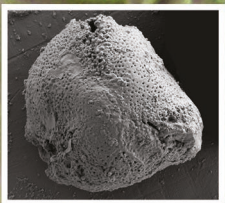


*Plukenetia kwangoensis* sp. nov.  
(Euphorbiaceae, Acalyphoideae, Plukenetieae),  
a new species of *Plukenetia* L.  
sect. *Hedraiostylus* (Hassk.) Müll.Arg.  
from Democratic Republic of Congo

Lynn J. GILLESPIE





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***Plukenetia kwangoensis* sp. nov.**  
**(Euphorbiaceae, Acalyphoideae, Plukenetieae),**  
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**sect. *Hedraiosstylus* (Hassk.) Müll.Arg.**  
**from Democratic Republic of Congo**

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**ABSTRACT**

*Plukenetia kwangoensis* sp. nov., a new species from savannas of western Democratic Republic of Congo, is described and illustrated. The species belongs to *Plukenetia* sect. *Hedraiosstylus* (Hassk.) Müll.Arg., an African and Asian section characterized by short styles, small dry capsules, small lenticular seeds, and foveolate pollen. It is morphologically most similar to *P. africana* Sond. from southern Africa, differing in its shorter petioles, absence of stipels at the petiole apex, leaf blades with narrowly acute bases and more numerous secondary veins, and shorter pistillate flower pedicels. The description of *Plukenetia* sect. *Hedraiosstylus* is emended to encompass the new species' erect habit and pinnately veined leaf blades; a key to the four species in the section is provided.

**RÉSUMÉ**

*Plukenetia kwangoensis* sp. nov. (Euphorbiaceae, Acalyphoideae, Plukenetieae), une nouvelle espèce de *Plukenetia* L. sect. *Hedraiosstylus* (Hassk.) Müll.Arg. de la République Démocratique du Congo.

*Plukenetia kwangoensis* sp. nov., une nouvelle espèce des savanes de l'ouest de la République Démocratique du Congo, est décrite et illustrée. L'espèce appartient à *Plukenetia* sect. *Hedraiosstylus* (Hassk.) Müll.Arg., une section africaine et asiatique caractérisée par des styles courts, des petites capsules sèches, des petites graines lenticulaires, et le pollen fovéolé. Il est morphologiquement le plus proche de *P. africana* Sond. d'Afrique australe, différant par ses pétioles plus courts, l'absence de stipelles à l'apex du pétiole, les limbes des feuilles avec des bases étroitement aiguës et des nervures secondaires plus nombreuses, et des pédicelles de fleurs pistillées plus courts. La description de *Plukenetia* sect. *Hedraiosstylus* est modifiée pour inclure le port dressé et les limbes des feuilles à nervation pennée de la nouvelle espèce; une clé des espèces de la section est fournie.

**KEY WORDS**

Euphorbiaceae,  
*Plukenetia*,  
Democratic Republic of  
the Congo,  
Kwango,  
savannas,  
identification key,  
new species.

**MOTS CLÉS**

Euphorbiaceae,  
*Plukenetia*,  
République  
démocratique du Congo,  
Kwango,  
savanes,  
clé d'identification,  
espèce nouvelle.

## INTRODUCTION

*Plukenetia* L. is a pantropical genus of vines, lianas, and perennial herbs belonging to Euphorbiaceae Juss. tribe Plukenetieae Hutch. The genus is distinguished by its 4-carpellate ovary and fruits, an unusual feature in the family, and pair of extrafloral nectaries at the base of the leaf blade on the adaxial surface (Gillespie 1993, 2007; Cardinal-McTeague & Gillespie 2020). Several species are cultivated and/or wild-harvested for their edible oil-rich seeds, including *P. conophora* Müll.Arg. (African walnut) in Africa (Akintayo & Bayer 2002; Amusa *et al.* 2014) and *P. carolis-vegae* Bussmann, Paniagua & C.Téllez, *P. × huayllabambana* Bussmann, C.Téllez & A.Glenn, and *P. volubilis* L. (Sacha Inchi, Inca peanut) in the Neotropics (Bussmann *et al.* 2013; Kodahl 2020; Kodahl & Sørensen 2021).

The palaeotropical species of *Plukenetia* were most recently revised by Gillespie (2007). Cardinal-McTeague & Gillespie (2020) proposed a revised sectional classification of the genus consisting of 6 sections and 25 recognized species, which is strongly supported by recent phylogenetic studies (Cardinal-McTeague & Gillespie 2016; Cardinal-McTeague *et al.* 2019; Cardinal-McTeague & Gillespie 2020). The seven known palaeotropical species belong to three sections, sects. *Angostylidium* Müll.Arg., *Hedraiosstylus* (Hassk.) Müll.Arg., and *Madagascarienses* Card.-McTeag. & L.J.Gillespie, which form a strongly supported but morphologically diverse palaeotropical clade. Cardinal-McTeague *et al.* (2019) estimated a South American origin for the genus in the mid Oligocene, with a single long distance dispersal event to Africa hypothesized in the early Miocene, where the lineage diversified (sects. *Angostylidium* and *Hedraiosstylus*), with subsequent dispersals to southeastern Asia (*P. corniculata* Sm., sect. *Hedraiosstylus*) and Madagascar (sect. *Madagascarienses*).

