

The West and Central African species
of *Vepris* Comm. ex A.Juss. (Rutaceae)
with simple or unifoliolate leaves,
including two new combinations

Olivier LACHENAUD & Jean-Michel ONANA

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The West and Central African species of *Vepris* Comm. ex A.Juss. (Rutaceae) with simple or unifoliolate leaves, including two new combinations

Olivier LACHENAUD

Meise Botanic Garden, Nieuwelaan 38, B-1860 Meise, Belgium
Herbarium et Bibliothèque de Botanique africaine, CP 265, Université Libre de Bruxelles,
Boulevard du Triomphe, B-1050 Brussels, Belgium
olivier.lachenaud@meisebotanicgarden.be

Jean-Michel ONANA

Department of Plant Biology, Faculty of Science, University of Yaoundé I, P.O. Box 812
Yaoundé, Cameroon
The National Herbarium of Cameroon P.O. Box 1601 Yaoundé, Cameroon.

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ABSTRACT

The genus *Vepris* Comm. ex A.Juss. (Rutaceae) includes around 85 species occurring mostly in Africa and Madagascar, among which three West and Central African species, differing from others in the area by their simple or unifoliolate leaves, are the object of the present paper. *Glycosmis? africana* Hook.f., described from the island of São Tomé, is transferred to the genus *Vepris*, as *V. africana* (Hook.f.) O.Lachenaud & Onana, comb. nov. This species, which also occurs in Gabon, Angola and the Republic of Congo, was previously known under the illegitimate name *V. gossweileri* (I.Verd.) Mziray [non *V. gossweileri* I.Verd.]. It is here illustrated for the first time, and a complete description is presented; it is notable for having androdioecious flowers, rather than dioecious as usual in the genus. Another new combination, *Vepris laurifolia* (Hutch. & Dalziel) O.Lachenaud, comb. nov. – based on *Garcinia laurifolia* Hutch. & Dalziel – is published for a West African species, so far known under the younger synonym *V. felicis* Breteler. This species is newly recorded from Sierra Leone, and an updated description is presented. These two species are compared to the similar *V. welwitschii* (Hiern) Exell, which is endemic to Angola and still relatively little-known. The conservation status of all three species is assessed, respectively as Near-threatened (*V. africana*, comb. nov.), Vulnerable (*V. laurifolia* (Hutch. & Dalziel) O.Lachenaud, comb. nov.) and Endangered (*V. welwitschii*).

KEY WORDS

Africa,
São Tomé,
Rutaceae,
Garcinia,
Glycosmis,
lectotypifications,
new synonyms,
new combinations.

RÉSUMÉ

Les espèces de Vepris Comm. ex A.Juss. (Rutaceae) d'Afrique occidentale et centrale à feuilles simples ou unifoliolées, avec deux nouvelles combinaisons.

Le genre *Vepris* Comm. ex A.Juss. (Rutaceae) comprend environ 85 espèces rencontrées principalement en Afrique et à Madagascar, dont trois, originaires d'Afrique occidentale et centrale et différant des autres présentes dans cette région par leurs feuilles simples ou unifoliolées, font l'objet du présent article. *Glycosmis? africana* Hook.f., décrit de l'île de São Tomé, est transféré dans le genre *Vepris*, sous le nom de *V. africana* (Hook.f.) O.Lachenaud & Onana, comb. nov. Cette espèce, qui est également présente au Gabon, en Angola et en République du Congo, était précédemment connue sous le nom illégitime *V. gossweileri* (I.Verd.) Mziray [non *V. gossweileri* I.Verd.]. Elle est ici illustrée pour la première fois, et une description complète en est donnée ; elle est remarquable par ses fleurs androdioïques, et non dioïques comme habituellement dans le genre. Une autre nouvelle combinaison, *Vepris laurifolia* (Hutch. & Dalziel) O.Lachenaud, comb. nov. – basée sur *Garcinia laurifolia* Hutch. & Dalziel – est publiée pour l'espèce ouest-africaine connue jusqu'à présent sous le synonyme *V. felicitis* Breteler. Cette espèce est nouvellement signalée de Sierra Leone, et une description révisée en est donnée. Ces deux espèces sont comparées au similaire *V. welwitschii* (Hiern) Exell, endémique d'Angola et encore relativement peu connu. Le statut de conservation des trois espèces est évalué, respectivement comme Quasi menacé (*V. africana*, comb. nov.), Vulnérable (*V. laurifolia* (Hutch. & Dalziel) O.Lachenaud, comb. nov.) et En danger (*V. welwitschii*).

MOTS CLÉS

Afrique,
São Tomé,
Rutaceae,
Garcinia,
Glycosmis,
lectotypifications,
synonymes nouveaux,
combinaisons nouvelles.

INTRODUCTION

The genus *Vepris* Comm. ex A.Juss. (Rutaceae), considered here in the broad sense of Mziray (1992), includes around 85 species that are found mostly in Africa and Madagascar, with one extending to Arabia and one in India. *Vepris* species are shrubs or trees without spines, with leaves variously unifoliolate, trifoliolate or digitate (never pinnate), flowers 4-merous and usually dioecious, arranged in racemes or panicles, and drupaceous fruits. *Vepris* is therefore easily separated from its two closest relatives, *Fagaropsis* Mildbr. ex Siebenl. with pinnate leaves, and *Toddalia* Juss. with a climbing habit, prickly stems and 5-merous flowers.

