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Possible horizontal gene transfer: *Virectaria stellata* (Sabiceeae-Rubiaceae), a new sandstone cliff species from the Republic of Guinea with stellate hairs recorded for the first time in the Rubiaceae

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Abstract. *Virectaria* (Sabiceeae-Cinchonoideae-Rubiaceae), is a morphologically isolated genus of tropical African herbs or subshrubs, occurring from Senegal to Tanzania. *Virectaria stellata,* a new species from Guinea, is published. It is a perennial herb, with stems becoming creeping and rooting, to 60 cm long. *Virectaria stellata* has stellate hairs, recorded here for the first time in the family Rubiaceae. We hypothesize that the stellate hairs of this species result not from mutation but from horizontal gene transfer (HGT) from an Acanthaceae, most likely *Barleria*, due to their common and perhaps uniquely shared microstructure. We briefly review literature on the control of the transition from simple to stellate hairs and on HGT in plants. *Virectaria stellata* is found in Forécariah and Kindia Prefectures in the Republic of Guinea. A *Virectaria* specimen without stellate hairs but otherwise similar to *V. stellata* was collected in Guinea, about 90 km to the North of the northernmost *V. stellata* collection. This specimen may represent a possible progenitor of *V. stellata*. The identification of this specimen requires further study. *Virectaria stellata* occurs in fissures in vertical sandstone rock at altitudes of 450 to 910 m, in sun or half-shade. An overview of sandstone endemic plant species in the vicinity of the new *Virectaria* is provided. No threats have been observed, therefore, *Virectaria stellata* is provisionally assessed here as Least Concern (LC).

Keywords: Acanthaceae, *Barleria*, horizontal gene transfer, lateral gene transfer, sandstone, stellate hairs.

INTRODUCTION

Among the specimens collected during botanical surveys aimed at establishing Important Plant Areas in the Republic of Guinea (henceforth Guinea;

Couch et al. 2019; Darbyshire et al. 2017) was a new species of *Virectaria* Bremek. (Rubiaceae: Sabiceeae) found on the Benna Plateau and Mont Kouroula in the prefectures Forécariah and Kindia respectively. The new material from Guinea was placed in *Virectaria* due to the presence of several traits that characterise this morphologically isolated genus: the stigma is unlobed and capitate and only slightly wider than the style; both style and stamens are exserted about as long as the corolla lobes; aestivation simply valvate; one of the two fruit valves is deciduous, the other persistent; and the floral disc is cone-like, accrescent, and dehiscing into two halves in fruit.

Virectaria Bremek. (Bremekamp 1952) was erected to contain most of the African species previously referred to the genus *Virecta* L.f. (Linnaeus 1782). The International Plant Names Index (IPNI 2024) lists 28 names under *Virecta*. The neotropical *Virecta* names, together with the type of *Virecta, V. biflora* L.f., are referrable to *Sipanea* Aubl., a genus of about 19 species in northern S. America and C. America. The Asian names of *Virecta* refer to *Ophiorrhiza* L., a genus of about 320 species occurring from India to N.E. Australia and Japan. Some African *Virecta* names are referred to *Pentas* Benth. (e.g. *Virecta lanceolata* Forssk.), *Parapentas* Bremek. (*Virecta setigera* Hiern); or *Sabicea* Aubl. (*Virecta lutea* G. Don). Verdcourt (1953) revised *Virectaria*, recognising five species from the 12 *Virecta* names attributable to the genus *Virectaria*.

Virectaria was placed in Ophiorhizeae by Bremekamp or was often formerly place in a loosely circumscribed Hedyotideae (both Rubioideae) e.g. Hepper (1963), together with *Oldenlandia* L., *Pentas, Parapentas* and *Hekistocarpa* Hook.f. However, Verdcourt (1953) did not concur and erected the mono-generic tribe Virectarieae (Verdcourt 1975) to accommodate the genus. He also recognised that it did not belong to Rubioideae but to Cinchonoideae/Henriquezieae. Currently eight species are recognised, *V. angustifolia* (Hiern) Bremek., *V. belingana* N. Hallé, *V. herbacoursii* N. Hallé, *V. major* (K.Schum.)Verdc., *V. multiflora* (Sm.) Bremek., *V. salicoides* (C.H.Wright) Bremek. and *V. tenella* J.B.Hall. Seven infraspecific taxa are also accepted (Dessein et al. 2001b).

Publication and molecular placement of the monotypic Socotran *Tamridaea* Thulin & B. Bremer showed a close relationship with *Virectaria* and the placement of these two genera in an expanded Sabiceeae (Bremer & Thulin 1998). Placement of *Virectaria* within the Sabiceeae was contested by Dessein et al. (2001a) on morphological grounds, and *Virectaria* was instead placed with *Hekistocarpa* and *Tamridaea* in an expanded Virectarieae near to Sabiceeae (Dessein et al. 2001b). However, more detailed subsequent molecular studies reconfirmed placement in Sabiceeae (Khan et al. 2008a; 2008b). The monotypic Cameroonian *Hekistocarpa* is sister to the three other genera of Sabiceeae, Socotran *Tamridaea* is sister to *Virectaria*, and these two genera are in turn sister to the most species-diverse genus *Sabicea* which, with c. 167 species, extends from the Neotropics, through Africa and Madagascar, to Sri Lanka.

