Lurking in the Shadows: A New Species of *Drypetes* (Putranjivaceae) from Central Africa Hiding in Forest Plots and Herbaria

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Abstract. Here we publish a new species of forest tree of the genus *Drypetes* Vahl (Putranjivaceae), *D. umbricola* D. J. Harris & Quintanar, which has a wide distribution in Central Africa (Cameroon, Central African Republic, Democratic Republic of the Congo, Gabon, and Republic of the Congo). It is known from 70 herbarium collections and additional sterile plot vouchers. A differential diagnosis, detailed morphological description, photographs, an illustration, and information about its habitat, distribution, and conservation status are provided.

Key words: Central Africa, *Drypetes*, new species, Putranjivaceae.

The new species published here belongs to *Drypetes* Vahl (Putranjivaceae, order Malpighiales), a pantropical genus of approximately 210 species (Govaerts et al., 2000) of dioecious trees and shrubs of which 70 species are said to occur in Africa and Madagascar (Radcliffe-Smith, 2001), although we predict this number will rise. It has been suggested that the genus is an indicator of "good-quality," undisturbed forests (Cheek et al., 2019). Its morphology is characterized by simple, alternate or subdistichous petiolate leaves, the bases with oblique to unequal sides. The flowers are solitary or clustered in inflorescences arranged in the leaf axils or cauliflorous on the branches or trunk. Both

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male and female flowers are apetalous and bear a nectariferous disk that, in the male ones, is surrounded or penetrated by a variable number of stamens (Pax & Hoffmann, 1922; Radcliffe-Smith, 2001).

In rainforest plots across the tropics, parataxonomists, ecologists, and taxonomists find it hard to identify trees in the genus *Drypete*s. The first explanation for this is the lack of global taxonomic revision since Pax and Hoffmann (1922). The second reason is that it is a very diverse group, with up to 16 species occurring in one set of forest plots (Harris, 2002). The third reason is that the inconspicuous flowers and small fruit are, in many species, 10–30 m high in the crown and rarely observed. In addition, species of *Drypetes* can range from narrow endemics to widely distributed species. With no recent revision and the acquisition of large numbers of new herbarium specimens since 1960, in many parts of the tropics it has become nearly impossible to accurately name all of the forest species of *Drypetes*. In Central Africa we report many *Drypetes* specimens being left unidentified at the genus level (for example, Sosef et al., 2006). Recently in Peru, *D. gentryana* Vásquez was described from a permanent plot (Vásquez, 2014) and was later found to occur over more than 1000 km in lowland Amazonia (Baker et al., 2017). In a parallel to the story of *D. gentryana*, the species we describe here has been collected in permanent forest plots and occurs across almost 2000 km of the Congo Basin. We believe that there are more undescribed species of *Drypetes* in plots in Africa, Asia, and South America.

During preparation of the taxonomic treatment of this genus for the forthcoming volume of *Flore du Gabon*, we examined many sterile plot vouchers of *Drypetes* in the herbarium at BRLU and compared them with more conventional fertile (and some sterile) specimens at BR, MO, P, and WAG. We also consulted all the protologues of the genus from Central Africa and images of the types available at JSTOR Global Plants. It became clear to us, eventually, that a group of specimens often left unidentified, or sometimes labeled as *D. klainei* Pierre ex Pax or *D. ituriensis* Pax & K. Hoffm., were conspecific with *Drypetes* sp. B of Harris and Wortley (2008). The species concept of Harris and Wortley took a long time to develop because of the difficulty in separating trees in plots of *D. ituriensis* and *Drypetes* sp. B, and the even greater difficulty of separating the sterile voucher specimens. In the field, it was found that the smell of the cut bark helped—in almost all individuals of *D. ituriensis* there was the sharp chemical smell of mustard oils, similar to but weaker than the smell of *D. gossweileri* S. Moore or reminiscent of the seeds of a green papaya (*Carica papaya* L.). In contrast, the cut bark of *Drypetes* sp. B smelled vaguely fruity but with no smell of mustard oils. The color of the slash was very close in both species. Sometimes individuals of *D. ituriensis* had spines on the trunk, and when these spines fall off, scars that look like pursed lips were left on the trunk. The flushing leaves of *D. ituriensis* were observed to be whitish and those of *Drypetes* sp. B were reddish. However, for 20 years Harris and a team of field assistants, born or raised in the forest, were not able to confidently separate the two species, so they continued to collect sterile vouchers. In the herbarium, the leaf shape is slightly different and the undersurface of the leaf of *Drypetes* sp. B dries a pale gray. The undersurface of dried *D. ituriensis* leaves can look a little grayish, sometimes having a purplish bloom, but the tertiary venation is more distinct and raised than that in the new species.

