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Source: Willdenowia, 48(3) : 391-397

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: <https://doi.org/10.3372/wi.48.48308>

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Two new *Gaertnera* species (*Rubiaceae*) from West Africa

Version of record first published online on 9 November 2018 ahead of inclusion in December 2018 issue.

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 ruminant 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

Article history: Received 7 May 2018; peer-review completed 24 August 2018; received in revised form 30 August 2018; accepted for publication 4 September 2018.

Citation: Jongkind C. C. H. 2018: Two new *Gaertnera* species (*Rubiaceae*) from West Africa. – Willdenowia 48: 391–397. doi: <https://doi.org/10.3372/wi.48.48308>

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 repre-

sented 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

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Ivory Coast, have ruminant 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.

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 × 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* calyprate, 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

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

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



Fig. 1. *Gaertnera pedunculata* – A: fruiting branches, from below (left), from above (right); B: infructescence, close-up. – All from Jongkind & al. 10223.

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.

Additional specimens seen (paratypes) — LIBERIA: Gola National Forest, 8 miles N of Bomi hills, fl. bud, 3 Feb 1971, Goll 116 (SL, WAG); Kpelle Forest, S of Gaiakpa, fr., 17 Dec 2010, Jongkind & al. 10223 (BR, WAG).

***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 ruminant 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* heterodistylous. 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 ruminant.

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.

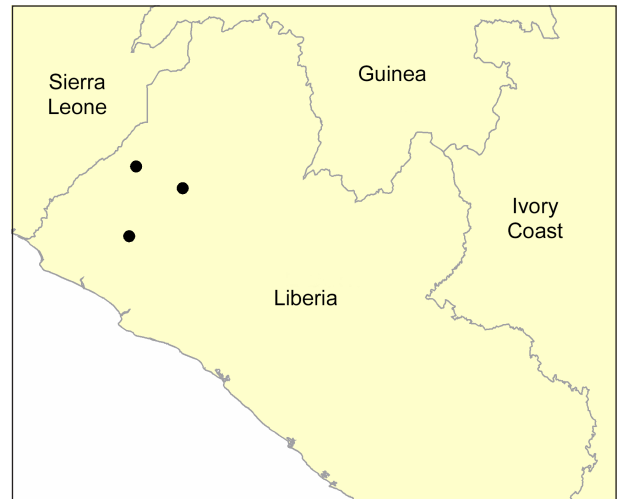


Fig. 2. Distribution of *Gaertnera pedunculata*.



Fig. 3. *Gaertnera monticola* – A: flowering branch; B: flowers (short style); C: fruits – A: Guinea, 2012, *Mas & al.* 1261; B: Guinea, 2012, *Mas & al.* 1253; C: Sierra Leone, 2010, *van der Burgt* 1429. – A & B photographed by Ehoarn Bidault; C photographed by Xander van der Burgt.

