation pinnate, midrib prominent below, lateral veins 9–12 pairs, alternate, slightly arcuate, festooned brochidodromus. *Inflorescences* axillary; panicle large, the primary axis up to 40 cm long in males and 25 cm long in females, secondary axes up to 14 cm long. Lateral cymes biparous, 7-flowered (male) or 3-flowered (female), flowers alternate. *Flowers* oblong, the male smaller than the female, pedicel 5–7 mm long, with stellate hairs. Sepals 3, slightly fused at the base, free part ovate, ± 3–3.5 mm, stellate tomentose on inner surface, glabrous on outer surface. Petals 3, lanceolate-ovate, ± 6 × 2.5 mm long in male, and up to 6.5 × 3.5 mm long in female flowers, tomentum of stellate hairs on outer surface, sparsely glandular hairs on the upper third of the inner surface. Male flowers with 6 stamens equal in two series, up to 4 mm long; anthers oblong, ± 1 mm long with glandular hairs on the thecae, filaments with a mixture of sparsely stellate and glandular hairs; disc annular, slightly 6-lobate above, glabrous; pistillode up to up to 1 mm high, tomentose stellate. Female flowers with 6 staminodes equal in two series, up to ± 2.5 mm long, anthers cordiform, much less than 1 mm long, with glandular hairs beneath, filaments as in the male flower; disc slightly smaller than in the male flower; pistil 2.5–3.5 × 1.5–2 mm, ovary globose, stellate tomentose, bilocular, placentation axile, biovulate, style short, stigmatate bilobate, often capitate. *Fruits* unknown. Fig. 1.

**DISTRIBUTION.** Cameroon, Congo (Kinshasa) and Gabon. Map 1.

**HABITAT.** Lowland evergreen forest. Altitude range: 0–700 m.

**COLLECTIONS EXAMINED. CAMEROON:** South Province, 16 km on the road Ebolowa to Minkok, fl. 26 March 1975, *de Wilde* J. J. F. E. 8115 (BR!, K!, WAG!, YA!);

**GABON:** Haute Ngounyé, fl. 6 Dec. 1926, *Le Testu* 5859 (P!); Liyança, Lastoursville, fl. Nov. 1929, *Le Testu* 7717 (K!); Keboma, fl. Sept. 1932, *Le Testu* 8925 (K!); Acam, fl. May 1933, *Le Testu* 9114 (K!). **CONGO (KINSHASA):** Leopoldville, Mvuazi, fl. Sept. 1952, *Devred* 1245 (K!).

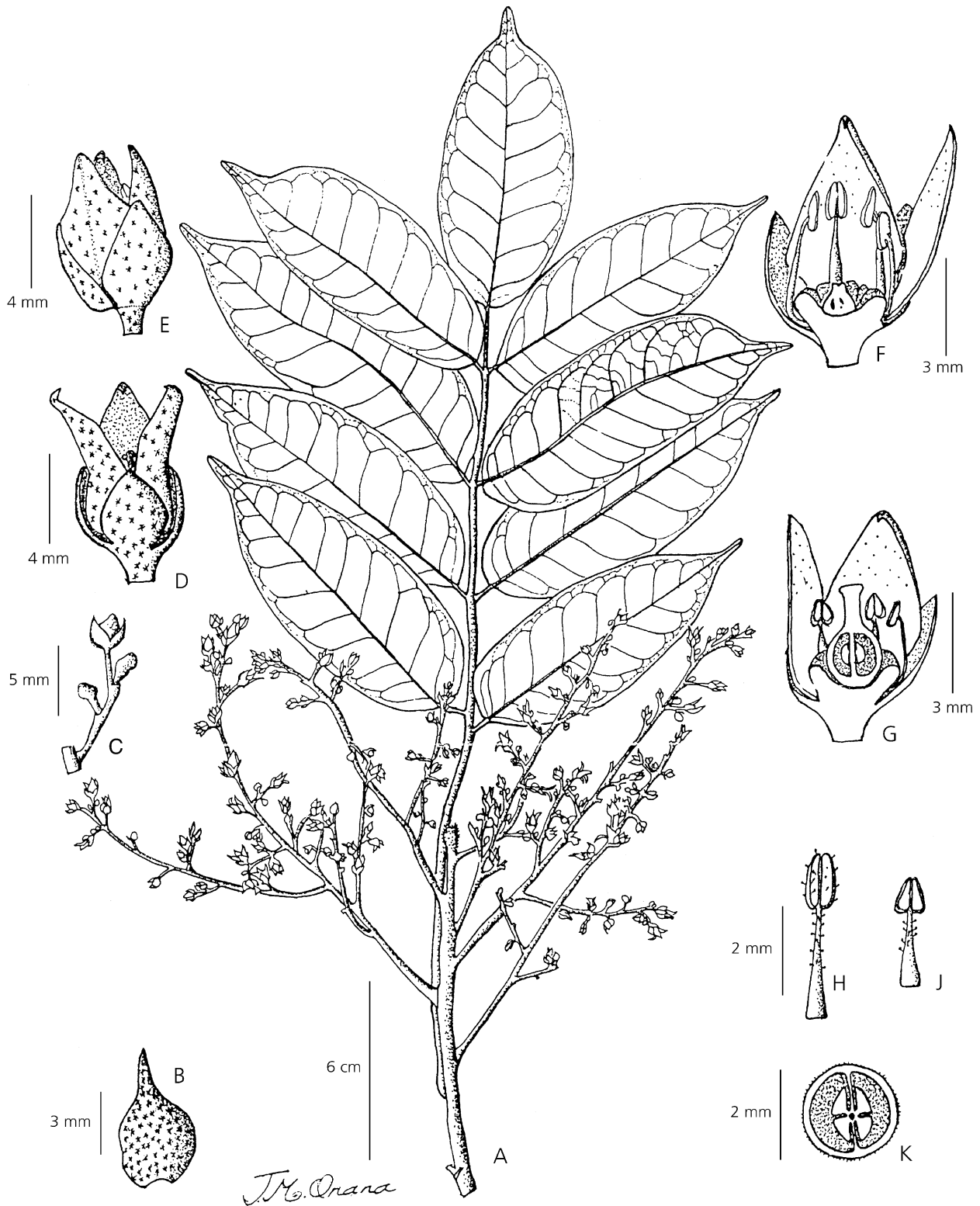
**ETYMOLOGY.** *Dacryodes villiersiana* is named for French botanist Jean François Villiers, for his important contribution to the knowledge of the flora of Cameroon.