Drypetes sp. B undoubtedly belongs to the same species group as *D. klainei* and *D. ituriensis*, both forest trees. The first has a very discontinuous distribution from Liberia in West Africa to Gabon and the Republic of the Congo (Brazzaville) in Central Africa. *Drypetes ituriensis* ranges from central Cameroon to the eastern Democratic Republic of the Congo. This group is characterized by axillary male flowers with a flat to slightly concave central nectariferous disk surrounded by few, habitually four stamens; female flowers also axillary, with 2-celled ovaries and 2-branched short styles with flabellate stigmas; and leaves with an entire to slightly undulate, flat to slightly recurved margin. These two closely related species were classified into two different sections, *D. klainei* in *Drypetes* sect. *Oligandrae* Pax & K. Hoffm. and *D. ituriensis* in *Drypetes* sect. *Stenogynium* (Müll. Arg.) Pax & K. Hoffm. (Pax & Hoffmann, 1922). From our point of view, both species belong to the same group and therefore should be classified in the same section. Our team is currently working on the typification and amendment of the sections of *Drypetes* and, until this is carried out, we have decided, for the moment, to leave aside the sectional classification of these species. In this article, we describe *Drypetes* sp. B as *D. umbricola* D. J. Harris & Quintanar and discuss its similarities to and differences from the aforementioned species and two others that are similar and previously classified in *Drypetes* sect. *Oligandrae*. The first of those, *D. urophylla* Pax & K. Hoffm., is another forest tree that occurs from Cameroon to the Democratic Republic of the Congo. The second, *D. kamerunica* Pax & K. Hoffm., is a poorly known species of shrub described from Cameroon and very rarely collected. An identification key to this group of Central African species has been provided; in addition, we summarize distinctions among these species in Table 1.

We provide here a differential diagnosis for *Drypetes umbricola*, a detailed morphological description, an illustration, photographs taken in situ, a distribution map, a list of the studied material, and all available

Table 1. Distinguishing morphological characters of *Drypetes umbricola* D. J. Harris & Quintanar and similar species in Central Africa.

	D. ituriensis	*D. kamerunica*	*D. klainei*	*D. umbricola*	*D. urophylla*
Leaf blade size (cm)	(6–)8–9.2(–11) × (2.3–)3.2–4	8–13 × 2.5–6	(3.1–)4–5.3(–7.8) × (1.4–)1.6–2(–2.4)	(8–)8.7–12.3(–14.4) × (3.2–)3.9–5.5(–7.3)	(8.7–)9.4–11.4 × (3.3–)3.6–3.9
Leaf blade shape	narrowly elliptic or lanceolate	elliptic-ovate	obliquely ovate or lanceolate	elliptic	elliptic
Leaf blade margin (distal half)	crenulate	entire	entire		entire
Leaf blade basal nerves	running parallel to the leaf margin for about half the length of the leaf	not running parallel to the leaf margin or if so for a much shorter distance	not running parallel to the leaf margin or if so for a much shorter distance	not running parallel to the leaf margin or if so for a much shorter distance	not running parallel to the leaf margin or if so for a much shorter distance
Leaf blade tertiary venation	raised	raised	obscure	obscure	raised
Leaf blade undersurface color (dried)	dull green	dull green	whitish dull green	whitish gray	dull green
Petiole pubescence	shortly pubescent, glabrescent	glabrous	shortly and densely pubescent	shortly pubescent	glabrous
Male flower pedicel length (mm)	4.5–6	3.6–5	(2–)3.2–4.9(–5.6)	(2.3–)2.6–3.4(–3.9)	5–10

information about its habitat, distribution, and conservation status. We hope this work will serve to attract attention and interest and promote further studies on this new species of tree, which has a very wide distribution and which has remained undescribed and therefore ignored until now. Other undescribed species of tree are still waiting to be discovered in permanent forest plots across the tropics and in piles of unidentified voucher specimens. *Drypetes umbricola* is just one example of the discoveries waiting to be made in the Central African forests, threatened by deforestation in many areas. Additional information on the biology and ecological roles of *D. umbricola* will provide information required to help conserve the valuable ecosystems that it inhabits.

Materials and Methods

The description presented here, as well as all the information about habitat and distribution, is based on the revision of 70 collections of *Drypetes umbricola* from B, BR, BRLU, C, E, EA, G, HBG, IEC, IFAN, K, LBV, LG, MA, MO, NY, P, PRE, S, SRGH, WAG, and YA (Thiers, 2020), as well as many sterile and still unmounted plot vouchers (more than 35). Measurements of quantitative morphological characters were carried out using a Mitutoyo CD-15CD digital caliper (Mitutoyo, Kawasaki, Japan) and a manual scale with precision of 0.1 mm. The descriptive terminology follows that used in Stearn (1973). Characters were selected because they have been commonly used in *Drypetes* taxonomy or because they were observed to be variable in the studied specimens.

The information about the habitat of the involved species, as well as their phenology and chorology, were based on collection data from labels. We also present a detailed drawing of *Drypetes umbricola* and three photographs that illustrate its habit and morphology. The only fruiting specimens of *D. umbricola* belong to the collection *T. B. Hart 858*, which has two deformed, maybe bitten, fruits that were not drawn, and *D. J. Harris 8184*, which consists of ripe fruits and two leaves picked up under a tree of *D. umbricola* and dried in a well-tightened press.

Geographical data were used to build a distribution map for *Drypetes umbricola* with ArcView 3.2 (ESRI, 2000). A preliminary assessment of conservation status using the IUCN Red List Categories and Criteria (IUCN, 2012) is provided. The geographical parameters of area of occupancy (AOO) and extent of occurrence (EOO), estimated using a 2 × 2 km grid, were calculated using GeoCAT (Bachman et al., 2011).