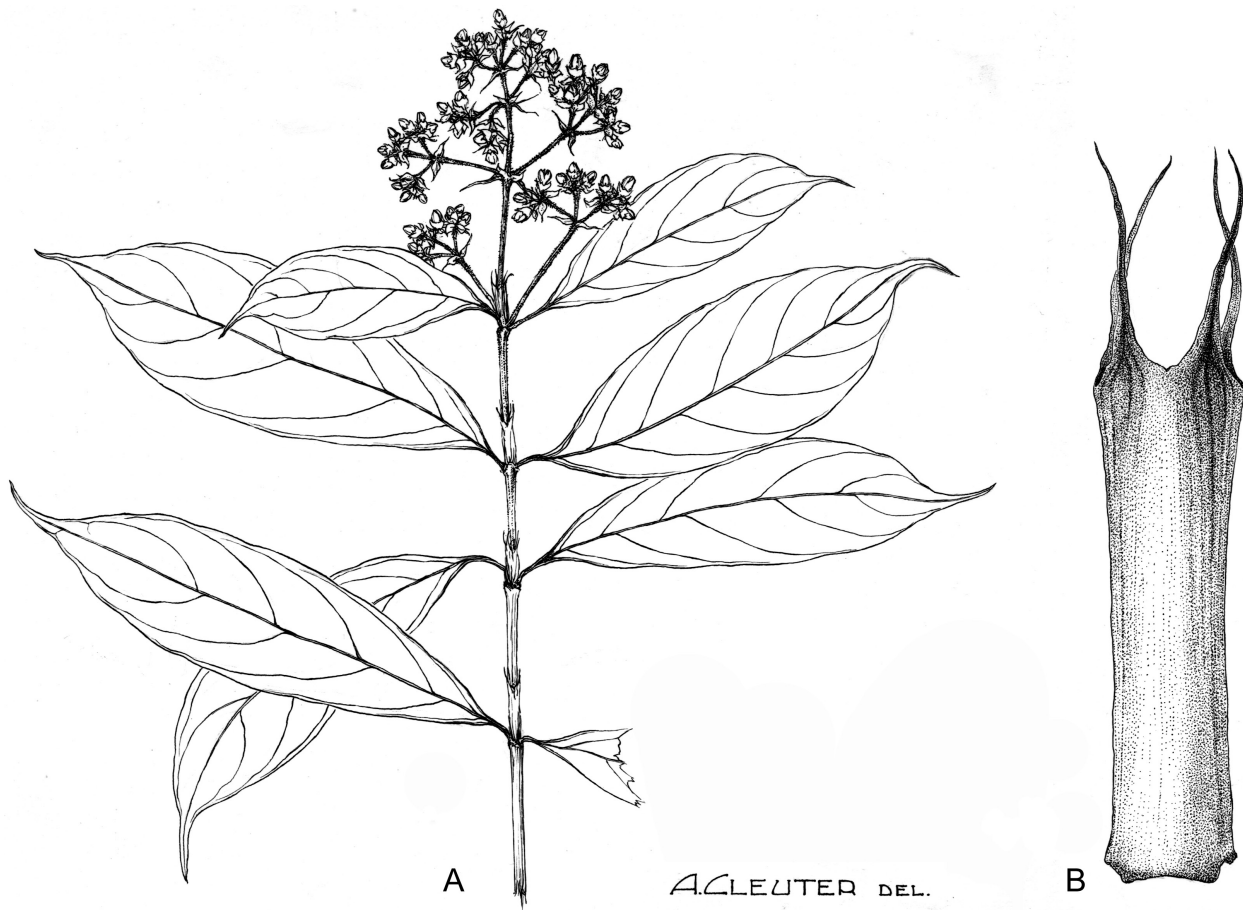


Fig. 4. *Gaertnera longevaginalis* – A: flowering branch, B: tubular stipule. – Congo Kinshasa, *Louis 1881* (BR). – Drawn by A. Cleuter; previously published by Petit (in Bull. Jard. Bot. État Bruxelles 29: 47 [Planche IV A, B], 1959); reproduced with the permission of and © Botanic Garden Meise.

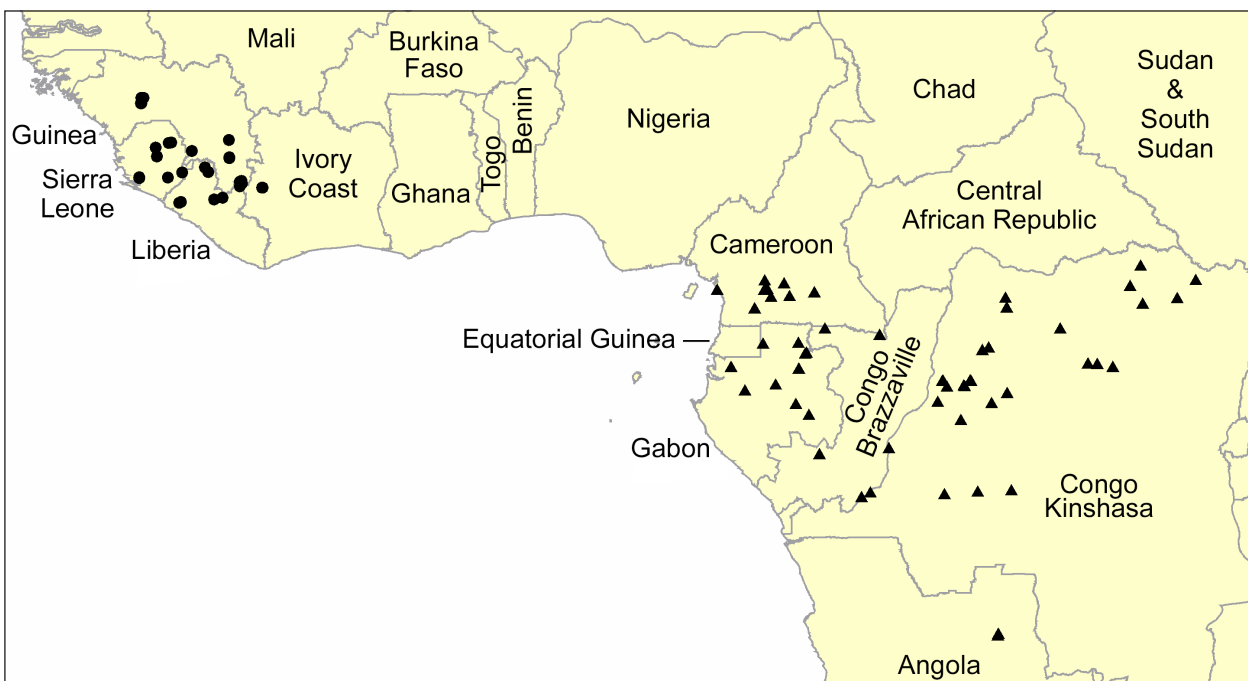


Fig. 5. Distributions of *Gaertnera monticola* (circles) and *G. longevaginalis* (triangles).