**COMMERCIAL NAME.** None recorded.

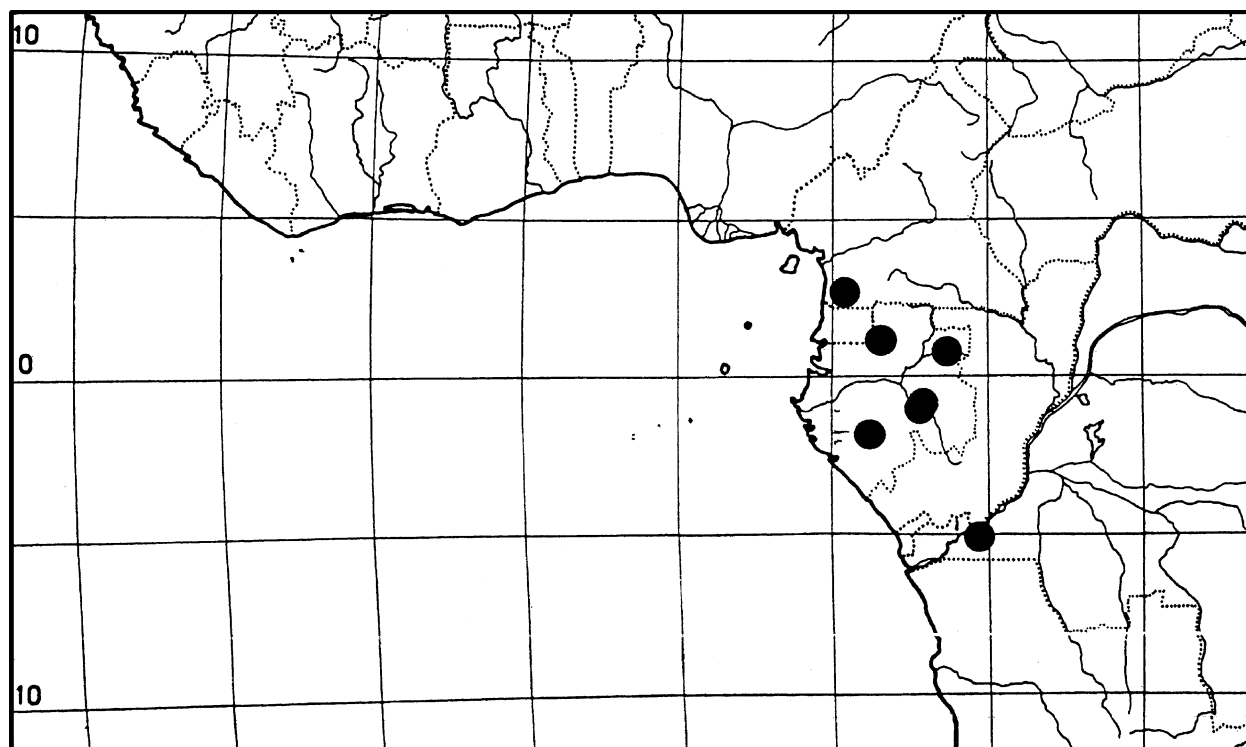
**LOCAL NAME.** None recorded.