In this paper we describe *Virectaria stellata sp. nov.*, increasing the numbers of species in the genus in Guinea from two to three (Gosline et al. 2023a; 2023b). The new species is exceptional in the Rubiaceae in having stellate hairs, and further remarkable in that they include an unusual type of stellate hair otherwise known from some Acanthaceae.

New, nationally endemic plant species continue to be steadily published from Guinea e.g. recently *Caseaeria septandra* Breteler & A.Baldé (Breteler & Baldé 2024, Salicaceae), *Keita deniseae* Cheek (Cheek et al. 2024, Olacaceae), *Erianthemum nimbaense* Jongkind and *Phragmanthera cegeniana* Jongkind (Jongkind 2023, Loranthaceae) and *Gymnosiphon fonensis* Cheek (Cheek et al. 2024, Burmanniaceae).

MATERIALS & METHODS

All specimens cited have been seen. Herbarium material was examined with a binocular microscope fitted with an eyepiece graticule. Measurements of flower structures and fruits were made from rehydrated material. The drawings were made using the same equipment equipped with a camera lucida. Herbarium codes follow Index Herbariorum (Thiers, updated continuously). Names of species and authors follow IPNI (2024). Nomenclature follows Turland et al. (2018). The extent of occurrence and the area of occupancy were calculated using GeoCAT (Bachman et al. 2011) and the conservation assessment was made following the categories and criteria of IUCN (2012). The morphological terminology follows Beentje (2016).

TAXONOMIC TREATMENT

Key to the species of the genus Virectaria *in Guinea*

1. Hairs stellate..... ***V. stellata***

   Hairs simple..... 2

2 Leaves elliptic to lanceolate; hairs on stems erect, to 2 mm long..... ***V. multiflora***

Leaves ovate-oblong, elliptic or sub-spathulate; hairs on stems appressed, to 0.2 mm long ..... ***V. procumbens***

Virectaria stellata Cheek, I.Darbysh. & Simbiano **sp. nov.**

Type: Republic of Guinea, Forécariah Prefecture, Benna Plateau, 4 km West of Gombokori, 9° 44' 19.2" N, 12° 49' 32.9" W, 780 m, fl., fr., 1 Nov. 2019, *Burgt & P.M. Haba* 2332 (holotype HNG; isotypes B, BR, EA, FI, K001381504, K001381505, LISC, MO, NY, P, PRE, SERG, SING, SL, US, WAG).

Diagnosis

Virectaria stellata differs from the other species of *Virectaria* Bremek., and from all other Rubiaceae species, in the presence of stellate hairs, which are abundant on the stems, both surfaces of the leaf, inflorescences, and on the outer surfaces of the calyx-hypanthium and the corolla. Morphologically, *Virectaria stellata* resembles *V. tenella* J.B.Hall, a species from Ghana (Hall 1972), that is also found in vertical rock habitat. The leaf blade of *V. stellata* is 10–30 (–50) mm long (vs (5–) 7–12 mm long) and the corolla of *V. stellata* is densely stellate hairy outside (vs glabrous).