Taxonomic Treatment

Key to *Drypetes umbricola* and similar species in Central Africa

1. Leaf margin crenulate toward the apex; petiole shortly pubescent, sometimes glabrescent.
   2. Leaves (6–)8–9.2(–11) × (2.3–)3.2–4 cm; basal lateral nerves of the leaf running parallel to the leaf margin for about half the length of the leaf; undersurface of dried leaf with raised tertiary venation and dull green color; pedicel of male flowers 4.5–6 mm long; cut bark smelling of mustard oils. . . . . *D. ituriensis* Pax & K. Hoffm.
   2′. Leaves (8–)8.7–12.3(–14.4) × (3.2–)3.9–5.5(–7.3) cm; basal lateral nerves of the leaf not running parallel to the leaf margin or if so for a much shorter distance; undersurface of dried leaf with obscure tertiary venation and whitish gray color; pedicel of male flowers (2.3–)2.6–3.4(–3.9) mm long; cut bark not smelling of mustard oils . . . . . *D. umbricola* D. J. Harris & Quintanar
1′. Leaf margin entire toward the apex; petiole densely and shortly pubescent or glabrous.
   3. Petiole shortly and densely pubescent; leaves (3.1–)4–5.3(–7.8) × (1.4–)1.6–2(–2.4) cm, obliquely ovate or lanceolate, the margin not or hardly undulate apically. . . . . *D. klainei* Pierre ex Pax
   3′. Petiole glabrous; leaves 8–13 × 2.5–6 cm, elliptic-ovate to narrowly elliptic, the margin habitually undulate apically.
      4. Pedicel of male flower 3.6–5 mm long; leaves elliptic-ovate, the base acute to slightly obtuse. . . . . .*D. kamerunica* Pax & K. Hoffm.
      4′. Pedicel of male flower 5–10 mm long; leaves narrowly elliptic, the base acute. . . . . *D. urophylla* Pax & K. Hoffm.

Drypetes umbricola D. J. Harris & Quintanar, sp. nov. TYPE: Cameroon. Station du Cacaoyer de N'Koemvone, 14 km on the rd. from Ebolowa to Ambam, 2°49′N, 11°8′E, 3 Oct. 1975 (fl. ♂), *J. J. F. E. de Wilde 8491* (holotype, MO-04573060!; isotypes, B [barcode] 10 0048211!, BR [bc] BR0000016004689!, C 18/2014 34!, EA!, HBG 46/2307!, K not seen, LG not seen, MA 534587!, NY!, P [bc] P04707555 photo!, PRE!, SRGH not seen, WAG [bc] WAG.1579100 photo!, WAG [bc] WAG.1579101 photo!, YA not seen). Figures 1, 2.

Diagnosis. Differt haec species a propinqua *Drypete ituriensi* Pax & K. Hoffm. foliis plerumque maioribus, nervis basalibus lateralibus foliorum ad margines non vel multo brevius parallele currentibus, foliis siccis subtus cinereis nervatione tertiaria obscura, pedicello florum masculinorum breviore, cortice secto sinapi non olente.

Tree 10–40 m tall; trunk 12–40 cm diam., sometimes spiny, bark rather smooth, pale brown, with small whitish lenticels, slash smooth, yellowish, sometimes with a sharp (acidic) and weak fruity smell, bole rather cylindrical with at the very base some low small but-