The taxonomic history of the genus is very complex. Due to the great variation in number of stamens (four to eight) and number and degree of fusion of carpels (one to four, free to completely fused), its species were historically classified in several different genera, namely *Araliopsis* Engl., *Diphasia* Pierre, *Diphasiopsis* Mendonça, *Oricia* Pierre, *Oriciopsis* Engl., *Teclea* Delile, *Tecleopsis* Hoyle & Leakey, *Toddaliopsis* Engl., and *Vepris* s.str. This classification was adopted in Verdoorn's (1926) monograph of African Toddalieae, and in all major African floras (Exell & Mendonça 1951; Keay 1958; Gilbert 1958; Mendonça 1963; Letouzey 1963a, 1963b; Kokwaro 1982). However, Mziray (1992) convincingly showed that all these genera should be included in *Vepris*. His classification has generally been adopted since (e.g. Breteler 1995; Hawthorne & Jongkind 2006; Cheek *et al.* 2009, 2018; Onana & Chevillotte 2015) and is supported by recent molecular results (Morton 2017).

While Mziray's classification has solved the problems of generic delimitation, *Vepris* remains a taxonomically problematic genus. The Cameroonian species were revised by Onana & Chevillotte (2015) with later additions by Cheek

et al. (2018) and Onana *et al.* (2019), but no recent treatment of the genus is available for most African countries. Several new species have been identified, and the taxonomic status of others, treated as imperfectly known by Mziray (1992) needs further investigation. A global revision of African *Vepris* would be much needed, especially in view of the fact that several species are restricted in distribution and potentially threatened, and that many are used in local medicine. They are commonly employed as aphrodisiac, fortifier, astringent, diuretic and antipyretic, and for the treatment of a diverse range of ailments, including malaria, lung diseases, kidney disorders, eye troubles, cardiac pains, coughs, colds and influenza, headaches, menorrhagia, infertility, angina and rheumatism. Numerous useful medicinal substances have been isolated from the genus, mostly furoquinoline alkaloids, but also acridine and quinol-2-one alkaloids, limonoids and triterpenoids (e.g. Ayafor *et al.* 1980, 1981, 1982a, b, c, d, 1986; Ngadjui *et al.* 1982; Matu 2011; Imbenzi *et al.* 2014; Atangana *et al.* 2017; Kenmogne *et al.* 2018).

The current paper deals with species of *Vepris* with simple or unifoliolate leaves occurring in West and Central Africa, including Angola. Most unifoliolate species of *Vepris* occur in East Africa and Madagascar, and only three have been reported from the Atlantic side of the continent: *V. gossweileri* (I.Verd.) Mziray of Angola and Congo (Brazzaville), *V. welwitschii* (Hiern) Exell from Angola, and *V. felicitis* Breteler from West Africa, the latter having actually simple leaves (without an articulation at the apex of the petiole) which is apparently unique in the genus. These species are presumably not direct relatives of one another, but are here treated together for practical reasons, since several taxonomic and nomenclatural issues are connected with them.

The first issue is that the combination *Vepris gossweileri* (I.Verd.) Mziray (based on *Teclea gossweileri* I.Verd.) is an

illegitimate later homonym of *Vepris gossweileri* I. Verd. (which is coincidentally a synonym of *V. welwitschii*). This is not the only reason why the name of this species must change: another is the existence of an earlier synonym, *Glycosmis? africana* Hook.f. The latter was described based on a poor fruiting collection from the island of São Tomé, and Hooker evidently had some doubt as to its generic position since he put a question mark after the generic name. The genus *Glycosmis* Corrêa is otherwise exclusively Asian – the African *G. welwitschii* Hiern having been transferred to *Vepris* by Exell (1929) – and has 5-merous bisexual flowers while those of *Vepris* are 4-merous and usually dioecious. Due to the poverty of the material both Oliver (1868: 308) and Exell (1944: 132) treated *G. africana* as an insufficiently known species. Stone (1985: 23) excluded it from *Glycosmis*, referring it to “*Teclea unifoliolata* Baill. (fide Tanaka)”. The latter species, originally described from the Comoros, was treated as imperfectly known by Mziray (1992: 77) and eventually transferred to *Vepris*, as *Vepris unifoliolata* (Baill.) Labat, M. Pignal & O. Pascal (Labat *et al.* 2005: 367). An examination of the type of *Glycosmis africana*, and of other more recent collections from São Tomé, leads to the conclusion that this species indeed belongs to the genus *Vepris*, previously unrecorded from the island (Exell 1944, 1956) and is conspecific with *Teclea gossweileri* from the continent, but appears to be different from *V. unifoliolata*, albeit very closely related. A new combination, *Vepris africana* (Hook.f.) O. Lachenaud & Onana, comb. nov. is therefore published, and a complete account of this hitherto little-known species is presented, including its first illustration, an updated description, a list of collections studied including the first national records from Gabon, and an evaluation of its conservation status.

Another issue is that an earlier and most unexpected synonym of *Vepris felicis* has been discovered. This name, *Garcinia laurifolia* Hutch. & Dalziel, was originally published in a different family, Clusiaceae. Such a remarkable error of familial attribution may be explained by the very poor state of the type collection, which has only immature fruits. Keay (1954) treated this species as imperfectly known without excluding it from *Garcinia*, but the type specimen in BM has been annotated in Verdoorn’s handwriting as *Teclea sp.*, a genus now synonymous with *Vepris*. From a comparison of the types there can be no doubt that *G. laurifolia* is identical with *V. felicis*, and since the epithet *laurifolia* is earlier and still available in *Vepris*, a new combination is needed. The original description of *G. laurifolia* being very incomplete, and that of *V. felicis*, although much better, being based on male specimens only, a more complete description is presented here since new collections with female flowers and fruits are now available. We also report the first occurrence of this rare species in Sierra Leone, and evaluate its conservation status.

The third species, *V. welwitschii*, is only briefly treated here, since little may be added to the previous accounts of Hiern (1896, as *Glycosmis welwitschii*), Verdoorn (1926, as *Vepris gossweileri* I. Verd.) and Exell & Mendonça (1951), and no more recent collections are known.