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., fr., 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, *Mann 802* (K); Loma mts, plateau above Yifin, 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); Guéckédou (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 Lorma National Forest, fr., 19 Nov 2005, *Jongkind & al. 6670* (BR, WAG); Gbanga, fl., fr., 21 Sep 1926, *Linder 758* (K). — IVORY COAST: Mt Tonkouï, fl., 27 Mar 1969, *Bamps 2263* (BR, P); Tonkouï, fr., 3 Oct 1961, *Hallé 380* (P).

Discussion

The endemic West African *Gaertnera* species, except for *G. pedunculata*, have conspicuous ruminant endosperm, but in *G. liberiensis* E. M. A. Petit, the fruits are not yet

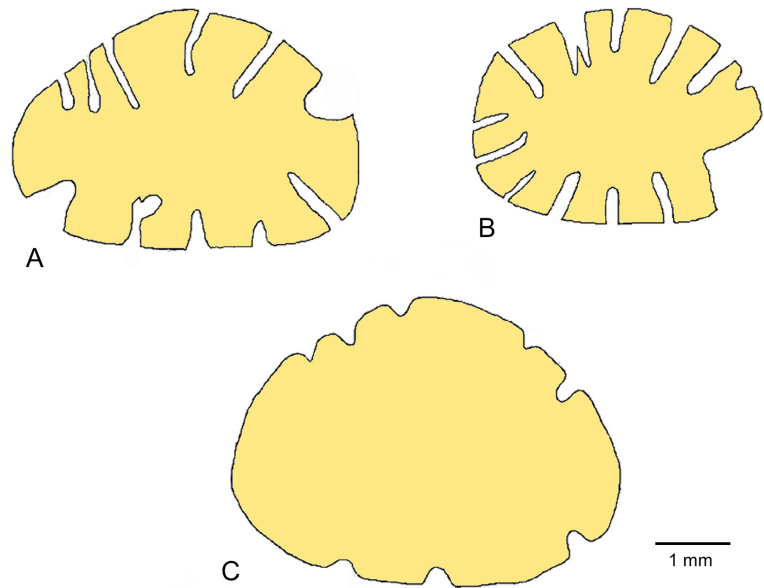


Fig. 6. Cross-sections of endosperm — A: *Gaertnera aurea*; B: *G. monticola*; C: *G. pedunculata*. — A from *de Koning 1156*; B from *Geerling & Bokdam 1693*; C from *Jongkind & al. 6978*.

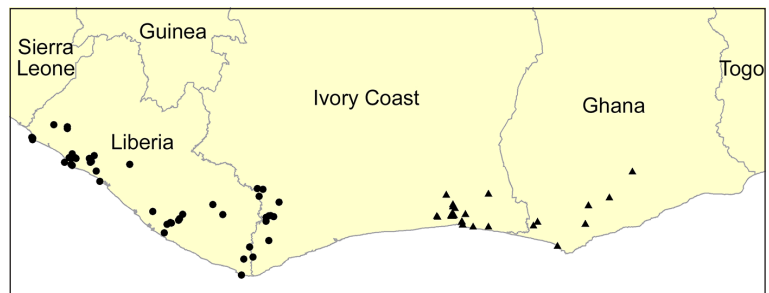


Fig. 7. Distributions of *Gaertnera cooperi* (circles) and *G. aurea* (triangles).

known. All Central African *Gaertnera* species have entire endosperm. It would not be surprising 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).

Acknowledgements

I want to thank Xander van der Burgt (K) and Ehoarn Bidault (MO) for the use of their photos. The author also would like to thank the reviewers, Charlotte Taylor

and Tariq Stévant (both MO), for their comments, which helped to improve the manuscript. Ann Bogaerts (BR) is thanked for granting permission on behalf of Botanic Garden Meise to reproduce as Fig. 4 the line drawings by A. Cleuter from Petit (1959).

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Willdenowia

Open-access online edition www.bioone.org/loi/will  **BioOne**
COMPLETE

Online ISSN 1868-6397 · Print ISSN 0511-9618 · Impact factor 1.500

Published by the Botanic Garden and Botanical Museum Berlin, Freie Universität Berlin

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