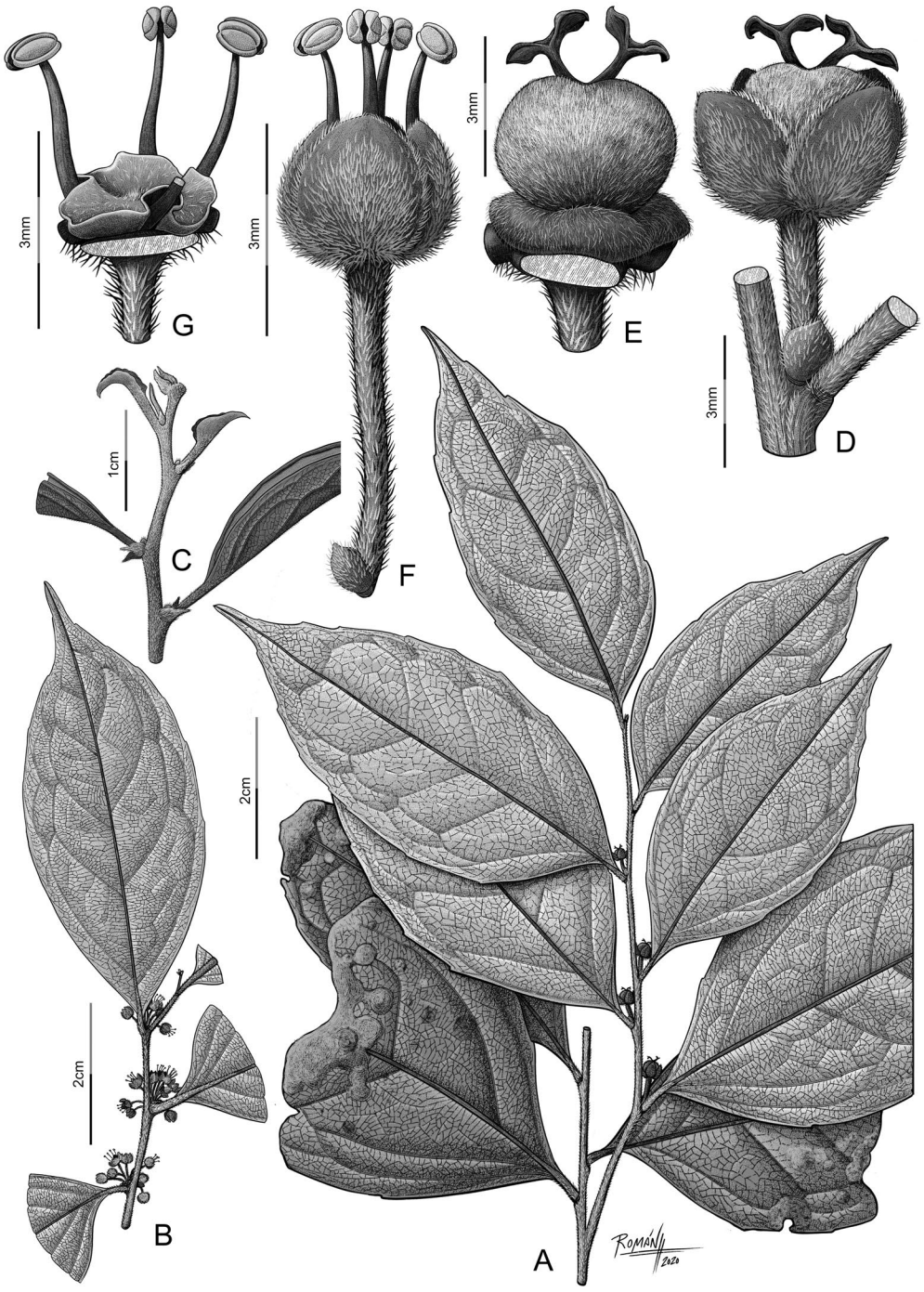

Figure 1. *Drypetes umbricola* D. J. Harris & Quintanar. —A. Branchlet, leaves, and female flowers. —B. Branchlet and male inflorescences. —C. Apical tip showing stipules. —D. Female flower. —E. Female flower without sepals, showing the disk. —F. Male flower. —G. Male flower without sepals and one stamen, showing the disk. A, D–E based on *J. M. Reitsma & B. Reitsma 1658* (NY). B, F–G based on *J. J. F. E. de Wilde 8491* (MA). C based on *D. J. Harris et al. 6597* (E). Illustration by Román García Mora.

Figure 2. *Drypetes umbricola* D. J. Harris & Quintanar. —A. Base of the trunk showing buttresses. —B. Slash of the bark. —C. Apical tip showing stipules. A, B based on *D. J. Harris 8810* (unmounted specimen at E). C based on *D. J. Harris et al. 6597* (E). Photographs by D. J. Harris.

tresses, up to 1 m high and 1.5 m wide at ground level, occasionally forked; branchlets shortly pubescent, trichomes 0.1–0.3 mm, sometimes then glabrescent; buds shortly pubescent, trichomes 0.1–0.2(–0.3) mm. Leaves alternate, simple; petiole (3.1–)3.9–5.1(–6.3) × 0.8–1.4 mm, shortly pubescent, trichomes up to 0.3 mm; stipules narrowly triangular to lanceolate, 2–3 × 0.3–0.7 mm, soon deciduous, shortly pubescent, trichomes 0.1–1.2 mm, scattered; leaf blade elliptic, (8–)8.7–12.3(–14.4) × (3.2–)3.9–5.5(–7.3) cm, papery to coriaceous, discolorous, dark green above, whitish gray and dull beneath; apex acuminate, (5–)11.4–16 (–19.1) mm; base oblique, acute; margin flat to slightly recurved, obscurely toothed to crenulate toward apex, with teeth up to 0.4 mm; adaxial and abaxial surfaces glabrous; secondary nerves 3 to 6 on right side, ascending. Male inflorescence axillary, 10 to 20 flowers per fascicle; bracts (0.9–)1.3–1.5 × (0.7–)1.3–1.6 mm, elliptic to broadly orbicular, quite irregular in shape, trichomes 0.05–0.1(–0.2) mm. Male flowers with pedicel (2.3–)2.6–3.4(–3.9) × 0.2–0.4 mm, shortly pubescent, trichomes up to 0.2 mm; sepals 4, (1.5–)1.7–2.1(–2.3) × (1.1–)1.6–1.9(–2.1) mm, shortly pubescent outside, trichomes 0.05–0.1(–0.2) mm, shortly pubescent inside, trichomes up to 0.2 mm, then glabrescent, with marginal cilia up to 0.2 mm; stamens 4, arranged in 1 whorl around margin of disk, filaments (1.9–)2.2–3.3(–3.8) mm, anthers 0.4–0.7 × 0.3–0.7 mm, glabrous; disk (0.6–)1.3–1.9 mm diam., up to 0.4 mm high, flat-concave, often cup-shaped, margin entire, somewhat undulate, slightly protruding between stamen filaments, without pistillode, glabrescent, initially pubescent, trichomes up to 0.05 mm, minute, sparse, sometimes with a central lock of trichomes up to 1 mm. Female inflorescence axillary, flower solitary; bracts 1.3–1.5 × 1.8–2 mm, broadly orbicular, quite irregular in shape, trichomes up to 0.05 mm. Female flowers with pedicel 2.3–2.5 × 0.7–0.9 mm, shortly pubescent, trichomes up to 0.2 mm; sepals 4, 3.1–3.4 × 3.2 mm, shortly pubescent outside, trichomes up to 0.1 mm, glabrescent inside, trichomes up to 0.1 mm, with marginal cilia up to 0.2 mm; style 1.6–1.9 mm, 2-branched, branches free; stigma 0.3–0.4 × 2.6 mm, narrowly flabellate; ovary 2.7 × 3.3 mm, globose, greenish to pinkish, (1- to)2-celled, shortly pubescent, trichomes up to 0.1 mm; disk 3.3–3.5 mm in diam., 0.6–1 mm high, cup-shaped, encircling ovary base, minutely pubescent, trichomes up to 0.05 mm. Fruit globose, 8–15 mm diam., without persistent sepals; pedicel 5–8 mm; seeds 2.