*Plukenetia* species display an immense variation in seed and fruit size and morphology. Seeds vary from 4.5 to 56 mm long, with an estimated volume of 28 to 38 000 mm<sup>3</sup>, with size correlated with plant size, fruit type, and dispersal and seedling ecology (Cardinal-McTeague *et al.* 2019). Species in section *Hedraiosstylus* are vines or perennial herbs with small, dry capsules that explosively dehisce and small seeds. At the other extreme, plants of *P. conophora*, the only species of sect. *Angostylidium*, are large, thick-trunked canopy lianas with very large, fleshy indehiscent fruit and very large seeds, and inhabit wet forest of central and west Africa. Species of sect. *Madagascarienses* have intermediate-sized seeds and fruits, which are tardily dehiscent, and are endemic to Madagascar.

Several years ago I was alerted to a possible new species of *Plukenetia* from the Democratic Republic of the Congo. The collection (Germain 2617) had been languishing in the Meise Botanic Garden Herbarium (BR) herbarium as an unidentified *Acalypha* L. for over 75 years, and was only recently recognized as belonging to *Plukenetia* by O. Lachenaud. The collection fits well within sect. *Hedraiosstylus*, but was from an area north of the two known species of the section in Africa, and considerably north of the range of the widespread *P. africana* Sond., to which it appeared most similar.

Here I describe a new species in *Plukenetia* sect. *Hedraiosstylus* from the Democratic Republic of the Congo based on this collection, emend the description of section *Hedraiosstylus* to encompass this species, and provide an updated key to the species of the section.

## MATERIAL AND METHODS

Specimens of the new species were borrowed from BR; herbarium acronyms follow Thiers (2022). The following on-line collection databases were searched for additional specimens: Global Biodiversity Information Facility (GBIF), Tropicos, and those of the BR, K, and P herbaria. Searches were also conducted for collections of *Plukenetia* not identified to species and those possibly misidentified from western Democratic Republic of the Congo and neighbouring countries.

Measurements were made on dried herbarium specimens, with the exception of staminate flowers, which were rehydrated using a solution of water with a drop of liquid soap. Pollen grains were isolated from several anthers and soaked in the same rehydrating solution, mounted on a glass slide, and examined and measured using a compound light microscope. Dry pollen grains were examined under a scanning electron microscope; material was insufficient for processing to remove pollenkitt.

The approximate locality of the only collection known was determined using satellite photos on Google Earth, gazeteers, online resources, and with the assistance of O. Lachenaud (BR). The species distribution basemap was modified from the Africa map on d-maps.com ([https://d-maps.com/carte.php?num\\_car=739](https://d-maps.com/carte.php?num_car=739)) and the satellite photo map from Google Earth.

## SYSTEMATICS/RESULTS

Family EUPHORBIACEAE Juss.  
Tribe PLUKENETIEAE Hutch.  
Genus *Plukenetia* L.

*Plukenetia kwangoensis* L.J.Gillespie, sp. nov.  
(Figs 1; 2; 3)

*Plukenetia kwangoensis* sp. nov. belongs to sect. *Hedraiosstylus* based on the character combination of short styles (< 2 mm long), small dry capsules (≤ 2 cm in diam.), small lenticular seeds, and foveolate pollen. It is distinguished from all other species in the section by its very short petioles (0.5–1.5 mm vs 2–60 mm long) and leaf blades with narrowly acute bases that are often attenuate along the petiole (vs obtuse to cordate, hastate, or sagittate), pinnate venation (vs palmate or 3-nerved venation except rarely appearing pinnate in *P. africana* Sond.), and numerous secondary veins (10–16 vs 2–8). Additionally, it differs from *P. africana* and *P. procumbens* Prain by its shorter pistillate flower pedicels (1.4–1.8 mm vs ≥ 3 mm), from *P. procumbens* by its linear-oblong leaf blades (L/W = 6–10 vs elliptic or ovate and L/W < 2), and from *P. africana* by its lack of stipels at the petiole apex.