Description

Perennial herb, prostrate, stoloniferous. Stellate hairs dense on stems, stipules, leaves (both surfaces), pedicel, calyx and corolla outer surfaces, and fruits; hairs white to colourless, 0.3–0.8 mm in diam., 10–25-armed, individual arms unequal in length, overlapping with adjacent hairs; in some stellate hairs, the central arm is a little longer to much longer than all other arms, extending from the centre of the stellate hair, 0.6–5 mm long, spiralled, erect, or appressed and directed to the leaf apex (Fig. 1B). Stems dull red, drying pale reddish, initially erect, then creeping, pendant, terete, each 10–60 cm long; young stems herbaceous, older stems woody, 0.7–1.5 mm in diam., to 4 (–10) mm in diam. at base, internodes 0.5–4 (–8) cm long, sometimes rooting at the nodes. Roots to 3 mm thick, to at least 50 cm long, with numerous wiry root branches, themselves highly branched. Stipules simple, triangular, to 1 mm × 1.5 mm, or bifurcate to the base into two triangular (rarely narrowly triangular-oblong) parts, apices acute to rounded; colleters inconspicuous. Leaves opposite, in equal pairs, decussate; petiole canaliculate, 2–10 × 0.5–0.7 mm, articulated at junction with stem. Leaf blades papery, drying pale green, leaf blade ovate, 10–30 (–50) × 6–17 (–28) mm, apex acute to attenuate, base obtuse to rounded; lateral nerves 4–7 on each side of the midrib, starting at 60–70° near the petiole, starting at c. 45° towards the apex, straight, then arching upwards and becoming parallel with the margin, not uniting; nerves channelled above, raised below, domatia absent, secondary and tertiary nerves moderately conspicuous above, not branching, not reticulate, quaternary nerves not visible. Inflorescence a densely branched cyme, axillary or terminal, 1–15(–30)-flowered, bracts elliptic, 2–3 mm long. Flowers 13–15 × 7–9 mm. Pedicel terete, shortly cylindrical, 1–1.5 mm long. Calyx-hypanthium shortly cylindrical to ellipsoid, 1.2–1.5 × 0.9–1 mm, lacking surface sculpture; calyx tube very short or absent, calyx lobes 5, green, narrowly triangular to linear, accrescent, very slightly unequal in length, 1–2 × 0.5 mm, colleters inconspicuous, glabrous inside. Corolla white, 7–8(–10) mm long, 8–9 mm diam. at anthesis, tube 3–5 mm long, 0.5–0.6 mm wide at base, widening gradually to 1 mm wide near lobes; lobes 5, lanceolate-oblong, 3.5–4 × 0.8–1.2 mm, apex acute, corolla outside with dense stellate indumentum, inside glabrous. Stamens 5, exserted, inserted in corolla mouth, 5–6 mm long, filaments white, terete, glabrous, anthers medifixed, dark brown to black, lanceolate-elliptic, 0.9–1.1 mm long. Disc (nectary) conical, purple, 0.25 × 0.1 mm, glabrous. Style white, filamentous, 9–11 mm long, exserted for half its length, glabrous. Stigma white, capitate, 0.3 mm diam.; ovary 2-locular, each locule with numerous ovules. Fruit straw-coloured, overall c. 4 x 1.5–2.5 mm in diam., fruit body ellipsoid, surmounted by the accrescent calyx, lobes linear-ligulate, 0.5–1.8 × 0.2 mm, glabrous inside; fruit dehiscing longitudinally into two valves, with one valve falling, the other remaining attached to the pedicel (Fig. 1 H). Disc (nectary) dividing into two halves that reflex away from each other and which either persist or fall in the ripening fruit. Placentas 2, c. 0.7 × 0.5 mm, protruding into the locule, each bearing 20–30 seeds. Seeds bright brown, truncated-obconic, (3–) 4–6-sided, widest distally, tapering to the hilum, c. 0.5 mm × 0.2–0.25 mm, surface tuberculate, distal surface with 20–30 rounded tubercles (Fig. 1I), hilum slightly raised, orbicular, 0.025 mm diam.

Etymology

The species epithet *stellata* is named after the stellate hairs that are so characteristic of this species (Figs. 1, 3).

Distribution

Endemic to Republic of Guinea, Kindia and Forécariah Prefectures (Map 1).

Habitat & ecology

Virectaria stellata occurs in fissures on vertical sandstone rock at altitudes of 450 to 910 m, in sun or