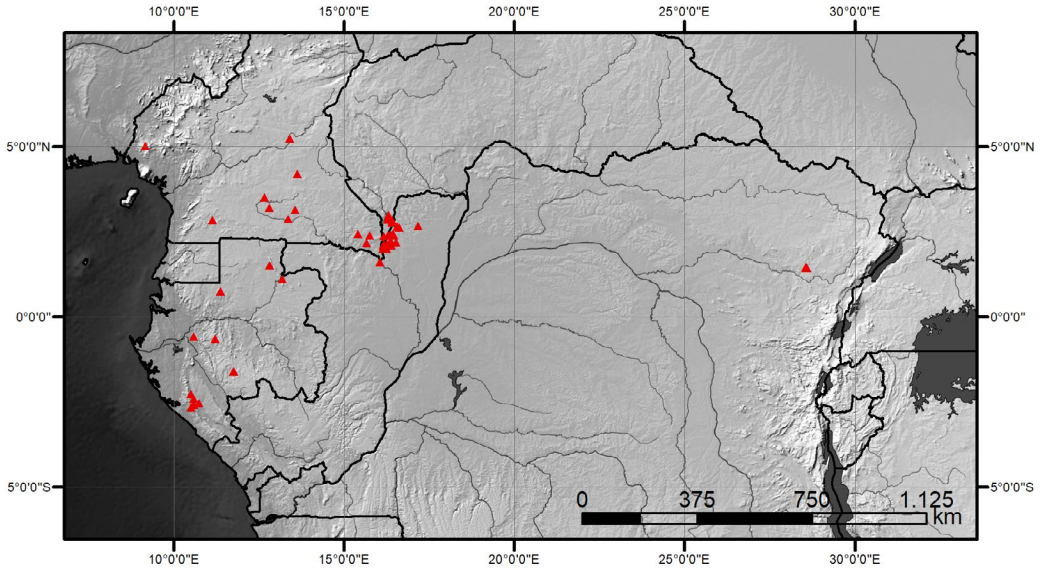

Figure 3. Distribution map of *Drypetes umbricola* D. J. Harris & Quintanar.

Distribution and habitat. *Drypetes umbricola* is found in Cameroon, the Central African Republic, Gabon, the Democratic Republic of the Congo, and the Republic of the Congo (Fig. 3) in primary and secondary mixed-species semi-evergreen, monodominant evergreen forests of *Gilbertiodendron dewevrei* (De Wild.) J. Léonard (Fabaceae), terra firma forests, and riverine forests at 100–1100 m elevation.

IUCN Red List category. The extent of occurrence (EOO) is estimated to be more than 1 million km^2 (far exceeding the 20,000 km^2 upper limit for Vulnerable status under criterion B1 of the IUCN Red List), whereas its area of occupancy (AOO) is estimated to be 212 km^2 (which falls within the limits for Endangered status under criterion B2). The species is known from 92 collections representing 54 occurrences, and 22 subpopulations in five countries across the Congo Basin. These 22 subpopulations represent 28 different locations (sensu IUCN Standards and Petitions Committee, 2019), thus the number of locations does not meet the threshold for any of the threatened categories. *Drypetes umbricola* has been collected in several protected areas in the Central African Republic (Dzanga Sangha National Park), Cameroon (Réserve de Biosphère du Dja), the Democratic Republic of the Congo (Okapi Wildlife Reserve), Gabon (Lopé, Moukalaba-Doudau and Minkébé National Parks), and the Republic of the Congo (Nouabalé-Ndoki National Park). In addition, it is widely distributed across the region. It survives and regenerates in areas that have been lightly logged. Abundance data are only available from the Sangha Trinational, where it occurs at the density of approximately one stem greater than 10 cm DBH per hectare. With the current available data, we cannot predict any decline for *D. umbricola* or extreme fluctuations in any of the parameters established by the IUCN. Notwithstanding human activities with varying levels of impact, *D. umbricola* seems to be an abundant and widespread species. It is assigned a preliminary status of Least Concern (LC).

Etymology. The epithet *umbricola*, meaning "shade-" or "shadow-dweller," was chosen because the new species remained hidden in the shadow of the more common *D. ituriensis* in the forest and in the herbaria for so long. Like many species of *Drypetes* in the Congo Basin, it is a small to medium-sized tree and only rarely is exposed to full sunlight in the occasional individual that reaches the canopy.

Vernacular names. This species and three other species of *Drypetes* are called "tembo" in the Bambenjele and Bangombe languages in Cameroon, the Central African Republic, and the Republic of the Congo.

Abundance data. In 11 ha of plots in the Central African Republic (Hall et al., 2003), trees above 10 cm DBH (diameter at 1.3 m) were measured and identified, and the density of this species is 0.92 ha^{-1}. Regeneration plots recording individual trees and shrubs 2.5–10 cm DBH were also sampled as subplots in the