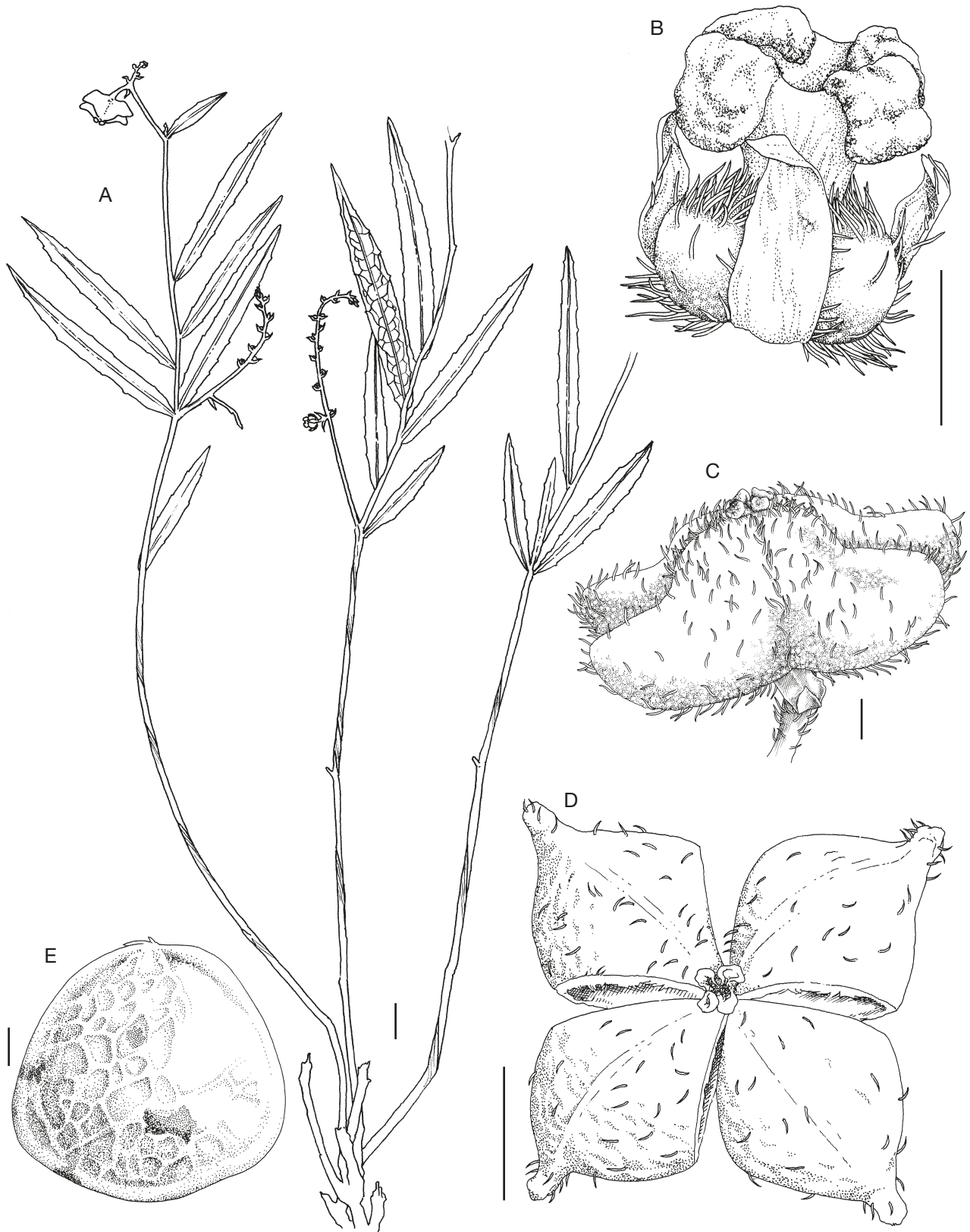


FIG. 1. — *Plukenetia kwangoensis* L.J. Gillespie, sp. nov., Germain 2617 (MO): **A**, habit; **B**, pistillate flower; **C**, immature fruit; **D**, mature fruit; **E**, seed. Illustration by Jessica Cosham. Scale bars: A, 1 cm; B, C, E, 1 mm; D, 5 mm.





FIG. 2. — *Plukenetia kwangoensis* L.J.Gillespie, sp. nov., holotype specimen: R.G.A. Germain 2617 (BR0000015669865).