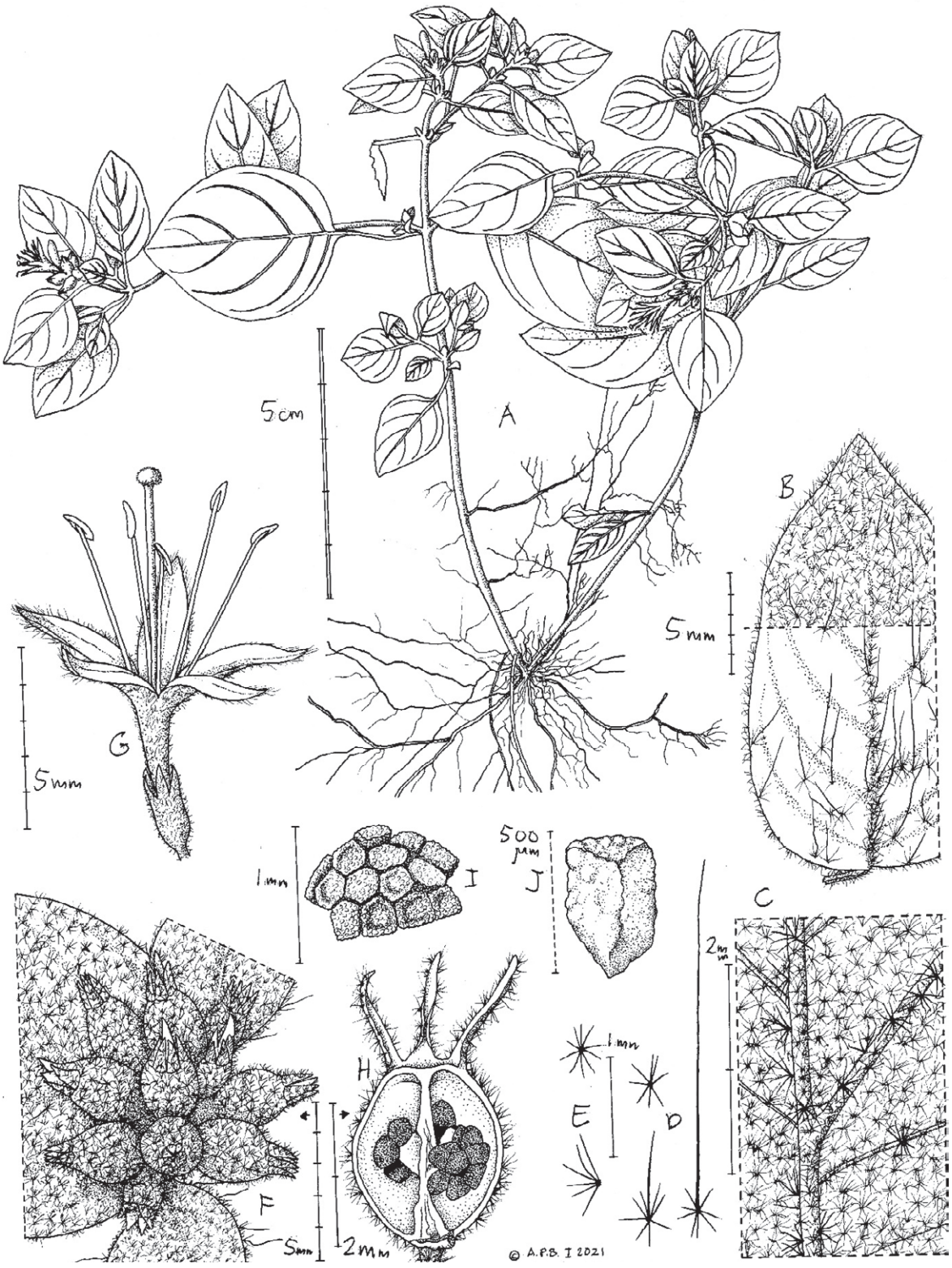


Figure 1. *Virectaria stellata.* A. habit, flowering plant; B. leaf upper surface (full cover of stellate hairs drawn only on distal part); C. leaf lower surface, showing midrib and secondary nerves; D. stellate hairs from upper leaf surface; E. stellate hair seen from above and side; F. infructescence, immature; G. open flower; H. fruit, after dehiscence (valve fallen); I. mature seeds *in situ* on placenta; J. mature seed, side view. A–J drawn from *Burgt & P.M. Haba* 2332 by Andrew Brown.