MATERIAL AND METHODS

This paper is based on a study of herbarium collections from BM, BR, BRLU, COI, K, LBV, LISU (Welwitsch herbarium only), P and WAG; types specimens from other herbaria were consulted online on JSTOR. The descriptions of the species are based on herbarium material and collectors’ notes; one of the species (*V. africana*, comb. nov.) was also studied on the field by the first author. All specimens cited have been seen, unless otherwise stated. For each species a risk of extinction assessment was made using the IUCN Red List Categories and Criteria (IUCN 2012, 2014). The extent of occurrence (EOO) and area of occupancy (AOO) were calculated using GeoCAT (Geospatial Conservation Assessment tool; Bachman *et al.* 2011) with a cell size of 2 km². The number of ‘locations’ (as defined by IUCN 2012) was calculated with regard to the kind of threats, such that a single location may encompass more than one adjacent subpopulation.

TAXONOMIC TREATMENT

Family RUTACEAE Juss.

Genus *Vepris* Comm. ex A.Juss.

Vepris africana (Hook.f.) O. Lachenaud & Onana,
comb. nov.
(Fig. 1).

Glycosmis (?) *africana* Hook.f., *Niger Flora*: 256 (Hooker 1849). — Type: **São Tomé & Príncipe**. São Tomé, without precise locality or date (fr.), *Don s.n.* (holo-, K[K000199556]).

Teclea gossweileri I. Verd., *Bulletin of Miscellaneous Information, Kew* 9: 409 (Verdoorn 1926), **syn. nov.** — *Vepris gossweileri* (I. Verd.) Mziray, *Symbolae Botanicae Upsalienses* 30: 72 (Mziray 1992), nom. illeg. [non *V. gossweileri* I. Verd.]. — Type: **Angola**. Cuanza Norte, Cabiri, 1.VII.1921 (male fl.), *Gossweiler* 8328 (holo-, K[K000199528, K000199529]).

DISTRIBUTION. — This species has a very scattered distribution in NW coastal Gabon (around Libreville), coastal Republic of Congo (mouth of Kouilou River), northern Angola, and the north of São Tomé island (Fig. 2).

HABITAT. — Littoral thickets, edge of mangroves, and forest islands in savanna, often associated with rocky outcrops (especially of limestone), 0–1200 m in elevation; often gregarious, sometimes even dominant in its habitat.

PHENOLOGY. — Flowers collected in January, March to July, and September to November, probably all year round; fruits in November.

OTHER STUDIED MATERIAL. — **Angola**. Granja de S. Luiz, Cazengo, 21.XI.1917 (fr.), *Gossweiler* 5260 (BM); towards Caçaça, Granja de S. Luiz, Cazengo, 9.XI.1919 (fl. buds), *Gossweiler* 5636 (BM); Cas-sualala, Cuanza Norte, 22.V.1921 (male fl. buds), *Gossweiler* 8311 (BM, P06600613); Cuanza Norte, Castendo, 16.X.1922 (bisexual fl.), *Gossweiler* 8437 (BM, BR); Hochland von Quela, 1200 m, IX.1938 (male fl.), *Nolde* 827 (BM).

Republic of the Congo. Bas-Kouilou, 2.I.1991 (st.), *Dowsett-Lemaire* 1496 (BR); Bas-Kouilou, 19.IV.1991 (male fl. buds), *Dowsett-Lemaire* 1583 (BR).

TABLE 1. — Morphological differences between *Vepris africana* (Hook.f.) O.Lachenaud & Onana, comb. nov., *V. laurifolia* (Hutch. & Dalziel) O.Lachenaud, comb. nov. and *V. welwitschii* (Hiern) Exell (diagnostic characters are in bold; open flowers are not known in *V. welwitschii*).

	<i>V. africana</i> , comb. nov.	<i>V. laurifolia</i> (Hutch. & Dalziel) O.Lachenaud, comb. nov.	<i>V. welwitschii</i>
petiole	articulate	not articulate	articulate
midrib (upper side)	prominent	canaliculate	prominent
secondary leaf veins	16-23 pairs	9-18 pairs	14-18 pairs
tertiary leaf venation	subparallel	reticulate	reticulate
male inflorescences	paniculate (lateral branches racemose)	thyrsoid (lateral branches cymose)	unknown
female (or bisexual) inflorescences	many-flowered	7- to 8-flowered	many-flowered
pedicels	0-0.5 mm	1-4.5 mm	1-2.5 mm
corolla lobes	patent to reflexed	erect	unknown
stamens	4, always present	8, present only in male flowers	unknown
intrastaminal disk (in male flowers)	absent	present, hirsute	unknown
pistillode of male flowers	longer than broad, linear at apex	broader than long, umbonate	unknown
ovary	1-locular	4- locular	2-locular (one locule aborting in fruit)
fruit colour	orange	orange	black
fruit shape and size	ellipsoid to globose, 6-11.5 × 6-7.5 mm	broader than long, 11-14 × 17-19 mm	ellipsoid, 5-8 × 4-6.5 mm
distribution	Gabon to Angola + São Tomé	Guinea to W Ivory Coast	Angola

