A synopsis of *Chlamydocardia* (Acanthaceae) including *Linocalix*

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Summary. *Linocalix* Lindau, one of the few remaining unplaced genera for the *World Checklist of Selected Plant Families* database, is found to be a synonym of *Chlamydocardia* Lindau (Acanthaceae). An extant type at the BR herbarium of *Linocalix albus* Lindau is referable to *Chlamydocardia subrhomboidea* Lindau. A synopsis of the two species of *Chlamydocardia*, *C. buettneri* Lindau (including *C. lanciformis* Lindau) and *C. subrhomboidea* is provided, together with an identification key and a discussion of their status. Neotypes are selected for *C. buettneri* and *C. subrhomboidea*, and *C. lanciformis* and *Linocalix albus* are lectotypified.

Key Words. African plants, synonymy, taxonomy, type specimen, World Checklist of Selected Plant Families.

Introduction

Lindau (1913) described the monotypic genus *Linocalix* from Bare in Cameroon as part of his ongoing studies on the African Acanthaceae, placing it near the genus *Gatesia* A. Gray (= *Yeatesia* Small *vide* Scotland & Vollesen 2000). *Linocalix* has since largely disappeared from the taxonomic literature, not having been mentioned in the relevant publications on West African Acanthaceae (most notably Heine 1963, 1966) nor in checklists of the tropical African flora (Lebrun & Stork 1997; Klopper *et al.* 2006) or the vascular plants of Cameroon (Onana 2011). In their classification of Acanthaceae, Scotland & Vollesen (2000) listed *Linocalix* (as *Linocalyx*) as a synonym of *Justicia* L. but without further elaboration or justification. With a treatment of the Acanthaceae for the *Flore du Cameroun* series yet to be produced, the status of *Linocalix* has remained unconfirmed. Thus *Linocalix* was one of the last genera of vascular plants to remain unresolved in the *World Checklist of Selected Plant Families* database (R. Govaerts, pers. data) and on *The Plant List* (2013). The specimen of the single species, *L. albus* Lindau (Ledermann 6140) at Berlin is believed to have been destroyed by the bombing of the Berlin herbarium during World War II. Fortunately, a duplicate of this collection is held at the BR herbarium and is available via the JSTOR Global Plants website (under *Linocalyx albus*, JSTOR 2016). Whilst depauperate, this specimen does include a flowering spike with one young corolla visible, which is a close match for the rare species *Chlamydocardia subrhomboidea* Lindau. This placement is confirmed by Lindau's description of *L. albus* in the protologue, which is a good match for *C. subrhomboidea*. *Linocalix* is therefore synonymised within *Chlamydocardia* here.

Chlamydocardia was placed in subtribe Justiciinae of tribe Ruellieae of subfamily Acanthoideae in the classification of the Acanthaceae by Scotland & Vollesen (2000).

More recent molecular evidence places the genus as the basal-most clade of the “*Tetramerium* lineage” (Daniel *et al.* 2008), one of the four major lineages in the tribe Justiceae sensu McDade *et al.* (2000). *Chlamydocardia* is recognised by having the combination of (1) a small (c. 9 – 12 mm long), corolla with a narrowly cylindrical tube much longer than the reflexed limb (the lower lip fully divided into three lobes, the upper lip comprising two almost completely fused lobes); (2) anthers with unequal-sized thecae but these held at $\pm$ the same height (i.e. not offset) and lacking appendages; and (3) broadly prolate to subglobose, 6-zonocolporate pollen with a mesocolpium of numerous verruculae often arranged in $\pm$ well defined longitudinal lines (Daniel *et al.* 2008; Darbyshire 2010; Fig. 1). This pollen type has been proposed as a synapomorphy for the genus (Daniel *et al.* 2008; see also Scotland & Vollesen 2000: fig. 39 A & B). Lindau's description of the pollen of *Linocalix albus* is a close match for this unique pollen type. Two species of *Chlamydocardia* are currently recognised; these are summarised in the taxonomic account below and an identification key is presented.

Taxonomic account

***Chlamydocardia* Lindau (1894: 39); Clarke (1900: 234); Heine (1963: 423; 1966: 184); Darbyshire (2010: 648).** Type species: *Chlamydocardia buettneri* Lindau.