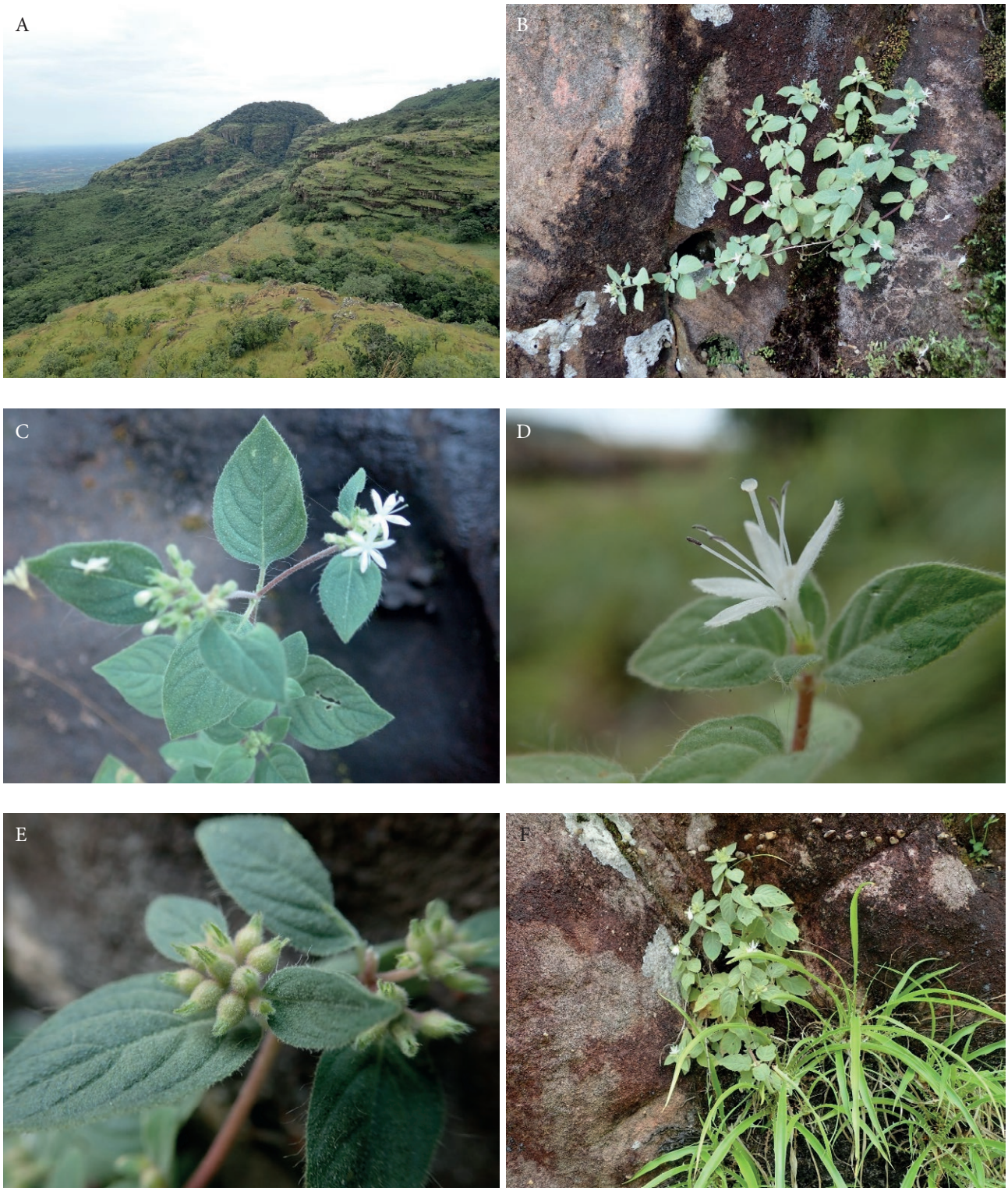


Figure 2. *Virectaria stellata*. A. vertical rock habitat on the Benna Plateau. The type specimen was collected on the rocks at the centre of the photo; B. flowering plant; C. inflorescence; D. flower; E. young fruits; F. flowering plant growing with *Pitcairnia feliciana*. B, D, E, F from: *Burgt* 2332; C from *Simbiano* 683. Photos: A, B, D–F by Xander van der Burgt; C by Faya Julien Simbiano.

half-shade (Fig. 2A). The species has been found growing with other Guinea endemic species, *Cailliella praeruptiocola* Jacq.-Fél. (Melastomataceae) (*Burgt* 2332), *Fleurydora felicis* A.Chev. (Ochnaceae) (*Burgt* 2332), *Kindia gangan* Cheek (Rubiaceae) (*Burgt* 2345) and *Pitcairnia feliciana* (A.Chev.) Harms & Mildbr. (Bromeliaceae) (*Burgt* 2332; Fig. 2F).

Phenology

Virectaria stellata was collected in flower in November, and in fruit in February, March and November. The dry season is from November to March and the rainy season is from April to October.

Conservation status

Virectaria stellata is known from eight collections in three localities which correspond to three locations. Three collections are from the centre of the Benna Plateau, South of Kindia, where thousands of plants were seen. Three other collections are from the 250 m high vertical rock escarpment at the Northern end of the Benna Plateau, South of Kindia; where hundreds of plants were seen. Many more plants are probably present here, higher up on the vertical rocks, where they cannot be seen from the base of the vertical rock. Two collections are from Mont Kouroula, North of Kindia, about 50 km North of the Benna Plateau; thousands of plants were seen here. The extent of occurrence (EOO) is 121 km^2, and area of occupancy (AOO) is 20 km^2. Although suitable areas of sandstone cliff habitat exist where the species is not found, it is likely that the EOO and AOO underestimate the true distribution of the species, as it is likely that other populations exist but have not yet been found. The extent of occurrence of the species is supposed to probably be less than 5,000 km^2 and the area of occurrence less than 500 km^2. Fires started by herders during the dry season have been observed to damage plants at the base of the cliffs on which this species grows. Fires are also set up cliffs to drive off bees from their nests, to collect honey (Cheek pers. obs., Kindia region). Although underground perennating structures are not recorded in this species, burned plants were observed by the specimen collectors to resprout from the base. Some plants have buds at the stem base showing signs of regeneration after the passage of fire (see for example *Burgt* 2332, HNG, K, SERG). Juvenile plants and young flowering plants were recorded near the base of the cliffs, in areas presumably affected by dry-season fires. It seems that, when mature plants are destroyed by fire, a new generation will grow back in the same place. Therefore, no decline was observed in area, extent and/or quality of habitat, as well as in number of mature individuals. *Virectaria stellata* is therefore provisionally assessed here as Least Concern (LC).