Gabon. *c.* 12 km NE of Libreville, Forêt de la Mondah, 0°33'N, 9°22'E, 28.I.1986 (male fl.), *J.M. & B. Reitsma 1775* (LBV, P06600589, WAG); *c.* 6 km NE Malibé, 0°35'N, 9°26'E, 20.XII.1986 (fr.), *J.M. & B. Reitsma 2742* (LBV, WAG); North of Libreville on Cape Esterias road, 0°35'N, 9°25'E, 14.VII.1986 (male fl. buds), *D.W. Thomas & Wilks 6350* (LBV, WAG); Rivière Maliba, 26.III.1969 (male fl.), *Villiers 54* (P06600612); Rivière Maliba, 11.VI.1969 (male fl.), *Villiers 111* (P06600614); village Maliba, 23.IX.1969 (male fl.), *Villiers 337* (P06600610).
São Tomé. near Morro Carregado, N coast, 0°25'N, 6°37'E, 13.II.1980 (fr.), *J.J.F.E. de Wilde et al. 448* (BR, WAG); chemin entre Plancas 1 et Ribeira Funda, 0°22.075'N, 6°35.784'E, 25.X.2019 (st.), *Lachenaud et al. 2745* (MO, STPH); côte Nord, *c.* 0.75 km à l'est de Lagoa Azul vers Morro Peixe, 0°24.379'N, 6°36.961'E, 28.X.2019 (fr. imm.), *Lachenaud et al. 2768* (BR, BRLU, COI, MO, STPH); without locality or date (fr.), *Oliveira 1657* (BRLU); Morro Barro Vermelho, 250 m, 10.I.1997 (st.), *Oliveira F33* (BRLU); Lobata, Lagoa Azul, Imbondeiros, zona norte da Praia das Conchas, 9.III.2018 (fl. buds), *Paiva et al. 288* (COI); without locality or date (st.), *Welwitsch 6762* (BM).

PRELIMINARY CONSERVATION ASSESSMENT. — **Near-threatened.** *Vepris africana*, comb. nov. is a shrub occurring in Central Africa (São Tomé, Gabon, Congo Republic and Angola) in dry or littoral forest habitats, often on rocky outcrops, from sea level to 1200 m in elevation. It is known from 22 herbarium specimens, five of which were not taken into account for this assessment since their localities are either missing or untraceable. Based on the remaining 17 specimens, its extent of occurrence (EOO) is estimated to be 369 480 km² (far exceeding the limit for Vulnerable status under criterion B1) and its area of occupancy (AOO) to be 48 km², within the limit for Endangered status under criterion B2. These collections represent twelve unique occurrences, eight subpopulations, and eleven locations in the sense of IUCN. Only one occurrence is protected in the Raponda-Walker Arboretum (Gabon), and most of the rest, especially in São Tomé and Gabon, occurs in areas where deforestation for agriculture, charcoal production, and urban expansion is strong, leading to an observed decline in the extent and quality of the habitat and number of individuals. The number of locations (eleven) is just above the limit for Vulnerable status under the conditions B2ab(iii,v), and because some of them are likely to disappear in the near future, the species is assessed as Near-threatened.

DESCRIPTION

Shrub

1-5 m high, much branched; all parts with slight citrus smell when crushed.

Twigs

Cylindrical, 2-2.5 mm thick, glabrous, soon covered with a pale grey bark, with scattered lenticels.

Leaves

Alternate or sometimes opposite near the apex of the twigs, unifoliate, entirely glabrous; petiole 0.4-3(-5) cm long, canaliculate above, slightly bipulvinate, articulate at apex; lamina elliptic to slightly oblanceolate, 5.5-18.5 × 1.7-7.4 cm, cuneate at base, acuminate at apex, ± coriaceous, drying olive green to grey-brown; midrib slightly convex above; secondary veins 16-23 pairs, weak and hardly distinct from the tertiaries, hardly ascending, forming regular arches 1-3.5 mm from leaf margin; tertiary and quaternary veins concolorous and prominent on lower leaf surface, the former parallel to the secondaries, the latter reticulate forming areolae *c.* 1 mm wide; glandular dots dense and rather conspicuous on lower leaf surface, 2-5 per mm².

Flowers

Androdioecious.

Male inflorescences

Axillary on young leafy twigs, 3-6 cm long, paniculate with flowers borne in distant glomerules along divaricate lateral branches up to 3 cm long, the axes glabrous to puberulous; bracts ovate, minute, < 0.5 mm long.

Male flowers

4-merous; pedicel absent or very short, 0-0.5 mm, glabrous; calyx cupular, 1-1.3 × 1-1.2 mm, truncate or with minute rounded lobes, glabrous except ciliate margin; bud ellip-