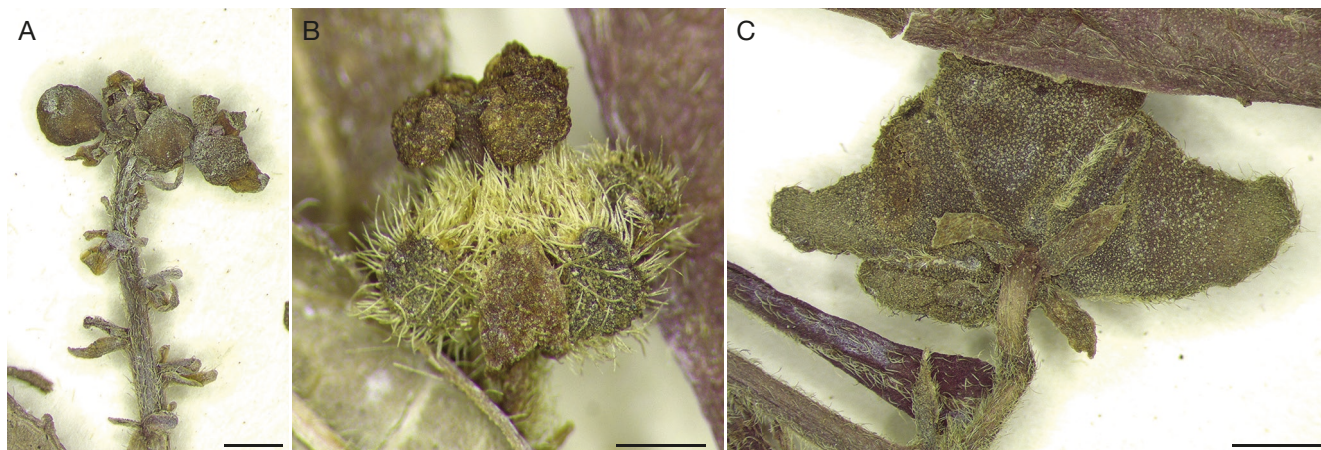


FIG. 3. — *Plukenetia kwangoensis* L.J.Gillespie, sp. nov., Germain 2617 (BR0000015669865): **A**, staminate flowers; **B**, pistillate flower; **C**, immature fruit. Scale bars: A, B, 1 mm; C, 2 mm.

**TYPE.** — Democratic Republic of the Congo. [Kwango Prov.]. Entre Kwango-Lufuna [Lufimi], savane herbeuse (incinérée) de la Ngambi, 4.VIII.1944, R.G.A. Germain 2617 (holo-, BR [BR0000015669865]!, iso-, MO!, P!).

**DISTRIBUTION AND ECOLOGY.** — *Plukenetia kwangoensis* sp. nov. is known from a single collection made in Democratic Republic of the Congo, between the Kwango and Lufimi [Lufuna on label] rivers in westernmost Kwango Province (see Notes below) (Fig. 4). The collection, with both flowers and fruit, was made in early August in herbaceous, seasonally burnt, open savanna.

**ETYMOLOGY.** — The specific epithet refers to Kwango, the province and region where the species is found, and also to the Kwango River and valley, which borders the savanna on the east.

#### DESCRIPTION

Monoecious perennial herbs, *c.* 30 cm high; caudex elongate, *c.* 1 cm diam., branched; stems erect to steeply ascending, older stems at base short, thick (3–6 mm diam.), woody, many-branched, leafy stems often purplish, especially basally and near leaf insertion, slender (1–1.4 mm diam.), pubescent.

#### Leaves

Alternate, simple; stipules linear-triangular to narrowly triangular, 1–2.3 mm long; petiole 0.5–1.5 mm long, pubescent; blade linear-oblong to linear-lanceolate, widest near or below the middle, 4–7 × 0.5–0.9 cm, L/W = 6–10, chartaceous, abaxial surface glabrate with pubescent midrib and scattered hairs on secondary veins, adaxial surface pubescent with major veins densely pubescent, base narrowly acute and often attenuate along the petiole, margins revolute, serrulate, teeth glandular, apex narrowly acuminate to narrowly acute; venation pinnate, often faintly 3-nerved at base, secondary veins 10–16 on each side of midrib, semicraspedodromous, sometimes brochidodromous, tertiary veins weakly percurrent or reticulate; stipels absent; adaxial basilar glands 2 (–6), often purplish, circular or elliptic, 0.1–0.6 mm in diam., on revolute margin, usually lateral- or sometimes abaxial-facing, basal pair 0.4–2 mm from blade base, sometimes additional 1–2 (–4) glands/side along margins on proximal 1/5 of blade; abaxial laminar glands absent.

#### Inflorescences

Bisexual, terminal (becoming leaf-opposed), narrow racemes, 2–7.5 cm long, axes moderately pubescent; peduncle 0.8–3.5 cm long; flowers 1/node, pistillate flower(s) 1 (2) at basal-most node(s), staminate flowers numerous above on axis 1–5 cm long; bracts triangular-ovate to lanceolate, 1.5–2.5 mm long, glabrate to sparsely pubescent.

