Two new Gaertnera species (Rubiaceae) from West Africa

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Two new Gaertnera species (Rubiaceae) from West Africa

Abstract: Two new Gaertnera species from West Africa, G. pedunculata Jongkind and G. monticola Jongkind, are described. Gaertnera pedunculata is described from three specimens from Liberia that were not cited in the recent revision of the genus by Malcomber & Taylor; G. monticola was earlier considered to be an isolated population of G. longevaginalis (Schweinf. ex Hiern) E. M. A. Petit occurring in West Africa. Gaertnera monticola has conspicuous ruminate endosperm, a character shown by most West African Gaertnera species but absent in the Central African ones such as G. longevaginalis s. str. A table is presented to show important differences between the seven Gaertnera species in Upper Guinea.

Key words: Africa, Rubiaceae, taxonomy, Gaertnera, tropical forest, Upper Guinea

Introduction

The palaeotropical genus Gaertnera Lam. comprises 88 species of shrubs and small trees (Malcomber & Taylor 2009; Taylor & al. 2014; Jongkind 2015), including the two new species from West Africa described here. The 15 continental African species are endemic, seven of them recorded in Upper Guinea (sensu White 1979; the forest area W of Benin). Apart from G. paniculata Benth., which is found all over Guineo-Congolia, all Gaertnera species in Upper Guinea are endemic to that area and often restricted to a part of it (Table 1, Fig. 2, 5 & 7).

Two fruiting Gaertnera specimens, collected by the author in different localities in the forest of W Liberia, did not belong to any of the Gaertnera species already known from continental Africa (Malcomber & Taylor 2009; Jongkind 2015). These specimens clearly represented the same species as Goll 116, a specimen with flower buds, collected 47 years ago in the same part of Liberia. That specimen was identified in 2004 by Simon Malcomber as G. cf. aurea Malcomber but it was later not cited in the revision of the genus (Malcomber & Taylor 2009). The location where Goll 116 was collected is far outside the distribution range of G. aurea (Fig. 2 & 7). The undescribed species to which the three specimens belong is here named G. pedunculata Jongkind because it differs from all other continental African Gaertnera species by its pedunculate and almost capitate inflorescence.

The endosperm of Gaertnera longevaginalis (Schweinf. ex Hiern) E. M. A. Petit is entire according to the taxonomic revision of Malcomber & Taylor (2009: 630, 631). However, all fruiting specimens checked for this publication from the isolated western populations of G. longevaginalis in Sierra Leone, Guinea, Liberia and...
Ivory Coast, have ruminate endosperm (Fig. 6B). This character can also be seen in a line drawing by Jacques-George Adam after Adam 20579 from Liberia (Adam 1975: 1004, 1239). The specimens from Central Africa (the area bounded by Cameroon, Congo Kinshasa and Angola) indeed always have entire endosperm. The West African specimens also differ from the Central African ones by their shorter and more compact inflorescences (Fig. 3 & 4). On top of that, the two populations are separated by 2000 km (Fig. 5). The main characters that unite the two populations are the shape of the stipules and the comparatively large inflorescence bracts – characters that are also found in several other species in Africa and of which the taxonomic importance was overvalued in the past (see “the Gaertnera vaginans complex” in Malcomber & Taylor 2009: 591). For example, the West African G. cooperi Hutch. & M. B. Moss shows a strong variation in the size of the bracts from specimen to specimen. Because of this, I assessed the two geographically separate populations of G. longevaginalis as distinct species and here name the West African species G. monticola Jongkind.

Material and methods

The morphological characters of the continental African Gaertnera species were studied in the herbaria BR, K, P and WAG, and both new species were also studied in the field. The herbaria are indicated by the international codes registered in Index Herbariorum (Thiers 2018+). The distribution maps are based on herbarium specimens only.

Table 1. Important differences between the Gaertnera species in Upper Guinea.