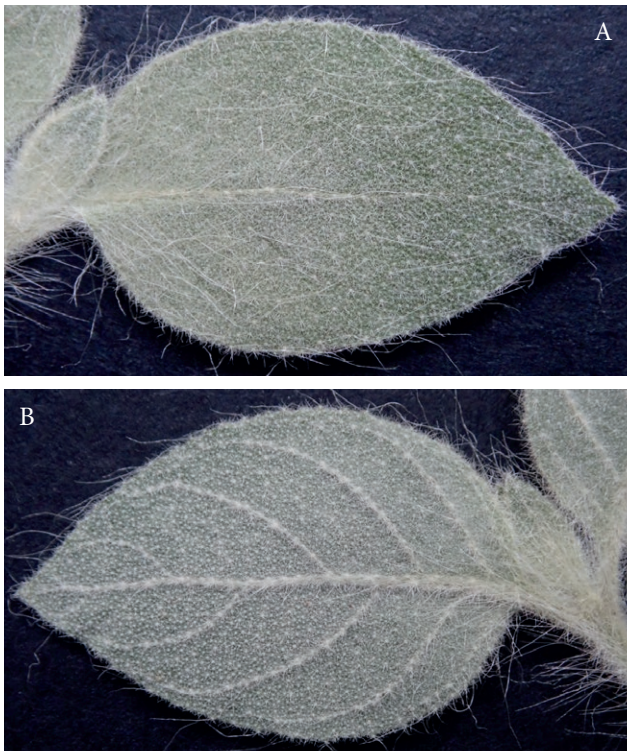
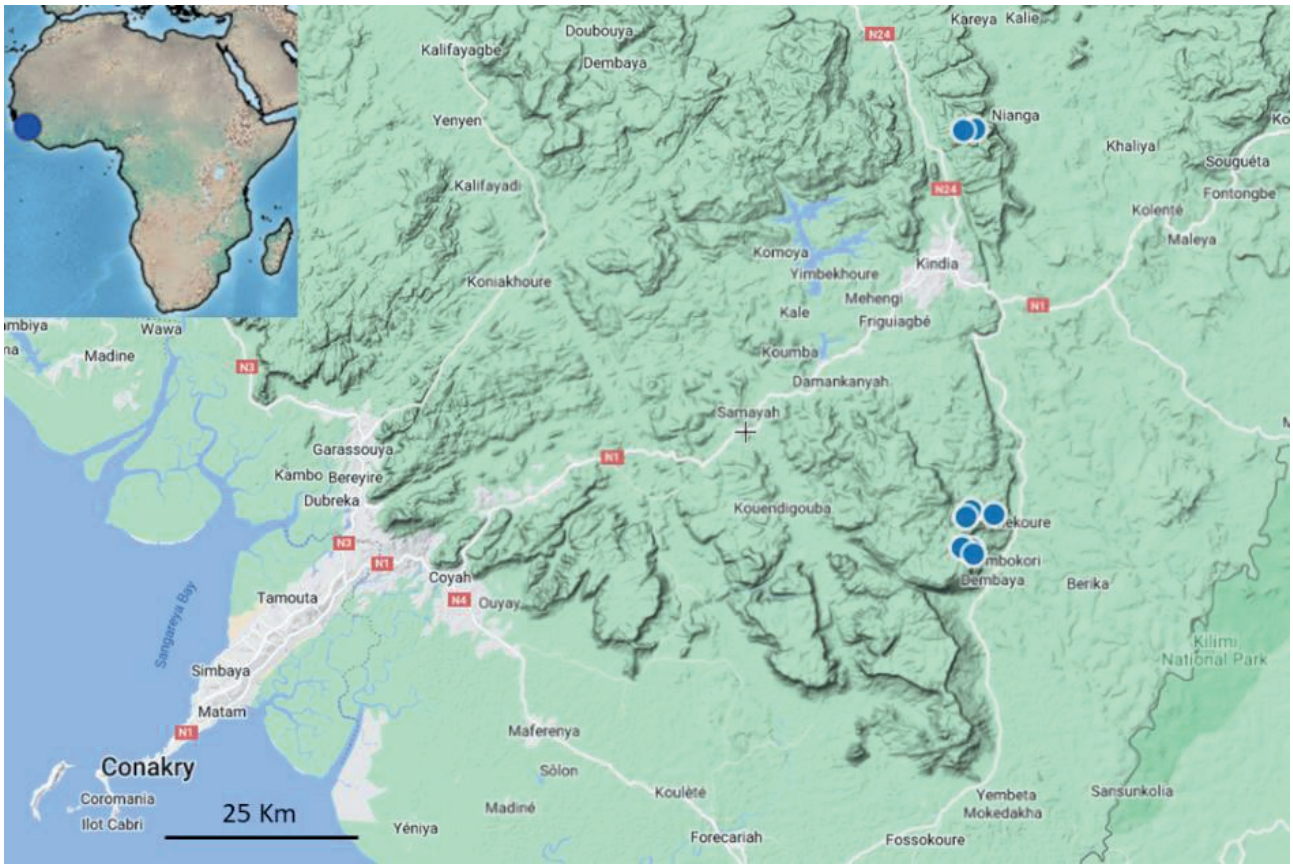


Figure 3. *Virectaria stellata*. A. Adaxial side of the leaf with stellate hairs, including many with one arm to 5 mm long; B. Abaxial side of the leaf with stellate hairs, including a few with one arm to 5 mm long. Length of leaf blade 19 mm. From *P.M. Haba* 1375. Photos: Xander van der Burgt.