#### Staminate flowers

In bud, only one partly open flower seen. Pedicels jointed, *c.* 2.5 mm long, proximal persistent part 0.8–1.7 mm long, moderately to densely pubescent; bud broadly ovoid or subglobose, obtuse at apex; sepals 4, ovate, *c.* 1.5 × 0.7–1.1 mm, glabrous or glabrate, apex acute with thickened tip; androecium subglobose, *c.* 1 mm in diam, comprising *c.* 13 stamens densely packed on small convex receptacle; filaments short-conical (barely developed in bud examined, < 0.1 mm long); nectary disc absent.

#### Pistillate flowers

Pedicel 1.4–1.8 mm long, densely pubescent; sepals elliptic or ovate, 2–2.7 × 0.8–1.2 mm, glabrate to sparsely pubescent abaxially, pubescent adaxially; ovary 1–1.4 × 2–3.2 mm (including wings), hirsute (hairs 0.4–0.7 mm long), 4-winged, wings short, rounded, becoming sparsely hirsute; styles 1–1.5 mm long, glabrous, mostly connate into a thick funnel-shaped column, 0.5–0.8 mm wide at base; stigmas 4, prominent, forming a crosslike structure 2–2.6 mm across at apex, each stigma spatulate, distal part disc-shaped, 1–1.4 mm wide, recurved, abruptly narrowed proximally, folded longitudinally and lining central depression in stylar column.

#### Fruits

4-lobed capsules (mature fruits only seen dehiscent), *c.* 6–7 × 13–14 mm, sparsely to moderately pubescent, surface verrucose and densely minutely papillose, each carpel lobe with central tubercle or short wing 1–2.5 mm long, 2–3 mm wide at base; styles persistent; columella 6 mm long, 2–2.5 mm wide at apex; pedicel 5–8 mm long.



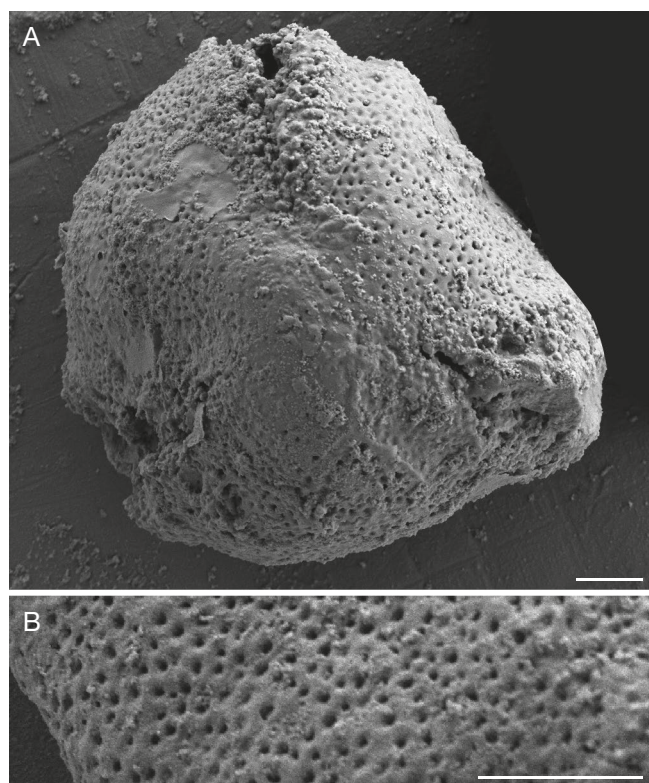


FIG. 4. — *Plukenetia kwangoensis* L.J.Gillespie, sp. nov., Germain 2617 (MO): A, pollen grain, polar view; B, closeup of foveolate tectum. Scale bars: 5  $\mu$ m.

### Seeds

Lenticular,  $6.2\text{--}7 \times 6.4\text{--}7 \times 3.1\text{--}3.9$  mm, rounded-deltate in outline, laterally compressed, with radial keel  $0.5\text{--}0.9$  mm wide, surface irregularly coarsely reticulate, pinkish beige or pale brown, often pale purplish between reticulations, often with few irregular dark brown or dark purple markings; testa dry, persistent.

### Pollen

Tricolpate, suboblate ( $P/E = 0.75\text{--}0.88$ ), polar axis  $30\text{--}35$   $\mu$ m, equatorial axis  $35\text{--}42$   $\mu$ m; amb subcircular; colpus broad with margins uneven and jagged; exine evenly thickened and somewhat thicker towards colpus margin, tectum foveolate, apparently scabrate (voucher: Germain 2617).