<table>
<thead>
<tr>
<th>Character</th>
<th>Gertnera aurea</th>
<th>Gertnera cooperi</th>
<th>Gertnera liberiensis</th>
<th>Gertnera luteocarpa</th>
<th>Gertnera monticola</th>
<th>Gertnera paniculata</th>
<th>Gertnera pedunculata</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stipules</td>
<td>calytrate, branched to 3 or 4 orders, congested to lax</td>
<td>calytrate, branched to 3–5 orders, congested</td>
<td>tubular</td>
<td>tubular not or very shortly branched, congested</td>
<td>tubular branched to 3 or 4 orders, lax</td>
<td>tubular branched to 4–6 orders, lax</td>
<td>calytrate almost capitate with branches not more than 3 mm long</td>
</tr>
<tr>
<td>Inflorescence</td>
<td>branched to 3 or 4 orders, congested</td>
<td>branched to 3–5 orders, congested</td>
<td>branched to 3 or 4 orders, lax</td>
<td>truncate, c. 1 mm long</td>
<td>truncate or with triangular lobes to 1 mm long</td>
<td>truncate, c. 1 mm long</td>
<td></td>
</tr>
<tr>
<td>Calyx</td>
<td>truncate or lobes to 0.3 mm long</td>
<td>triangular lobes to 0.4–4 mm long</td>
<td>triangular lobes 1–1.5 mm long</td>
<td>triangular lobes 2–4 mm long</td>
<td>truncate or with triangular lobes to 1 mm long</td>
<td>truncate, c. 1 mm long</td>
<td></td>
</tr>
<tr>
<td>Corolla tube length</td>
<td>1.8–3.3 mm</td>
<td>8–11 mm</td>
<td>4–5 mm</td>
<td>c. 9 mm</td>
<td>c. 3 mm</td>
<td>2.5–5 mm</td>
<td>–</td>
</tr>
<tr>
<td>Corolla lobes length</td>
<td>1.8–2.7 mm</td>
<td>3.5–6 mm</td>
<td>c. 3 mm</td>
<td>c. 5 mm</td>
<td>c. 4 mm long</td>
<td>1.5–3 mm</td>
<td>–</td>
</tr>
<tr>
<td>Fruit colour</td>
<td>blue to black</td>
<td>blue to black</td>
<td>–</td>
<td>yellow</td>
<td>blue to black</td>
<td>blue to black</td>
<td>blue to black with shallow grooves</td>
</tr>
<tr>
<td>Endosperm</td>
<td>ruminant</td>
<td>ruminant</td>
<td>–</td>
<td>ruminant</td>
<td>entire</td>
<td>ruminant</td>
<td></td>
</tr>
<tr>
<td>Distribution</td>
<td>SE Ivory Coast, Ghana</td>
<td>Liberia, SW Ivory Coast</td>
<td>Liberia (endemic)</td>
<td>Liberia to Ghana</td>
<td>Guinea, Sierra Leone, Liberia, W Ivory Coast</td>
<td>Guinea-Congolian</td>
<td>W Liberia (endemic)</td>
</tr>
</tbody>
</table>

Conservation status was assessed according to IUCN Red List categories and criteria (IUCN 2012). The RBG Kew website http://geocat.kew.org was used to calculate the Extent of Occurrence (EOO) and Area of Occupancy (AOO).

Results

Gaertnera pedunculata Jongkind, sp. nov. – Table 1, Fig. 1, 6C.
Holotype: Liberia, Gola forest, fr., 28 Nov 2005, Jongkind, Daniels, Konie & Gorpudolo 6978 (WAG; isotype: BR).

Diagnosis — Gaertnera pedunculata differs from all other continental African Gaertnera species by its almost capitate inflorescence with branches not more than 3 mm long and peduncle 1.5–3 cm long; and endosperm with shallow grooves.