Additional specimens examined

GUINEA. Forécariah Prefecture, Benna Plateau, 5 km W of Gombokori, 9° 44' 22.9" N, 12° 50' 11.4" W, 910 m, fl. & fr., 4 Nov. 2019, *P.M. Haba & Burgt* 1363 (B, BR, G, HNG, K, MO, P, SERG, US, WAG). **Kindia Prefecture**. Mont Kouroula, 6 km E of Koumbaya, 10° 10' 57" N, 12° 49' 21.4" W, 450 m, fl. & fr., 7 Nov. 2019, *Burgt, P.M. Haba & Holt* 2345 (HNG, K, P, WAG); Mont Kouroula, 6 km E of Koumbaya, 10° 10' 52.5" N, 12° 50' 06.5" W, 460 m, fr., 10 Nov. 2019, *P.M. Haba, Burgt & Holt* 1375 (HNG, K); near Mambia village, mount Yon-Ya, 9° 46' 31.1" N, 12° 48' 8.9" W, 720 m, fr., 30 March 2023, *Konomou, Burgt, Conté & Thiam* 1128 (B, BR, G, HNG, K, MO, P, PRE, SERG, WAG); near Molota, path to Balaqui, 9° 46' 23.6" N, 12° 49' 57.6" W, 660 m, sterile, 31 March 2023, *Thiam, Konomou, Conté & Burgt* 23 (HNG, K); between villages Dokokouré and Tinekouré, 9° 46' 43.6" N, 12° 49' 34" W, 640 m, fl., 16 Nov. 2023, *Simbiano, Thiam, Touré & Bangoura* 683 (HNG, K).



Map 1. Distribution of *Virectaria stellata* (blue dots). Map data © Google 2024.

DISCUSSION

Possible horizontal gene transfer: Stellate hairs: a newly discovered trait for Rubiaceae

The presence of stellate hairs in *Virectaria stellata* (Fig. 1 and 3) is remarkable because not only is it here recorded for the first time in the genus *Virectaria*, but also for the first time in the entire family Rubiaceae, from which, until now, only simple hairs have been recorded apart from T-shaped hairs in the genus *Coptosapelta* Korth. (Robbrecht 1988), unrelated to *Virectaria*. In fact stellate hairs are thought to be absent from the Gentianales as a whole (Bridson pers. comm. in review 2024). In many of the stellate hairs in *Virectaria stellata*, the central arm greatly exceeds the others, by a factor of ten or more. On the leaf upper surface, these stellate hairs are appressed and directed towards the leaf apex. This unusual stellate hair type is absent in plant families from which stellate hairs are almost universal, e.g. the Malvales (Cheek in Heywood et al. 2007; Cheek and Dorr 2007). In fact this stellate hair type is otherwise known to us only from the tribe Barlerieae in Acanthaceae, in the genera *Barleria* L. and *Lepidagathis* Willd. (Darbyshire et al. 2010). In *Barleria*, this trait has evolved independently in several lineages (Balkwill & Balkwill 1997; Darbyshire et al. 2019; Comito et al. 2022). Two species of *Barleria* in Guinea have stellate hairs, *B. asterotricha* Benoist and *B. maclaudii* Benoist, and those of *B. asterotricha* in particular are similar to the hairs seen in *Virectaria stellata*. Both *Barleria* species are recorded in the same highland area (Fouta Djalon) as *Virectaria stellata* but have not yet been recorded as sympatric with it. We conjecture that horizontal gene transfer from a *Barleria* to the progenitor of *V. stellata* may be the explanation for this phenomenon, in the absence of any other plausible explanation. Horizontal gene transfer can be defined as the transfer of genetic material from one species to another without sexual reproduction (which is vertical gene transfer).

Horizontal gene transfer is a more likely explanation than gene mutation for these structures because to change from the simple hairs (trichomes) seen in all other *Virectaria* species (and indeed Rubiaceae/

Gentianales) to the stellate hair trait would require a change of not one (credible by mutation), but multiple genes simultaneously (unlikely in a single mutation event). The regulation of the changes between simple and stellate hairs has been studied in detail in *Arabidopsis thaliana* (L.) Heynh. (Brassicaceae/Cruciferae) in many tens of papers beginning with Folkers et al. (1997). Study of changes in the leaf hairs of this species have become the model for understanding the biological and molecular basis underlying the development of cell shape in plants (Mathur 2006; Syzmanski et al. 2000; Luo and Oppenheimer 1999; Pattanaik et al. 2014). Over 30 different genes are known to control the developmental processes of trichomes in the species. These processes include changes in endoreduplication, cell enlargement and in the microtubule and actin cytoskeletons (Schellmann and Hulskamp 2005; Pattanaik et al. 2014). More than 15 genes have been shown to function as activators or suppressors of trichome branch initiation alone. Among these, some genes influence branching directly, while others control branch number in an endoreplication-dependent manner (Camoirano et al. 2020).