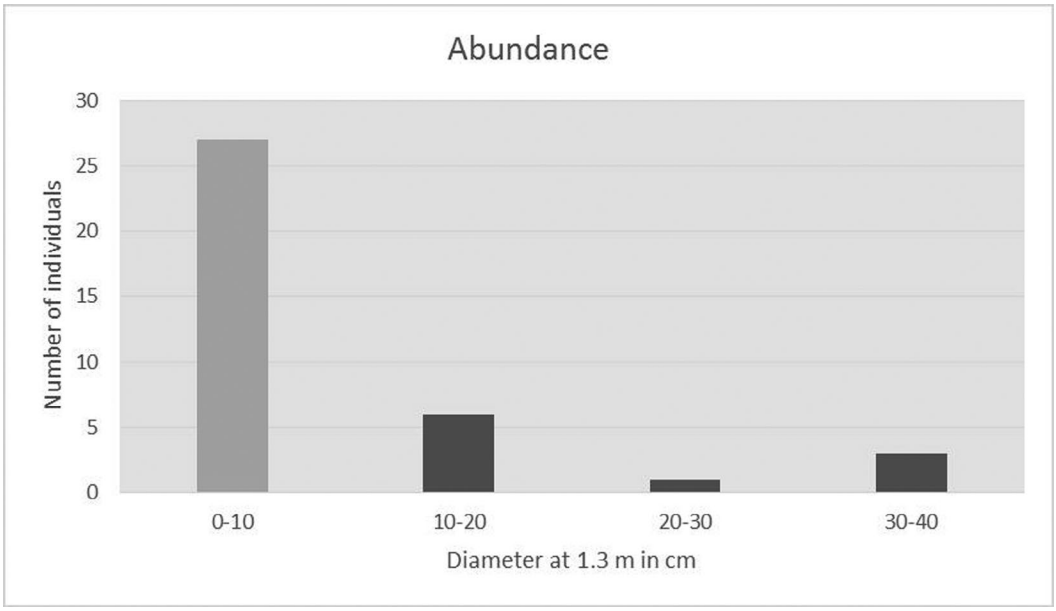

Figure 4. Abundance distribution of trees of *Drypetes umbricola* D. J. Harris & Quintanar in 11 ha of plots in the Sangha Trinational. The results for size class 2.5–10 cm DBH were extrapolated from a subsample of 1.21 ha.

same study. For these smaller trees, 1.21 ha were sampled and three individuals of *Drypetes umbricola* were recorded. This density was extrapolated to give 27 small stems over the 11 ha (Fig. 4).

Taxonomic notes. *Drypetes umbricola* belongs to the species group of *D. ituriensis* and *D. klainei*, whose names have been used to identify the material belonging to this new species with some frequency, either because the leaf shape often resembles that of *D. ituriensis*, or because it has pubescent petioles, as do *D. klainei* and many populations of *D. ituriensis*. This species group, enlarged in Central Africa with the species pair of *D. kamerunica* and *D. urophylla*, is characterized by axillary male flowers with a characteristic cuplike, central nectariferous disk surrounded by few, habitually four stamens, and female flowers with 2-celled ovaries and 2-branched short styles with flabellate stigmas. *Drypetes kamerunica* is a very poorly known species that may turn out to be conspecific with *D. urophylla*.

All of these species were classified in *Drypetes* sect. *Oligandrae* except *D. ituriensis*, which was classified in *Drypetes* sect. *Stenogynium* (Pax & Hoffmann, 1922). From our point of view, all the aforementioned species belong to the same natural group as *D. umbricola*, and therefore all of them should be classified in the same section. The typification and amendment of the sections of *Drypetes* will be carried out in the near future in conjunction with molecular phylogenies. For the moment, we judge it prudent to leave aside the sectional classification of these species.

Drypetes klainei can be easily differentiated from *D. umbricola* due to its much smaller leaves, (3.1–)4–5.3(–7.8) × (1.4–)1.6–2(–2.4) cm. In addition, its obliquely elliptic to narrowly elliptic leaves with entire margins are unusual for the genus in Central Africa. There are some populations of *D. ituriensis* with smaller leaves and glabrescent petioles, but those leaves are (6–)8–9.2(–11) × (2.3–)3.2–4 cm and therefore larger than *D. klainei*. Our new species, *D. umbricola*, can be distinguished from *D. ituriensis* because it lacks the typical nervation pattern of the leaf underside of *D. ituriensis*, which has the basal lateral nerves running parallel to the leaf margin for about half the length of the leaf, and because it has shorter pedicels in male flowers: (2.3–)2.6–3.4(–3.9) mm versus 4.5–6 mm long in *D. ituriensis*. Both *D. kamerunica* and *D. urophylla*, if indeed they are separate, are not to be confused with *D. umbricola*, since they are species with glabrous petioles and entire leaf margins.

Paratypes. CAMEROON. **East:** Alat-makay, 2°51′N, 13°21′E, 12 May 2000 (st.), *Betti 1136* (BRLU); Lobeke Reserve, 2°09′N, 15°39′E, 13 Nov. 1998 (st.), *Harris et al. 6407* (E); *Gilbertiodendron dewevrei* forest close to Mambele crossroads on the Moloundou to Yokadouma rd., 2°25′N, 15°24′E, 14 Nov. 1998 (st.), *Harris et al. 6417* (E); Lobeke Reserve. ca. 2 km from Djaloumbe bai on the path to rd., 2°22′N, 15°45′E, 27 Nov. 1998 (st.), *Harris et al. 6597* (E); Lobeke Reserve. ca. 2 km from Djaloumbe bai on the path to rd., 2°22′N, 15°45′E,