### NOTES

Like the other two African species of *Plukenetia* sect. *Hedraiostylus*, *P. kwangoensis* sp. nov. is a perennial herb with a thick woody rootstock and appears to be adapted to resprouting. The slender stems appear to be erect to ascending, unlike the apparently prostrate stems of *P. procumbens* Prain (known only from a single collection from south central Angola). The more widespread and common *P. africana* has stems initially erect, becoming twining, scandent, or sometimes trailing (Gillespie 2007). It is not known if *P. kwangoensis* sp. nov. and *P. procumbens* also develop twining stems; if not, these would be the only two species in the genus that do not have twining stems, and are not vines or lianas. All

three species grow in seasonally dry habitats, and have the capacity to resprout, presumably following fire, desiccation, and/or grazing.

The adaxial basilar glands or extrafloral nectaries characteristic of the genus *Plukenetia* are not conspicuous and can often be difficult to see in *P. kwangoensis* sp. nov. Due to the leaf blade margin being strongly revolute proximally, the glands are usually visible only abaxially or laterally, and are sometimes completely hidden.

Despite extensive searches of on-line herbarium collection databases, no additional specimens or collections of the new species were found.

Locality information on the single collection known (Germain 2617) is rather vague and refers to the area between the Kwango and Lufuna (more usually called Lufimi) rivers, which run in parallel for over 100 km in western Democratic Republic of Congo, southeast of Kinshasa. As observed on satellite photos, this region consists of an arid plateau with savanna, dissected on each side by valleys with forest-savanna mosaic on the slopes and gallery forest along the rivers (Fig. 5). “Savane herbeuse de la Ngambi” most likely refers to Nseke Gambi, an area of extensive savanna (c.  $5^{\circ}28'$  to  $5^{\circ}39'S$  and  $16^{\circ}20'$  to  $16^{\circ}27'E$ ; nseke meaning savanna in Kikongo) located in the southern part of this area, c. 25–40 km north of the border with Angola, as shown on the map Institut géographique du Congo belge (1958) Territoire du Popokabaka – Échelle 1/200 000 (O. Lachenaud, pers. comm.). Further confirmation comes from a collection made by R.G.A. Germain the previous day (Germain 2605) with a more precise locality, “entre village Mwala et Mutumba-Yungu” (O. Lachenaud, pers. comm.). Mwala (c.  $5^{\circ}28'S$ ,  $16^{\circ}30'E$ ) and Mutumba-Yungu [Mutombo-Yamfu, c.  $5^{\circ}25.5'S$ ,  $16^{\circ}26'E$ ] are about 10 km NE and 6 km N of the Nseke Gambi area, respectively. Thus the *P. kwangoensis* sp. nov. collection was most likely made in the northern part of the Nseke Gambi savanna area (estimated area  $5^{\circ}28'\text{--}5^{\circ}32'S$ ,  $16^{\circ}20'\text{--}16^{\circ}27'E$ ) (Fig. 5). The elevation of this savanna area is approximately 700–800 m.

The species (based on the one known locality) occurs much farther north than the other two African members of sect. *Hedraiostylus*, and is disjunct from *P. procumbens* by close to 1000 km, and from *P. africana* by c. 1300 km. The geographically closest species of the genus is *P. conophora*, a large canopy liana widespread in lowland tropical rainforest of central and western Africa (Gillespie 2007). The latter species belongs to the monospecific section *Angostylidium*, and differs in its large fruit (5–7.5 cm diam.), large seeds ( $> 2.5$  cm long), and presence of interstaminal nectaries in the staminate flowers (vs absence of nectaries) (Gillespie 2007; Cardinal-McTeague & Gillespie 2020). Although geographically close, the two species grow in very different habitats. The closest precise localities of *P. conophora* appear to be about 350–400 km to the west, north and north-east of *P. kwangoensis* sp. nov. (Gillespie 2007; GBIF.org (28 February 2022) GBIF Occurrence Download <https://doi.org/10.15468/dl.dwkfhh>). Based on an old collection (Couret s.n., L) from the vicinity of Brazzaville, Republic