Horizontal gene transfer (HGT) is a universal phenomenon and most frequently documented in prokaryotes, while also known in animals, fungi and plants (Quispe-Huamanquispe et al. 2017; Richardson and Palmer 2007; Gao et al. 2014). Existing literature on HGT in plants is extensive, and growing fast with the increasing availability of next generation gene sequencing allowing the detection of HGT events (Quispe-Huamanquispe et al. 2017). Studies to date have mainly relied on the phylogenetic signal of the donated DNA being discordant from that of the host (Richardson & Palmer 2007). However, the gold standard to determine gene function resulting from HGT is the existence of a phenotype that is correlated with the presence of those genes (Quispe-Huamanquispe et al. 2017). Ten possible pathways to HGT in plants are reviewed in Gao et al. (2014). Parasitic plants commonly acquire genetic material by HGT from their hosts. For example, transcriptome analyses of three parasitic members of Orobanchaceae show the occurrence of 52 high-confidence HGT events (Yang et al. 2016). HGT events mediated by the bacterium *Agrobacterium* have been detected in *Nicotiana* L. (Solanaceae), *Linaria* Mill. (Plantaginaceae) and *Ipomoea* L. (Convolvulaceae). The transferred material persists in the germline and appears to have a role in evolution. The ability of *Agrobacterium* to transform plants has been exploited for decades as a means to introduce foreign genes of interest into crop plants (Quispe-Huamanquispe et al. 2017).

The case of *Amborella trichopoda* Baill. (Amborellaceae) is spectacular because at least several dozen (and possibly hundreds) of HGT events are thought to have occurred in this species, to the extent that most of the mitochondrial genetic material is thought to be foreign, from multiple different donors including mosses and flowering plants, possibly resulting from plant-to-plant contact from epiphytes (Richardson and Palmer 2007).

Since this paper was submitted, a *Virectaria* specimen that entirely lacks stellate hairs but is otherwise morphologically very similar to *V. stellata*, was collected in Guinea, about 90 km to the North of the northernmost *V. stellata* collection. This specimen: *de Nevers* 14581 (HNG, K), was collected from a prostrate, densely hairy, flowering herb, on 25 Sept. 2019, on vertical rock surface near Télimélé, 10° 55' N, 13° 10' W. The longest hairs on this specimen are several mm long, transparent, and spiralled; these hairs look exactly like the long arms of the stellate hairs of *V. stellata*. This specimen may represent a possible progenitor of *V. stellata*. Since *de Nevers* 14581 differs in several other characters from *V. stellata* the collection may represent a new taxon, for example a new variety or a new species of *V. stellata*. Further study by both morphological and molecular phylogenetic analysis is needed, of this specimen and additional specimens to be collected, to test the hypothesis that this entity shares a recent common ancestor with *V. stellata*. Genomic analysis is needed to test the hypothesis that HGT from *Barleria asterotricha* has occurred.

Endemics of the sandstone table mountains of the Fouta Djalon

Of the 22 Important Plant Areas (IPAs) in Guinea (Couch et al. 2019), five are in the sandstone table mountains area. Although *Virectaria stellata* does not occur in any of these five IPA's, one of the three localities where the species is found, is on Mont Kouroula, located in the buffer zone of the Mont Gangan IPA area (Couch et al., 2019). The Benna Plateau contains two of the three localities where *Virectaria stellata* occurs, is rich in rare plant species, and should be considered for designation as an IPA. For further information on the sandstone habitats of the Fouta Djalon see Couch et al. (2019: 20–29).

Virectaria stellata is the latest in a steady flow of new species to science published from the sandstone habitats of the southwestern outliers of the Fouta Djalon highlands in Guinea. The table mountains are perhaps best known to botanists for being the home of *Pitcairnia feliciana* (Bromeliaceae), the only Old World species of that family (Larridon 2018). *Fleurydora felicis*

(Ochnaceae) a monotypic tree genus arising from a South American clade, has a similar geographic range and is also restricted to sandstone cliffs (Canteiro & Cheek 2019). Many other endemic plant species occur on the table mountains. These include the monotypic genus *Benna alternifolia* Burgt (Melastomataceae), *Cailliella praerupticola* (Melastomataceae), *Ctenium bennae* Xanthos (Poaceae, Xanthos et al. 2021), *Gladiolus mariae* Burgt (Iridaceae), *Impatiens bennae* Jacq.-Fél. (Balsaminaceae), *Inversodicrea tassing* Cheek (Podostemaceae, Cheek et al. 2019), *Kindia gangan* (Rubiaceae, Cheek et al. 2018), *Mesanthemum bennae* Jacq.-Fél. (Eriocaulaceae), *Rhytachne perfecta* Jacq.-Fél. (Poaceae), *Tephrosia kindiana* Haba, B.J.Holt & Burgt, *Ternstroemia guineensis* Cheek (Pentaphylacacae, Cheek et al. 2020), and *Trichanthecium tenerium* Xanthos (Poaceae, Xanthos et al. 2020). There is no doubt that more discoveries of new taxa, and range extensions, will be made if botanical survey work continues.

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