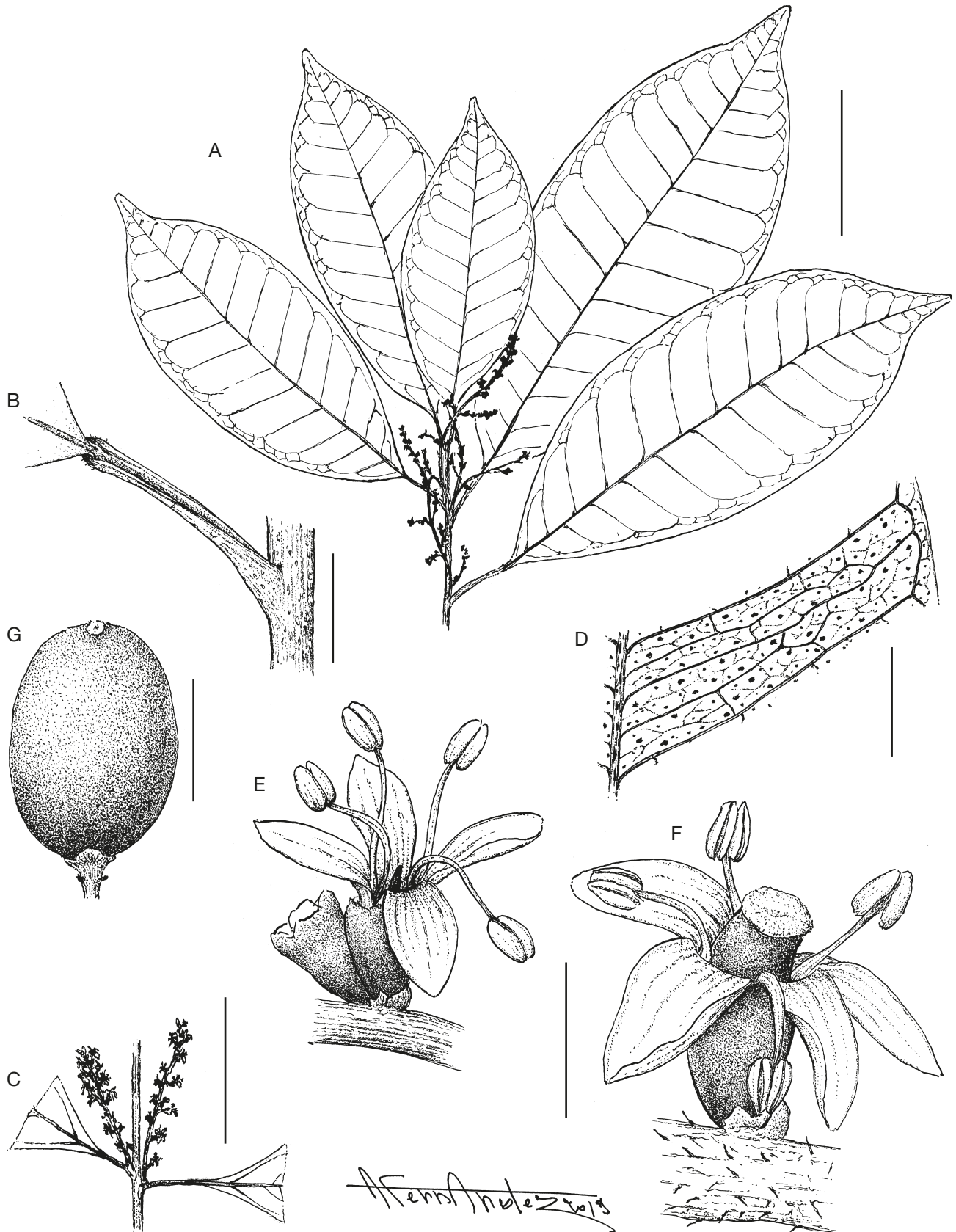


FIG. 1. — *Vepris africana* (Hook.f.) O.Lachenaud & Onana, comb. nov.: **A**, twig with male inflorescences in bud; **B**, petiole; **C**, portion of twig with bisexual inflorescences; **D**, detail of lower leaf surface showing venation and glandular dots; **E**, portion of inflorescence with male flower; **F**, same with bisexual flower; **G**, fruit; **A**, **B**, from Dowsett-Lemaire 1583; **C**, **F**, from Gossweiler 8437; **D**, **G**, from J.J.F.E. de Wilde et al. 448; **E**, from Nolde 827. Drawing: Antonio Fernandez. Scale bars: **A**, **C**, 4 cm; **B**, **D**, **G**, 5 mm; **E**, **F**, 2 mm.

soid, *c.* 1 × 0.7 mm, rounded at apex; petals free, narrowly oblong, 2.5–3 × 0.7–1 mm, rounded at apex, glabrous, patent to reflexed at anthesis; stamens 4, glabrous, with linear filaments *c.* 1.5 mm long and elliptic anthers *c.* 0.6 × 0.4 mm; intrastaminal disk absent; pistillode *c.* 2.3 mm long, linear with inflated base, glabrous.

Bisexual inflorescences

Axillary and sometimes terminal on young leafy twigs, 0.5–8 cm long, racemose or sometimes paniculate with short ramifications < 0.5 cm long, with flowers condensed in ± distant glomerules along the axes, the latter with short and sparse patent hairs; bracts minute, triangular to ovate, *c.* 0.5 mm.

Bisexual flowers

4-merous, sessile; calyx cupular, 1.2–1.5 × 1.5–1.8 mm, truncate or with minute rounded lobes, glabrous except ciliate margin; bud ellipsoid, *c.* 2 × 1.3 mm, rounded at apex; petals free or nearly so, narrowly ovate, 2–2.7 × 0.7–1.2 mm, rounded at apex, glabrous, patent to reflexed at anthesis; stamens 4, similar to those of male flowers but with thicker filaments; ovary 1-locular, subcylindrical, *c.* 1.5 × 0.8 mm, glabrous, the apex truncate with a broad sessile discoid stigma *c.* 0.8 mm broad.

Fruits

Orange, ellipsoid to subglobose, 6–12 × 6–8 mm when dry (up to 15 × 12 mm in life), smooth, glabrous, sessile, with persistent stigma; pericarp very thin, *c.* 0.2 mm thick when dry; endocarp thinly crustaceous, *c.* 0.2 mm thick; seed solitary.

REMARKS

Vepris africana, comb. nov. is unusual for the genus in being apparently androdioecious: in both types of flowers the anthers are present and produce normal pollen; the ovary is normally developed in bisexual flowers but reduced to a pistillode in male flowers. The species is very similar to *V. unifoliolata* (Baill.) Labat, M. Pignal & O. Pascal [syn. *V. punctata* (I. Verd.) Mziray] from the Comoros and Madagascar, which appears to differ only in its truly dioecious flowers – the female ones lacking anthers – and glabrous calyx margin. The differences between the two taxa are rather slight, in spite of their wide geographic disjunction, and they might perhaps be treated as subspecies of a single species – in which case *V. africana*, comb. nov. is the older name.

The distribution of *V. africana*, comb. nov. is rather unusual, but no significant differences could be found between the collections from São Tomé (with fruits only), Gabon and Congo (with male flowers and fruits) and Angola (with fruits and both flower types). The occurrence of the species in São Tomé, a recent volcanic island never connected to the continent, probably originates from dispersal by frugivorous birds, or possibly by marine currents since the plant often grows near the coast. There is no reason to suspect an introduction by man, since it is not a ruderal plant and not reported to be cultivated.