Description — Shrub or small tree to 3 m tall. Twigs glabrous, smooth, with an inconspicuous ridge around petiole base. Leaves glabrous; blade 9–16.5 x 3.5–6 cm, elliptic, often with almost parallel sides, rather abruptly narrowing to petiole, base attenuate, apex acuminate; abundant tiny dots on adaxial surface; midrib prominent on both surfaces; main lateral veins 5–7 pairs, without domatia; tertiary venation conspicuously subparallel; petiole 0.7–2 cm long. Stipules calytrate, c. 2 cm long, with 2 or 4 lobes at apex, glabrous except for puberulous lobes, smooth, splitting along one side, caducous. Inflorescence almost capitate with branches not more than
3 mm long; peduncle 1.5–3 cm long, puberulous; bracts like tiny leaves, 12–15 × 3–6 mm; bracteoles absent. Flower buds white, with a few tiny hairs; calyx truncate, c. 1 mm long. Drupes ellipsoid, blue, glabrous; seeds 1 or 2; endosperm with shallow grooves; calyx accrescent in fruit, c. 3 mm long.

Distribution and ecology — Endemic to W Liberia (Fig. 2). In forest.

Conservation status — The Extent of Occurrence (EOO) was calculated as 1069 km² and the Area of Occupancy (AOO) was estimated as 12 km² based on a cell width of 2 km, both criteria for the Endangered category (IUCN 2012). The species is not known from protected areas and there are logging and mining concessions in the forest close to where it was collected. Gaertnera pedunculata is known from three subpopulations that correspond to three locations. It is assigned a preliminary conservation status of Endangered EN B1ab(iii)+2ab(iii) following IUCN Red List categories and criteria (IUCN 2012).

Etymology — The species is named Gaertnera pedunculata because the almost capitate inflorescence is conspicuously pedunculate.


Gaertnera monticola Jongkind, sp. nov. — Table 1, Fig. 3, 6B. Holotype: Guinea, Mount Nimba, on W side, 1300 m, fl., fr., 14 Dec 1967, Geerling & Bokdam 1693 (WAG; isotypes: BR, MO).

Diagnosis — Gaertnera monticola differs from G. longevaginalis, with which it was earlier confused, by a shorter and more compact inflorescence (to 5 cm long, vs to 10 cm long) and by seeds with conspicuous ruminate endosperm.

Description — Shrub or treelet to 6 m tall. Twigs puberulous or glabrous. Leaves glabrous except for domatia; blade 5.5–15.5 × 1.5–4.5 cm, thin, elliptic to oblong or lanceolate, base ± cuneate, apex acuminate; main lateral nerves 5 or 6 pairs, often with hairy domatia; petiole 3–15 mm long. Stipules fragile, quickly deciduous through fragmentation; tubular sheath 8–14 mm long, glabrous; lobes 4, 6–9 mm long, with a few hairs. Inflo-
rescence terminal, to 5 cm long but usually shorter, compact; branches puberulous; bracts and bracteoles almost glabrous, narrowly triangular to lanceolate, or laciniate, to 11 mm long, often with hairs at margin. Flowers heterodistyloous. Calyx tube c. 1.5 mm long; lobes to 4 mm long. Corolla glabrous outside; tube c. 3 mm long, pinkish to white; lobes c. 4 mm long, white, densely hairy at base inside. Anthers 2–2.5 mm long. Style 4–7 mm long. Long-styled flowers: filaments c. 1 mm long; anthers partly included; style conspicuously exserted. Short-styled flowers: filaments c. 3 mm long; anthers fully exserted; style hardly exserted. Drupes 0.9–1.8 × 0.6–1.2 cm, blue-purple, glabrous; seeds 1 or 2; endosperm ruminate.

Distribution and ecology — Guinea, Sierra Leone, Liberia and W Ivory Coast (Fig. 5). In closed forest and, more commonly, in gallery forest on slopes, often close to streams, from low altitude to 1600 m.

Fig. 5. Distributions of Gaertnera monticola (circles) and G. longevaginalis (triangles).
**Conservation status** — The species is relatively widespread and clearly not rare. During the last 20 years, it was found in four countries. The number of locations is more than ten; the species may therefore be assessed as Least Concern (IUCN 2012).