27 Nov. 1998 (st.), *Harris et al. 6617* (E); Ekom, proche Lomié (vente de coupes sur la zone), 3°7′N, 13°34′E, 18 Nov. 2013 (st.), *IRD plot 888 (M. Libalah, N. Kamdem, G. Kamdem & C. Wonkam)* (BRLU); Parc National de Deng-Deng, 5°13′N, 13°24′E, 14 Aug. 2014 (st.), *IRD plot 1215 (M. Libalah, N. Kamdem, D. Zebaze, G. Mofack, N. Texier & O. Ngana)* (BRLU); SE de Grand Pol près de la rivière Petit Sezok, Feuille IGN 1/200.000 BERTOUA, 4°11′N, 13°37′E, 6 Mar. 1960 (fl. ♂), *R. Letouzey 3223* (BR, G not seen, HBG, IFAN not seen, K not seen, MO, P, S, WAG, YA); à 10–20 km au NW de Ngola, feuille IGN 1/200.000 ABONG-MBANG, 3°29′N, 12°40′E, 4 Apr. 1961 (st.), *R. Letouzey 3719* (P, YA); à 10–20 km au NW de Ngola, feuille IGN 1/200.000 ABONG-MBANG, 3°29′N, 12°40′E, 6 Apr. 1961 (st.), *R. Letouzey 3739* (P); Réserve de Biosphère du Dja, à 500 m de la station de Bouamir, 3°11′N, 12°48′E, 28 May 2001 (st.), *B. Senterre & S. Kouob 1649* (BRLU). **Southwest:** Banyong, Batanga area, betw. Awong & Banyu, ca. 15 km W of Manyemen, transect 4, 5°0′N, 9°10′E, 3 May 1988 (st.), *A. Gentry & D. Thomas 62483* (MO).

CENTRAL AFRICAN REPUBLIC. **Sangha-Mbaéré:** 45 km S of Lidjombo, Ndakan gorilla study area M 100 to M 5600, 2°21′N, 16°10′E, 28 Feb. 1989 (fl. ♂), *Harris & Fay 1955* (E, MO, WAG); Kongana research camp, 2°47′N, 16°25′E, 23 Dec. 1993 (st.), *Harris 4179* (E); 25 km SE of Bayanga, Kongana research camp, 2°47′N, 16°25′E, 20 Feb. 1994 (st.), *Harris 4719* (E); Kongana camp, 25 km SE of Bayanga, 2°48′N, 16°25′E, 24 Oct. 2000 (st.), *Harris 6825* (E); Kongana camp, 25 km SE of Bayanga, 2°45′N, 16°25′E, 27 Oct. 2000 (st.), *Harris 6875* (E); Kongana camp, 25 km SE of Bayanga, 2°45′N, 16°25′E, 30 Oct. 2000 (st.), *Harris 6952* (E); Madibwé, close to St. Francois rd., ca. 12 km NE of Bayanga, 2°58′N, 16°18′E, 6 May 2001 (st.), *Harris 7582* (E); Madibwé, close to St. Francois rd., ca. 12 km NE of Bayanga, 2°58′N, 16°18′E, 8 May 2001 (st.), *Harris 7615* (E); Madibwé, close to St. Francois rd., ca. 12 km NE of Bayanga, 2°58′N, 16°18′E, 8 May 2001 (st.), *Harris 7616* (E); Kongana camp, 25 km SE of Bayanga, 2°48′N, 16°25′E, 21 May 2001 (st.), *Harris 7793* (E); Kongana camp, 25 km SE of Bayanga, 2°48′N, 16°25′E, 24 May 2001 (st.), *Harris 7851* (E); Mondika study site, 42 km SE of Lidjombo, 2°22′N, 16°17′E, 7 July 2002 (st.), *Harris 8177* (E); Mondika study site, 42 km SE of Lidjombo, 2°22′N, 16°17′E, 7 July 2002 (fr.), *Harris 8184* (E).

DEMOCRATIC REPUBLIC OF THE CONGO. **Ituri:** Zone de Mambasa, Ituri Forest, Epulu, 1°25′N, 28°35′E, 9 Mar. 1983 (fl. ♂), *Hart 431* (BR, MO); Zone de Mambasa (Ituri), 1°25′N, 28°35′E, 20 Jan. 1988 (fl. ♂), *Hart 808* (BR, MO); Zone de Mambasa, Ituri Forest, Epulu, 1°25′N, 28°35′E, 7 June 1988 (fr.), *Hart 858* (BR, MO); Zone de Mambasa (Ituri Forest), Afarama, 1°26′N, 28°33′E, 20 Feb. 1992 (fl. ♂), *Mayali [Collection of Hart 1343]* (BR, MO); Ituri Distr., Lodjo Camp, pt. 088 to pt. 089, 26 Oct. 2010 (st.), *Luke 14648* (BR, EA not seen).