The original publication of *Teclea gossweileri* (Verdoorn 1926) does not specify the herbarium of deposit of the type,

Gossweiler 8328. However, there appears to be only one specimen of this number in Kew (consisting of two sheets labelled Sheet I and Sheet II) which is therefore to be regarded as the holotype. No sheet of this number was found in BM, and Exell & Mendonça (1951: 271) report none from Portuguese herbaria, from which they studied the material for their treatment.

One of the Angolan collections (*Gossweiler* 4799) referred to this species by Exell & Mendonça (1951, as *Teclea gossweileri*) actually represents *Vepris welwitschii*; see under that species. Differences between *V. africana*, comb. nov., *V. laurifolia* (Hutch. & Dalziel) O. Lachenaud, comb. nov. and *V. welwitschii* are summarised in Table 1.

Vepris laurifolia (Hutch. & Dalziel)

O. Lachenaud, comb. nov.

Garcinia laurifolia Hutch. & Dalziel, *Flora of West Tropical Africa*, ed. 1, 1(1): 236 (Hutchinson & Dalziel 1927). — Type: **Guinea** (see note). Ninia, Talla Hills, 17.II.1892 (imm. fr.), *Scott-Elliott* 4806 (holo-, BM [BM000798360]).

Vepris felicitis Breteler, *Kew Bulletin* 50: 131 (Breteler 1995), **syn. nov.** — Type: **Liberia**. Central Province, *c.* 5 km SE of Zuole, 2.IV.1962 (male fl.), *J.J.F.E. de Wilde & Voorhoeve* 3754 (holo-, WAG; iso-, A n.v., B n.v., BR, K[K000800952], P n.v.).

DISTRIBUTION. — This species occurs in a few scattered localities in southern Guinea, Sierra Leone, Liberia and extreme western Ivory Coast (Fig. 2).

HABITAT. — Primary and secondary forest, sometimes in galleries, up to 543 m in altitude.

PHENOLOGY. — Flowers from October to December and in April–May; fruits in May (very young ones in February).

PRELIMINARY CONSERVATION ASSESSMENT. — **Vulnerable** [VU B2ab(ii, iii, iv, v)]. *Vepris laurifolia* (Hutch. & Dalziel) O. Lachenaud, comb. nov. is a shrub occurring in lowland forest from coastal Guinea to western Ivory Coast. It is known from ten herbarium specimens collected between 1892 and 2019, one of which was not considered for this assessment since its locality cannot be precisely traced. Based on the remaining nine collections, its extent of occurrence (EOO) is estimated to be 45 737 km² (exceeding the limit for Vulnerable status under criterion B1) and its area of occupancy (AOO) to be 36 km², within the limit for Endangered status under criterion B2. These collections represent nine unique occurrences, six subpopulations, and seven locations in the sense of IUCN. Only one subpopulation is protected in the Forêt Classée de Ziamá (Guinea), while most of the rest occurs in areas where deforestation for agriculture is apparent from satellite images, and one in Sierra Leone is to be flooded by the construction of a dam. A decline in the extent and quality of habitat, AOO, number of subpopulations and number of individuals is therefore expected. Based on this decline and the low number of locations (seven), the species qualifies for Vulnerable status under the conditions B2ab(ii, iii, iv, v).

OTHER STUDIED MATERIAL. — **Guinea.** Sérédou, 2.XII.1964 (male & female fl.), *Fora* 20 (BR); Benna, XI.1937 (male fl.), *Jacques-Félix* 2096 (P06601076, P06601077); vallée du Badabou, au pied du Kakoulima, X.1954 (fl. buds), *Schnell* 7568 (K); Forêt Ziamá, 7.XII.2019 (male fl. buds), *Yarwoah & Konaté* 192 (BRLU n.v., MO, P n.v., SERG n.v.).

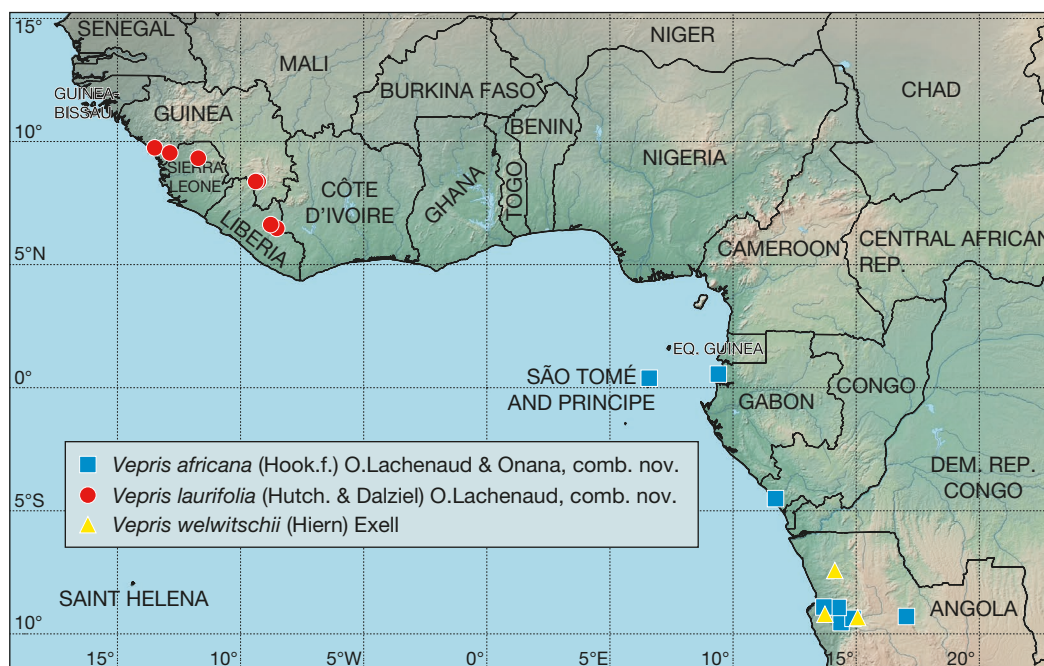


FIG. 2. — Distribution map of *Vepris africana* (Hook.f.) O.Lachenaud & Onana, comb. nov. (■), *V. laurifolia* (Hutch. & Dalziel) O.Lachenaud, comb. nov. (●) and *V. welwitschii* (Hiern) Exell (▲).