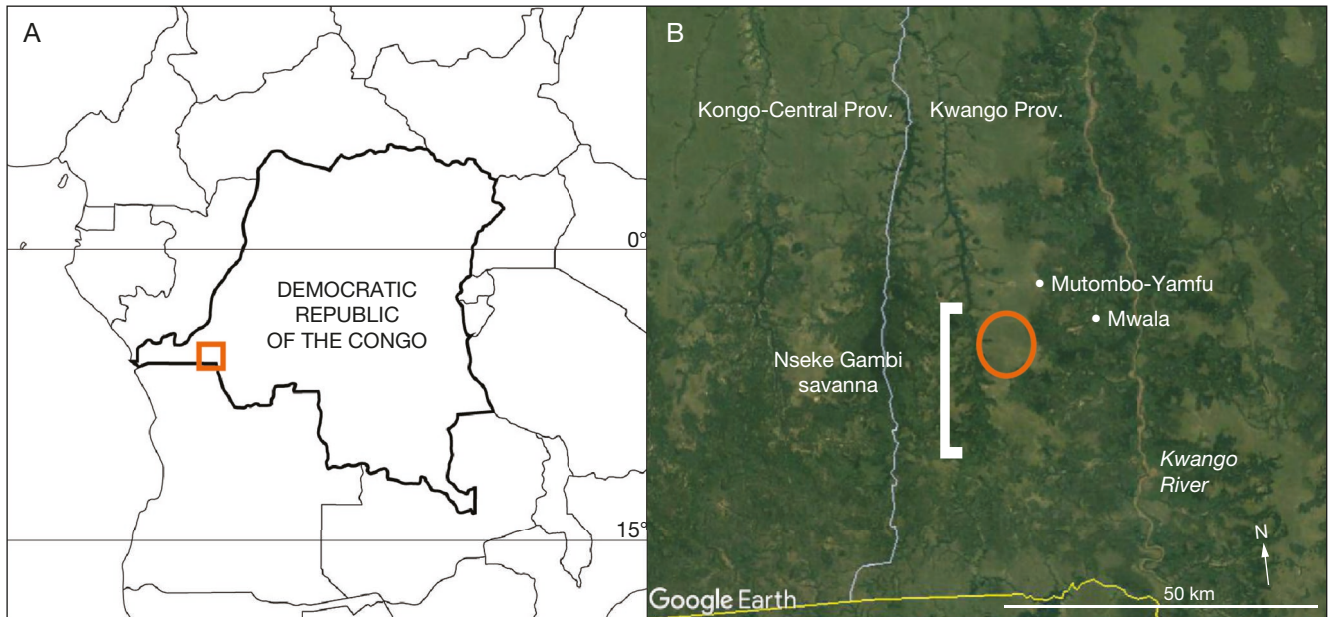


FIG. 5. — Distribution of *Plukenetia kwangoensis* L.J.Gillespie, sp. nov. in the Democratic Republic of Congo, central Africa: **A**, location of the single known collection, Germain 2617, indicated by orange square, corresponding to inset **B**; **B**, approximate locality in Nseke Gambi savanna, Kwango Province shown by orange circle.

of Congo, with an imprecise locality, *P. conophora* may possibly occur as close as 180 km to the only known locality for *P. kwangoensis* sp. nov. (note the dot for this collection of *P. conophora* in Gillespie (2007) is slightly misplaced and should be farther north).

#### PRELIMINARY CONSERVATION STATUS

*Plukenetia kwangoensis* sp. nov. is recommended as Data Deficient, in view of the fact that: 1) it is known from a single old collection with an imprecise locality; 2) the area where it occurs is poorly known botanically and has not been explored recently; 3) this small and rather inconspicuous plant is likely to be overlooked, especially outside flowering and fruiting season; 4) nothing is known about its population size; and 5) it is unclear whether the species is facing any threats (O. Lachenaud, pers. comm.). The area where it occurs is not protected but is rather sparsely populated, and from its occurrence in a recently burnt savanna, the species may be expected to tolerate some habitat degradation. This area of forest-savanna mosaic is botanically interesting but relatively under-collected (O. Lachenaud, pers. comm.); it forms part of the Western Congolian forest-savanna mosaic, an ecoregion considered bioregionally significant (Burgess *et al.* 2004). The vegetation of the area between the Kwango and Lufimi rivers seems not to have been described in detail, although more eastern parts of the Kwango region (which have a more complex topography, including deep valleys with rocky cliffs) have been studied by Devred *et al.* (1958). Targeted fieldwork in the Kwango region is recommended to increase our understanding of the species' distribution, ecological requirements, and other information necessary for assessing its conservation status. The species should also be looked for in similar habitats of adjacent northern Angola.

*Plukenetia* sect. *Hedraiostylus* (Hassk.) Müll.Arg. in DC.

*Prodromus systematis naturalis regni vegetabilis* 15 (2): 772 (Müller 1866).

See Cardinal-McTeague & Gillespie (2020) for taxonomy and complete synonymy.

#### EMENDED DESCRIPTION

[derived from Cardinal-McTeague & Gillespie (2020)]. Vines, lianas, or perennial herbs, stems slender, scandent, procumbent, or erect, twining or not. Leaf venation palmate or pinnate, primary veins 1 or 3(-5).

#### Inflorescences

Bisexual racemes (rarely racemose thyrses); pistillate flowers solitary (rarely 2) at basal-most node(s); staminate flowers 1/ node (sometimes 1-2/node in reduced condensed cymes).

#### Staminate flowers

Receptacle convex, subglobose, or globose; nectaries absent; stamens 8-20, densely packed; filaments conical, < 0.5 mm long; pollen P = 30-40 µm, E = 35-50 µm, tectum foveolate.