Linocalix Lindau (1913: 39), **synon. nov.** Type species: *Linocalix albus* Lindau.

Genus nov. sensu Vollesen & Darbyshire (2004: 231).

Bracts variously obovate, linear-oblongate or spatulate-obcordiform, widest in the distal half, 0.7 – 7 mm wide.....***C. buettneri***

Fig. 1. SEM images of the pollen of *Chlamydocardia buettneri*. **A** whole grain, equatorial view (scale bar = 50 μ m); **B** detail of aperture and sculpturing (scale bar = 10 μ m). Images from *Brenan* 9317 ex Cameroon.

Bracts ovate, elliptic or subrhombic, widest in the proximal half or at the midpoint, 6 – 9.5 mm wide.....**C. subrhomboidea**

Chlamydocardia buettneri Lindau (1894: 39); Clarke (1900: 234); Heine (1963: 423; 1966: 185, pl. 38: 1 – 9); Vollesen (1998: 2); Vollesen & Darbyshire (2004: 224); Hawthorne & Jongkind (2006: 438, 446, 447); Sosef (2006: 37); Darbyshire (2010: 650, fig. 83); Onana (2011: 30). Types: Gabon, Sibange Farm, fl. & fr. Sept. 1884, *Büttner* 469 (B† holotype); Gabon, forêt de Mondah, N of Libreville, fl. 13 Aug. 1992, *Dibata* 1054 (K! neotype, **selected here**; MO, WAG isoneotypes). Fig. 2. *Chlamydocardia lanciformis* Lindau (1911: 300). Types: D.R. Congo, Beni, Muera, fl. & fr. Jan. 1908, *Mildbraed* 2225 (B† syntype); pl. 32 G–J in *Wiss. Ergebn. Deut. Zentr. Afr. Exped., Bot.* 2, 1911 (lectotype, **selected here**).

DISTRIBUTION. Widespread in the wet Guineo-Congolian forests of West and Central Africa: Ivory Coast, Nigeria, Cameroon, Equatorial Guinea, Gabon, Congo (-Brazzaville), D.R. Congo, Uganda.

CONSERVATION STATUS. This widespread species was assessed as of Least Concern (LC) by Darbyshire (2010).

NOTES. *Chlamydocardia buettneri* is variable in terms of bract shape, ranging from broadly obovate (e.g. *Casas* 12100 from Bioko), to spathulate-obcordiform, i.e. with a narrowly cuneate or attenuate base and with two expanded rounded lobes towards the apex, usually also with a short acumen (e.g. *Cable* 841 from Cameroon, *Keay* in FHI 28278 from Nigeria; Fig. 2E), or linear-oblancheolate (e.g. *Eilu* 450 from Uganda, Fig. 2D). The lattermost form was previously separated as *C. lanciformis* but there are plants intermediate between this and the “spathulate-obcordiform” bract form across its range, notably in

Uganda. What unites all these bract forms is that they are widest in the distal half, with a long-attenuate or -cuneate base and (except for linear-oblancheolate forms) with a short but marked acumen. Variants on the “spathulate-obcordiform” bract shape are the most common and widespread form – these bracts are quite unlike anything seen elsewhere in African Acanthaceae.

The original specimen of *Chlamydocardia buettneri* is believed to have been destroyed by the bombing of the Berlin herbarium during World War II and no duplicates have so far been traced. *Dibata* 1054 is therefore chosen as a neotype as it is an informative specimen and the collecting locality is not too distant from the original type locality. Likewise, the original specimen of *Chlamydocardia lanciformis* is believed to have been lost in the same way; the illustration in the protologue is therefore selected as a lectotype here.

Chlamydocardia subrhomboidea Lindau (1895: 119); Clarke (1900: 235); Heine (1966: 185, in notes); Onana (2011: 30). Types: Cameroon, between Victoria [Limbe] and Bimbia, fl. 10 July 1894, *Preuss* 1309 (B† holotype); Cameroon, Moliki, fl. & fr. Nov. 1938, *Jacques-Félix* 2534 (P 02894780! neotype, **selected here**; K!, P 02894779!, P 00536453! isoneotypes). Fig. 3. *Linocalix albus* Lindau (1913: 408). Type: Cameroon, Bare, fl. 15 Nov. 1909, *Ledermann* 6140 (B† isotype; BR 629 315! lectotype, **chosen here**), **synon. nov.**

Chlamydocardia buettneri sensu Heine (1963: 423) pro parte, non Lindau.