Sierra Leone. SE of Fadugu, along Seli (Rokel) River, just downstream of proposed dam near Yiben village, 9°19'43.4"N, 11°41'14.8"W, 23.IV.2014 (fl. buds), *van der Burgt et al.* 1861 (K, [P00784732](#)); SE of Fadugu, along Seli (Rokel) River, 3 km upstream of proposed dam (to be flooded), 9°18'39.5"N, 11°41'25.6"W, 24.IV.2014 (st.), *van der Burgt et al.* 1862 (K); along the Seli River, E of Fadugu, upstream of Yiben village, 9°19'48.1"N, 11°41'25.6"W, 23.V.2014 (female fl. & fr.), *Momoh* 96 (K, WAG).
Ivory Coast. 16 km SW of Toulepleu, 6°28'N, 8°31'W, 9.IX.1975 (fr.), *Beentje* 936 (WAG).

DESCRIPTION

Shrub

1-4 m high, ramose.

Twigs

Cylindrical, c. 2 mm thick, puberulous to glabrous.

Leaves

Alternate or often opposite, simple; petiole (0.2-)0.5-2.7 cm long, canaliculate above or subterete, usually bipulvinate, not articulate at apex, puberulous to glabrous; lamina elliptic, (5.5-)8-26 × (2-)2.6-7.6 cm, acute to obtuse at base, acuminate at apex, ± coriaceous, entirely glabrous, drying dull greyish-green above and yellowish green below; midrib slightly canaliculate above; secondary veins 9-18 pairs, only slightly more apparent than tertiaries, inserted almost at a right angle to the midrib and forming regular arches 1-5 mm from the leaf margin; tertiary veins concolorous and prominent on lower leaf surface, reticulate, forming areolae 1.5-2 mm wide; glandular dots dense, conspicuous to hardly distinct on lower leaf surface, 2-5 per mm².

Flowers

Dioecious.

Male inflorescences

Terminal or axillary, 1-3 cm long, 6- to 30-flowered, thyrsoid with flowers borne in (sometimes very short) lateral cymes, the axes puberulous; bracts linear to narrowly triangular, 0.7-1.5 mm long.

Male flowers

4-merous; pedicel 1-2 mm long, puberulous or glabrous; calyx cupular, 0.5 × 2 mm, with slightly angular and ciliolate margin, otherwise glabrous; bud subglobose to depressed-ovate, 1.5-2 × 1.5-2.5 mm, acute to obtuse at apex; petals ovate, 2.5-4 × 1.5-1.7 mm, free to connate at base, slightly acute at apex, glabrous, erect at anthesis; stamens 8, glabrous, with linear filaments c. 1.5 mm long and elliptic anthers c. 0.6 × 0.4 mm; intrastaminal disk 8-crenate in outline, c. 1.5 mm in diameter, densely hirsute; pistillode shortly umbonate, < 1 mm long.

Female inflorescences

Terminal or axillary, 1-2.5 cm long, 7-8-flowered, racemose or paniculate with very short ramifications < 0.1 cm long, the flowers well apart from each other, the axes puberulous; bracts triangular, 0.5-0.8 mm.

Female flowers

4-merous; pedicel 1.5-4.5 mm long; calyx cupular, 0.8-1 × 2-2.5 mm, slightly angular with margin often splitting, glabrous except ciliolate margin; bud not seen; petals ovate, 4-5 × 1.3-2 mm, free to connate at base, acute at apex, glabrous,

erect at anthesis; stamens apparently absent; ovary 4-locular with fused carpels, 4-lobed in outline, obovoid to subglobose, 1.4–2 × 1.5–1.7 mm, pubescent with stiff appressed hairs, with a shortly stipitate 4-lobed stigma 0.7–1.3 × 1–1.5 mm.

Fruits

Orange, broader than long and slightly 4-lobed, 11–14 × 17–19 mm, glabrous, finely depressed-punctate, on pedicel 3–4 mm long; pericarp c. 0.5 mm thick when dry; seed solitary, c. 10 × 8 mm, with endocarp thinly crustaceous, reticulate and adhering to the pericarp.

REMARKS

For illustrations of this species see Breteler (1995) and Hawthorne & Jongkind (2006). The petals of male flowers were originally described as connate at base (Breteler 1995) but in *Fora 20* appear to be quite free; a similar variation is seen in the female flowers.

The type locality of *V. laurifolia* (Hutch. & Dalziel) O.Lachenaud, comb. nov., Ninia, which cannot be traced precisely, lies in Guinea (Gledhill 1969: 427) and not in Sierra Leone as originally cited by Hutchinson & Dalziel (1927). However, the species does occur in Sierra Leone, where it has been recently collected.