#### Pistillate flowers

Styles c. 70% to completely connate, forming a stout-cylindrical or funnel-shaped column with free arms spreading (if partly connate) or depressed-globose or stout-cylindrical column (if completely connate), entire style 0.5-1.7 mm long.

#### Fruits

4-lobed capsules, dry, dehiscent, 1.1-2 cm in diam.

#### Seeds

Lenticular or broadly lenticular, 5.5-10.5 × 3.5-8 × 2.5-8 mm ("small" to "medium" *sensu* Cardinal-McTeague *et al.* 2019).

KEY TO THE SPECIES OF *Plukenetia* SECT. *Hedraiostylus*  
(modified from Gillespie 2007; Cardinal-McTeague & Gillespie 2020)

1. Petioles > (1-)3 cm long; leaf blades > (2-)4 cm wide, base deeply cordate; stipels present adaxially at petiole apex, 0.5-1 mm long; capsules with strap-shaped wing 6-12 mm long on each carpel lobe; southeast Asia ..... *P. corniculata* Sm.
- Petioles < 1.5 cm long; leaf blades < 3.5 cm wide, base obtuse, rounded, truncate, acute, attenuate, hastate, or rarely sagittate; stipels absent or present adaxially at petiole apex, 0.1-0.6 mm long; capsules with tubercle or wing 3 mm long on each carpel lobe; southern and central Africa ..... 2
2. Leaf blades elliptic or ovate, 2-4.5 cm long, 1.3-3.3 cm wide, L/W = 1.2-1.7, bases rounded to broadly obtuse; Angola ..... *P. procumbens* Prain
- Leaf blades narrowly triangular, lanceolate, linear-lanceolate, or linear-oblong, 3-8 cm long, 0.2-1.5 (-3) cm wide, L/W = 2-10, bases acute, attenuate, truncate, hastate, rarely sagittate or obtuse ..... 3
3. Petioles 2-9 mm long; stipels usually present adaxially at petiole apex; leaf blade secondary veins 2-8/side, bases often hastate; pistillate pedicels 3-10 mm long; Botswana, Mozambique, Namibia, South Africa, Zambia, Zimbabwe ..... *P. africana* Sond.
- Petioles 0.5-1.5 mm long; stipels absent; leaf blade secondary veins 10-16/side, bases narrowly acute and often attenuate, never hastate; pistillate pedicels 1.4-1.8 mm long; Democratic Republic of the Congo ..... *P. kwangoensis* L.J.Gillespie, sp. nov.

## DISCUSSION

The circumscription of *Plukenetia* sect. *Hedraiostylus* is here expanded to include the erect stems, pinnately veined leaf blades, and funnel-shaped style column of *P. kwangoensis* sp. nov. Distribution of the section is expanded to include central Africa in addition to southern Africa and Southeast Asia.

Leaf blade primary venation pattern has been considered an important character in *Plukenetia*, dividing the genus into two major clades, the pinnately veined clade (subclades P1, P2) and the palmately veined clade (subclades P3-P5) (Cardinal-McTeague *et al.* 2019). Section *Hedraiostylus* is a member of the palmately veined clade, specifically the Old World lineage (subclades P4, P5). However, the section is not exclusively palmately veined, but rather shows a continuum between the two states, with primary venation pattern correlated with leaf blade shape, particularly the blade base shape. *Plukenetia kwangoensis* sp. nov. has leaf blades with narrowly acute bases that are pinnately veined with a single prominent primary vein (Figs. 1, 2), although sometimes an obscure lateral primary vein pair may be present. The cordate leaf blades of *P. corniculata* are palmately veined, whereas the elliptic, round-based blades of *P. procumbens* are distinctly 3-nerved. The widespread *P. africana* exhibits considerable variation in leaf blade shape, at least in part influenced by age and position on the plant, in part correlated with geography (Gillespie 2007), with a corresponding variation in primary venation pattern. Leaf blades vary from linear or lanceolate to triangular and bases non-hastate to prominently hastate, with venation typically weakly palmate or 3-nerved, rarely pinnate with a single primary vein on linear non-hastate blades. Broader palmately veined leaf blades are hypothesized to be plesiomorphic in the section, with blades becoming narrower with the subsequent reduction and/or loss of the lateral primary vein pair in *P. kwangoensis* sp. nov. and sometimes in *P. africana*.

Understanding phylogenetic relationships among *Hedraiostylus* members will have to await further collections and

molecular analysis. Cardinal-McTeague *et al.* (2019) included only two species in their analysis, *P. africana* and *P. corniculata*, which were strongly supported as sister taxa. The other two species, *P. kwangoensis* sp. nov. and *P. procumbens* are known only from their type collections and remain to be sequenced.

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