GABON. **Ngounié:** Bouvala, à environ 14 km à l'est de Mimongo, 1°37′S, 11°45′E, 7 Oct. 2007 (st.), *MBG transect 155 (Leal et al.)* (BRLU); Bouvala, à environ 14 km à l'est de Mimongo, 1°37′S, 11°46′E, 12 Oct. 2007 (st.), *MBG transect 1558 (Leal et al.)* (BRLU); CFAD de Rimbunan Hijau, au Sud-Ouest du Parc National de la Lopé, 0°40′S, 11°13′E, 28 Feb. 2009 (st.), *Dauby et al. 1647* (BRLU, WAG not seen); ca. 40 km SW of Doussala, Inventory, 2°33′S, 10°44′E, 17 July 1986 (st.), *J. M. Reitsma & B. Reitsma 2407* (LBV, MO, NY, WAG); Chantier CEB, ca. 50 km SW of Doussala, 2°36′S, 10°35′E, 18 Oct. 1985 (fl. ♀), *J. M. Reitsma & B. Reitsma 1658* (C, MA, MO, NY, WAG); Doudou Mtns., ca. 50 km SW of Doussala, Inventory, 2°26′S, 10°35′E, 7 Jan. 1987 (st.), *J. M. Reitsma & B. Reitsma 2771* (LBV, NY, WAG); Inventory, chantier CEB, ca. 50 km SW of Doussala, 2°36′S, 10°35′E, 18 Oct. 1985 (st.), *J. M. Reitsma & B. Reitsma 1661* (LBV, NY, WAG); Inventory, chantier CEB, ca. 50 km SW of Doussala, 0°36′S, 10°35′E, 17 Oct. 1985 (st.), *J. M. Reitsma & B. Reitsma 1681* (LBV, NY, WAG); Inventory chantier CEB, ca. 50 km SW of Doussala, 2°36′S, 10°35′E, 21 Oct. 1985 (st.), *J. M. Reitsma & B. Reitsma 1704* (LBV, NY, WAG). **Ogooué-Ivindo:** Bélinga, 1°5′N, 13°11′E, July 1966 (st.), *Hallé & Le Thomas 711* (P, WAG not seen). **Ogooué-Maritime:** 32 rd.-km N of Igotchi-Mouenda, Bakker timber concession, 2°41′S, 10°30′E, 12 May 1997 (st.), *McPherson 16953* (MO, WAG not seen); ± 17 km sur la route à partir de Doussala dans une direction Nord-Ouest, 2°17′S, 10°30′E, 23 Mar. 2000 (st.), *Sosef 1384* (LBV, WAG not seen). **Woleu-Ntem:** Sud-Est du Parc National de Minkébé, aux abords de la rivière Sing, 1°29′N, 12°48′E, 12 Aug. 2009 (st.), *Dauby et al. 2044* (BRLU, WAG not seen); Sud-Est du Parc National de Minkébé, aux abords de la rivière Sing, 1°29′N, 12°49′E, 14 Aug. 2009 (st.), *Dauby et al. 2067* (BRLU, WAG not seen); Chantier Rougier Ocean, Oveng Inventory, 0°44′N, 11°22′E, 24 June 1985 (st.), *J. M. Reitsma & B. Reitsma 1205* (LBV, MO, NY, WAG); Inventory, ca. 25 km SW of Mintsic, 0°44′N 11°22′E, 3 Mar. 1986 (st.), *J. M. Reitsma & B. Reitsma 2007* (LBV, MO, NY, WAG); ca. 15 km NE of Oveng, Inventory, 0°44′N, 11°22′E, 9 May 1986 (st.), *J. M. Reitsma & B. Reitsma 2194* (LBV, MO, NY, WAG).

REPUBLIC OF THE CONGO. **Likouala:** N side of Sombo stream, 8 km N of Makao, 150 km NW of Impfondo, 2°39′N, 17°10′E, 25 Apr. 1995 (st.), *Harris 5284* (E); Parc National de Nouable Ndoki, ca. 130 km NNE of Ouesso, 2°36′N, 16°37′E, 13 Mar. 2017 (st.), *Harris 10076* (E, IEC). **Sangha:** Ouesso, 1°36′N, 16°3′E, 7 May 1971 (st.), *Grison 70* (P); Nouabalé-Ndoki National Park, Goualougo study site, 38 km E of Bomassa, 2°10′N, 16°31′E, 10 June 2002 (st.), *Harris 7954* (E, IEC); 29 km E of Kabo, 2°4′N, 16°20′E, 21 Feb. 2007 (st.), *Harris 8936* (E, IEC); 47.5 km NE of Kabo, Nouabalé-Ndoki National Park, 2°22′N, 16°22′E, 1 May 2007 (st.), *Harris & Ndolo Ebika 9039* (E, IEC); 56.5 km NE of Kabo, Nouabalé-Ndoki National Park, 2°24′N, 16°27′E, 4 May 2007 (st.), *Harris & Ndolo Ebika 9094* (E, IEC); 12.5 km NE of Kabo, 2°07′N, 16°10′E, 12 May 2007 (st.), *Harris & S. T. Ndolo Ebika 9197* (E, IEC); 16.5 km ENE of Kabo, 2°05′N, 16°14′E, 14 June 2007 (st.), *Harris 9230* (E, IEC); 16.5 km ENE of Kabo, 2°05′N, 16°14′E, 14 June 2007 (st.), *Harris 9233* (E, IEC); 27 km ENE of Kabo, 2°06′N, 16°19′E, 15 June 2007 (st.), *Harris 9241* (E, IEC); 18 km ESE of Kabo, 1°59′N, 16°14′E, 19 June 2007 (st.), *Harris 9332* (E, IEC); 18 km ESE of Kabo, 1°59′N, 16°14′E, 19 June 2007 (st.), *Harris 9338* (E, IEC); 10.5 km ESE of Kabo, 1°59′N, 16°09′E, 21 June 2007 (st.), *Harris 9357* (E, IEC); 10.5 km ESE of Kabo, 1°59′N, 16°09′E, 21 June 2007 (st.), *Harris 9358* (E, IEC); 39.5 km NE of Kabo, Nouabalé-Ndoki National Park, 2°5′N, 16°23′E, 12 Sep. 2013 (st.), *Medjibe 662* (E); 12.5 km NE of Kabo, 2°7′N, 16°10′E, 7 Sep. 2006 (st.), *Moukassa 113A* (E, IEC); 16.5 km ENE of Kabo, 2°5′N, 16°14′E, 22 Jan. 2007 (st.), *Moukassa 2240* (E, IEC); 55 km NE of Kabo, Nouabalé-Ndoki National Park, 2°22′N, 16°28′E, 26 Feb. 2007 (st.), *Moukassa 2801* (E, IEC); 14 km E of Kabo, 2°0′N, 16°12' E, 4 May 2007 (st.), *Moukassa 3986* (E, IEC); 8 km ENE of Kabo, 2°4′N, 16°9′E, 25 Nov. 2006 (st.), *Nzolani Silaho 1440* (E, IEC).

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