**Etymology** — The species is named *Gaertnera monticola* because many specimens are collected above 1000 m in altitude.

**Selection of additional specimens seen (paratypes)** — **SIERRA LEONE:** Nongowa, Kambui Hills, fl., 24 May 1960, Bakshi 184 (K, P); Makali, fl., Feb 1945, Deighton 4086 (K); Loma mts, 1600 m, fl., 15 Aug 1964, Jaeger 7158 (K, MO, P, WAG); mine site hill pt 217, 08.43°N, 11.67°W, 440 m, fl., 7 Jun 2011, Luke & Rogers 15091 (BR); Bagroo River, fl., Apr 1861, Mamm 802 (K); Loma mts, plateau above Yilin, fl., 25 Mar 1964, Morton & Gledhill SL 1032 (K, WAG); Southern Sula Mountains, SE of Bumbuna, S of Farangbaia, fl., fr., 4 Mar 2010, van der Burgt 1429 (K). — **GUINEA:** Beyla, Fon, galerie de la grotte, fl. bud, 5 Feb 1949, Adam 3658 (P); Guéckedou (Bolodou), 20 Jul 1949, Adam 5740 (P); Diaguissa, 1300–1400 m, fl., 8 Apr 1905, Chevalier 12420 (P); Chute de la Dintinn, fl., fr., Apr 1905, Chevalier 12984 (P); Mt Simandou, N du Pic de Fon et Pic de Dabatini, fl., 22 Mar 2008, Haba 39 (K, WAG); Dalaba, fl., Mar 1936, Jacques-Félix 795 (P); W of Nimba mts, near natural bridge crossing Diougou river, fr., 13 Dec 2006, Jongkind & al. 7630 (BR, P, WAG); Nimba mts, Mt Sempere, 1460 m, fl., 17 Feb 2012, Mas & al. 1253 (BR, MO, P, WAG); Nimba mts, la vallée de Wolanda, 1420 m, fl., 20 Feb 2012, Mas & al. 1261 (BR, MO, P, WAG). — **LIBERIA:** Nimba mts, crête vers la Guinée, fr., 14 Jan 1965, Adam 20579 (P); top of Mt Wolawisi, near Pandamai, fl., Mar 1944, Bequaert 106 (K); Nimba mts, 1100 m, fr., 29 Aug 1968, Breteler & de Wit 5458 (BR, MO, P, PRE, WAG); Baila, fl., fr., 9 Feb 1947, Harley 1910 (K, P); Bomi hills, fl., 13 Feb 1969, Jansen 1515 (BR, K, MO, P, WAG); North Lorna National Forest, fr., 19 Nov 2005, Jongkind & al. 6670 (BR, WAG); Gbanga, fl., fr., 21 Sep 1926, Linder 758 (K). — **IVORY COAST:** Mt Tonkoui, fl., 27 Mar 1969, Bamps 2263 (BR, P); Tonkoui, fr., 3 Oct 1961, Hallé 380 (P).

**Discussion**

The endemic West African *Gaertnera* species, except for *G. pedunculata*, have conspicuous ruminate endosperm, but in *G. liberiensis* E. M. A. Petit, the fruits are not yet known. All Central African *Gaertnera* species have entire endosperm. It would not be surprizing if the West African endemics are more related to each other than to the Central African species. If they are closely related, they could be, as a group, sister to all other *Gaertnera* species because one of them is already considered to be in that position (see Malcomber & Taylor 2009: 590). *Gaertnera cooperi* in the sense of Malcomber & Taylor (l.c.) is in fact *G. luteocarpa* Jongkind. The specimen Jongkind & al. 2077, which was sampled for the molecular research of *G. cooperi*, later became part of *G. luteocarpa* (Jongkind 2015). After the publication of *G. luteocarpa*, and the re-identification of *G. cooperi* specimens in herbaria, the latter species became restricted to Liberia and SW Ivory Coast (Fig. 7).

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