Vepris welwitschii (Hiern) Exell

Glycosmis welwitschii Hiern, *Catalogue of the African Plants collected by Dr Friedrich Welwitsch. Dicotyledons, Part 1*: 115 (Hiern 1896). — *Vepris welwitschii* (Hiern) Exell, *The Journal of Botany* 67: 148 (Exell 1929). — Type: **Angola**, in montibus petrosis supra Tandambando, IX.1854 (fr.), *Welwitsch 471* (lecto-, LISU[LISU206243], here designated). — Syntypes: **Angola**, inter Camutamba et Quicando, IX.1857 (fr. imm.), *Welwitsch 471* (syn-, LISU[LISU206244]); locality and date unclear (see notes), *Welwitsch 471* (syn-, BM[BM000798355]); “Zenza do Golungo”, IX.1854 (fr. imm.), *Welwitsch 471* (syn-, PRE[PRE0601859-0]); no locality or date (fr. imm.), *Welwitsch 471* (syn-, COI[COI00097048]).

Vepris gossweileri I. Verd., *Bulletin of Miscellaneous Information, Kew* 9: 399 (Verdoorn 1926). — Type: **Angola**, Serra do Socollo-Undui between Ambriz and Lifuni river, 11.XII.1907 (fr.), *Gossweiler 4895* (lecto-, K[K000199522, K000199523], here designated; isolecto-, BM, COI[COI00040965]).

DISTRIBUTION. — Endemic to northern Angola (Fig. 2).

HABITAT. — Xerophytic vegetation on limestone outcrops, up to 800 m in altitude.

PHENOLOGY. — Flower buds in September; fruits in September (immature) and October.

PRELIMINARY CONSERVATION ASSESSMENT. — **Endangered** [EN B2ab(iii)]. *Vepris welwitschii* is a shrub endemic to Angola and occurring in xerophytic vegetation on limestone outcrops. It is known from seven specimens collected between 1854 and 1929, four of which were not considered for this assessment since their localities are either too vague or not traceable. Based on the remaining three collections, its extent of occurrence (EOO) is estimated to be 14 092 km² (within the limit for Vulnerable status under criterion B1) and its area of occupancy (AOO) to be 12 km², within the limit for Endangered status under criterion B2. These collections

represent three unique occurrences, three subpopulations, and three locations in the sense of IUCN. None of these occur in protected areas, and most are threatened by deforestation for agriculture and/or charcoal production (apparent from satellite images), leading to an expected decline in the extent and quality of the habitat. Because of this decline, and the small number of locations (three), the species qualifies for Endangered status under the conditions B2ab(iii). Since the area where it occurs has not been explored botanically in recent times, field work is critical for more precise information about the species' range and state of conservation.

OTHER STUDIED MATERIAL. — **Angola**, Vale de Cao, 26.X.1903 (fr.), *Gossweiler 1493* (BM, P06600651); Cuanza Norte, without precise locality, no date (fr.), *Gossweiler 4799* (COI p.p., see notes above); Vale do Zando, Cazengo, 800 m, 22.IX.1921 (fl. buds), *Gossweiler 8915* (BM); Catete, 1929 (fr.), *Gossweiler 9173* (BM, COI).

REMARKS

This species is still known from incomplete material only, no mature flowers having been collected; according to Welwitsch the fruits are black, which is unusual in the genus (they are more commonly red or orange), and the leaves are dry even in the fresh state. It is not to be confused with *Teclea welwitschii* (Hiern) I. Verd. (Verdoorn 1926: 408) [basonym: *Zanthoxylum welwitschii* Hiern (1896: 114)], which is a synonym of *Vepris grandifolia* (Engl.) Mziray, a trifoliolate species.

The original description of *Glycosmis welwitschii* mentions a single collection, *Welwitsch 471*, but two different localities and dates: “on dry bushy rocky hills between Camutanda [Camutamba] and Quicanda, in young fr. Sept. 1857; also in mountainous rocky situations above Tandambondo, in young fr. Sept. 1854”. It is known that Welwitsch commonly grouped under the same number collections from different places that he considered conspecific (Albuquerque *et al.* 2009). One of the sheets in LISU, which has fruits better developed than the other and an unequivocal indication of locality in Welwitsch's handwriting, is here selected as lectotype; other sheets of the same number should be regarded as syntypes. The sheet in BM bears two contradictory indications of localities and dates – corresponding to those given in the protologue – so its exact origin is unclear.

Exell's (1929) transfer of *Glycosmis welwitschii* Hiern to the genus *Vepris* was overlooked by Stone (1985: 23) who in his monograph of *Glycosmis* treated this species as imperfectly known and commented “this is almost certainly *G. parviflora* run wild as a naturalized plant here as in São Tomé island”. This is actually not the case: while the Asian *Glycosmis parviflora* (Sims) Little is occasionally cultivated in Africa – Stone (1985: 15) cites one collection from Angola and the first author has seen two from the Democratic Republic of Congo – it does not seem to have naturalised anywhere, has never been recorded from São Tomé (as far as we know) and is in any way quite different from *Vepris welwitschii*, which is certainly a native African species.

The original description of *V. gossweileri* I. Verd. (Verdoorn 1926) does not specify the herbarium of deposit of the type, *Gossweiler 4895*, but the locality cited, “Loanda: Cazengo”, is a strong indication that the specimen in Kew (consisting of two parts labelled Sheet I and Sheet II) was the one studied; the sheets in BM and COI bear a more precise indication of locality. Accordingly the Kew specimen is here designated as lectotype.

The specimen *Gossweiler* 4799 is a mixture of two different species. One sheet in BM and two in COI [COI00040957, COI00040958] represent the trifoliate species *V. grandifolia* (Engl.) Mziray, to which they were correctly referred by Exell & Mendonça (1951: 270, as *Teclea grandifolia* Engl.). A single sheet of the same number in COI [COI00040963], with unifoliate leaves, was cited as *Teclea gossweileri* by Exell & Mendonça (1951: 271) but actually represents *V. welwitschii*.

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