Genus nov. sensu Vollesen & Darbyshire (2004: 231).

DISTRIBUTION. Cameroon, D.R. Congo.

CONSERVATION STATUS. Assessed as Endangered EN B2ab(iii) by Darbyshire & Cheek (in Onana &

Fig. 2. *Chlamydocardia buettneri*. A habit; B detail of stem indumentum; C bract, outer surface; D bract, outer surface, narrow extreme; E bract, outer surface, "spatulate-obcordiform" form; F bracteoles and calyx; G corolla with stamens and pistil; H dissected corolla with stamens; J mature capsule with seeds; K mature seed. A – C & H – K from G. Taylor 3312 ex Uganda; D from *Eilu* 450 ex Uganda; E from *Cheek* 7162 ex Cameroon; F & G from *Brenan* 8455 ex Nigeria. Reproduced from F.T.E.A. *Acanthaceae Part 2* (Beentje 2010: fig. 83), with permission of the Trustees of the Royal Botanic Gardens, Kew. DRAWN BY JULIET WILLIAMSON.

Fig. 3. *Chlamydocardia subrhomboidea*, collected as Osborne 299 ex Cameroon. PHOTO: J. OSBORNE.

Cheek 2011: 70) as it is known from only five locations and is threatened by conversion of its forest habitat to agricultural land in at least two of its known sites.

NOTES. *Chlamydocardia subrhomboidea* is usually easily separated from *C. buettneri* by its larger, ovate or at most elliptic bracts that lack an acumen, the apex being acute or at most shortly attenuate. These large bracts result in a more markedly strobilate flowering spike than in *C. buettneri* (see Fig. 3). In addition, *C. subrhomboidea* is typically a more robust plant than *C. buettneri* with larger leaves, but there is some overlap in these vegetative characters. A small number of specimens of *C. buettneri* from Cameroon (notably Brenan 9317 and Cable 1216, both K!) with particularly broad obovate bracts begin to approach those of *C. subrhomboidea*. It is therefore conceivable that *C. subrhomboidea* could be an extreme form of *C. buettneri* but this would be best investigated using molecular methods and it would be premature to reduce *C. subrhomboidea* to synonymy without such a study. Interestingly, Heine (1963) initially synonymised *C. subrhomboidea* within *C. buettneri* but later resurrected it as a clearly distinct species, after having

studied specimens from Cameroon and D.R. Congo (Heine 1966).

The holotype of *Chlamydocardia subrhomboidea* is believed to have been destroyed by the bombing of the Berlin herbarium during World War II and no duplicates have so far been traced. A neotype is therefore selected here; one of the three P sheets of Jacques-Félix 2534 is chosen as this is an informative specimen, with both flowers and mature fruits, and the collection site is not too distant from the type locality; this specimen is also duplicated at K.

The identity of *Chlamydocardia nuda*

Chlamydocardia nuda C. B. Clarke (1900: 235). Type: Gabon, Como R., 60 miles from Gaboon, fl. July 1896, Bates 494 (K! holotype; BM!, G-DC!, L!, P! isotypes).

NOTES. This rare species, endemic to Gabon, was originally placed with some doubt in *Chlamydocardia* by Clarke (1900), but rejected from that genus by Lindau (1911). Heine (1966) subsequently transferred this species to *Justicia* L. with a new name *J. tigrina* Heine as the epithet *nuda* was already occupied in *Justicia* by *J. nuda* (Nees) O. Schwartz (Schwartz 1939: 259). Heine's *J. tigrina* remains the accepted name in current works (see e.g. Sosef 2006). However, this placement also appears to be in doubt and the status of this species is currently under investigation by the first author [I.D.] together with colleagues at Rancho Santa Ana Botanic Garden and the California Academy of Sciences. In any case, it certainly does not belong in *Chlamydocardia*, having a very different floral morphology to that genus: the corolla is markedly 2-lipped with only a shortly divided lower lip, the limb is approximately equal in length to the tube and the anther thecae are puberulous and markedly offset, each with a flattened basal "proto-appendage" with small conical protrusions (see Heine 1966: pl. 38, 10 – 13).

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