**USE.** None recorded.

**CONSERVATION.** *Dacryodes villiersiana* appears to be distributed from South Province, Cameroon, through Gabon, to Congo (Kinshasa). We here assess its conservation status as VU B2ab (iii) (Vulnerable) on the basis that the area of occupation is less than 2000 km<sup>2</sup>, the population is fragmented between 3 countries, and present in less than 10 localities, and since there has been loss of the quality of habitat due to deforestation. The most recent



**Fig. 1.** *Dacryodes villiersiana*. A leaf and inflorescence; B bract; C female cyme with alternate lateral flowers; D female flower; E male flower; F longitudinal section of male flower; G longitudinal section of female flower; H stamen; J staminode; K transverse section of ovary. (A, B, C, D, G, J & K from de Wilde *J. J. F. E* 8115; E, F, H from *Le Testu* 5958). DRAWN BY JEAN MICHEL ONANA.



Map 1. Distribution of *Dacryodes villiersiana* in Central Africa.

collection known to us was made about 30 years ago. More fieldwork to collect this species is needed.

**TAXONOMIC AFFINITIES.** *Dacryodes villiersiana* is close to *D. klaineana* because of the very similar indumentum of the flower organs. The new species is easily distinguished from *D. klaineana* by the paniculate inflorescence (very rarely paniculate, in this case only 2 opposite secondary axes, or not in *D. klaineana*) and the pedunculate cymes (always sessile in *D. klaineana*). *D. villiersiana* closely resembles *D. edulis* in the leaves, but *D. villiersiana* does not have pseudostipules (vs present in *D. edulis*); and in the inflorescence, on lateral cymes, the flowers are strongly alternate and reduced in number for *D. villiersiana* (these being seven in males and three in females) (vs subopposite to opposite and numerous for *D. edulis*, (fifteen to thirty in males and seven in females)).

**VALIDITY OF THE NEW SPECIES.** The fruit of *Dacryodes villiersiana* is unknown. *Pseudodacryodes* Pierlot (Pierlot 1997) is characterised by the fruit having two seeds and entire cotyledons. It is possible that when the fruit of *D. villiersiana* is discovered it may place the species in this genus. But this seems unlikely.

### Excluded species

1. *Dacryodes* ? *trimera* (Oliv.) H. J. Lam (1932a: 202, 1932b: 337) Type: West Tropical Africa [Gabon],

fl. Sept. 1868, Mann 1812 (holotype K!, isotype K!) = **Santiria trimera** (Oliv.) Aubrév.

*Pachylobus trimerus* (Oliv.) Guillaumin (1909b: 202).

Type: West Tropical Africa [Gabon], Sept. 1868, Mann 1812 (holotype K!, isotype K!).

*Sorindeia trimera* Oliv. (1868: 441). Type: West Tropical Africa [Gabon], Mann 1812 (holotype K!, isotype K!).

**NOTE.** *Dacryodes trimera* is based on the type species of *Sorindeia trimera* Oliv., now known as homotypic synonym for *Santiria trimera*.

2. *Dacryodes viridiflora* (Engl.) H. J. Lam (1932a: 202, 1932b: 337). Type: Cameroon, Campo, Sept. 1908, Tessmann 540<sup>a</sup> (holotype B†) = **Santiria trimera** (Oliv.) Aubrév.

*Pachylobus viridiflorus* Engl. (1910: 139). Type: Cameroon, Campo, Tessmann 540<sup>a</sup> (holotype B†).

**NOTE.** The type specimen of *Dacryodes viridiflora* was destroyed at B, and no original material survives. However, the description states that the petiole is canaliculated, a character unknown in *Dacryodes*, but found in *Aucoumea* Pierre and *Santiria* Oliv. (*Burseraceae*) which occur in our area. Since the description also states that the disc is intrastaminal, *Aucoumea* which has an extrastaminal disc is excluded,

leaving *D. viridiflora* as a probable synonym of *Santiria*. In addition Engler (1910: 139) treated the homotypic synonym for *D. viridiflora*, *Pachylobus viridiflorus* Engl. as a synonym for *Santiriopsis tessmannii* K. Krause which is known now to be a synonym for *Santiria trimera*.

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