

***Scaphochlamys calcicola* (Zingiberaceae): a New and Unusual Species from Borneo**

A.D. POULSEN

Royal Botanic Garden, 20A Inverleith Row, Edinburgh EH3 5LR,
Scotland, U.K.

AND

R.J. SEARLE

48 Bartons Drive, Yateley, Hampshire, GU46 6DP, UK.

Abstract

Scaphochlamys calcicola A.D.Poulsen & R.J.Searle is described from the Bau limestone area in Sarawak, Borneo. Its placement within *Scaphochlamys* and relationship with *Boesenbergia* and *Distichochlamys* are discussed.

Introduction

The genus *Scaphochlamys* Baker comprises 27 described species distributed from the southernmost provinces of Thailand, through Peninsular Malaysia, Singapore, and the island of Borneo. The most comprehensive review of the genus is by Holttum (1950) as part of a treatment of the Zingiberaceae in Peninsular Malaysia, which includes 20 species of *Scaphochlamys*. The four species from Borneo were reviewed by Smith (1987), and since then three new species have been described from Thailand (Sirirugsa & Larsen, 1991; Jenjittikul & Larsen, 2002).

The current species was discovered during a botanical inventory of the Bau limestone area conducted by staff of the Sarawak Biodiversity Center in 2001–2002. This project subsequently involved the first author in assisting with the identification of Zingiberaceae material and compiling a preliminary checklist of all species. This list (Poulsen *et al.*, 2004) included a species of *Scaphochlamys* which follow-up fieldwork, including the first author in 2002–2003, has confirmed to be new. During this fieldwork, several flowering individuals were found, photographed and preserved in spirit for further studies essential for making the following description which forms part of a revision of the genus due for publication by the second author.

Scaphochlamys calcicola A.D.Poulsen & R.J.Searle, *sp. nov.*

Scaphochlamydi sylvestri, *S. occulatae* et *S. breviscapaea* similis. Ab eis inflorescentiis compactis spiraliter dispositis differt.

Typus: Malaysia, Borneo, Sarawak, Kuching Division, Bau area, Gunung Tai Ton (1°24'N; 110°8'E), altitude 50 m, in a recently deforested limestone gorge, 20 June 2003. *Poulsen, Jugah & Clausager 2022* (holo SAR; iso AAU, E, L, K).

Terrestrial herb 30–60 cm tall. *Rhizome* horizontally creeping above the ground, robust, about 7 mm diam, when dried, sometimes forking, with well-developed anchoring roots (not stilted). Leafy shoots 2–20 cm apart, distinctly unifoliolate; *laminar leaf* tightly enclosed by 3(–5) leafless sheaths, the longest to 18 cm, cream at base, flushed green towards apex, becoming brown and papery with age, shredding; these completely hide the much shorter sheath and ligule of the leaf; *sheath* to 3 cm, margin thin and densely ciliate terminating in a ± obscure, bilobed, to 5 mm (when fresh), membranous ligule; *petiole* (measured from the base of the shoot because the ligule is often hard to establish) 10–27–39) cm long, canaliculate; *lamina* 15–37 x 9–18 cm, broadly elliptic to lanceolate, slightly asymmetric, plicate, upper surface plain green, lower surface very pale green and villose (up to 1 mm long, appressed, white hairs, scattered throughout the lower surface but most dense near and on the sides of the midrib); base rounded to slightly cordate and attenuate; apex distinctly acuminate to *c.* 1 cm. *Peduncle* to 1.5 cm, slender, glabrous, hidden at base of the leaf; inflorescence derived from near the leaf base inside the leafless sheaths, flowering from base to apex; *inflorescence head* 7–10 cm long, bilaterally flattened: 1.5–2.0 wide and 0.5–0.6 cm deep, tapering towards a pointed apex, with 8–13 bracts arranged distichously and 0.3–0.7 cm apart on an elongated spike; *bracts* pale green, 2.5–3.2 cm long and 0.9 cm wide near the base, held stiffly upright, boat-shaped, outer surface glabrous or covered in short spiky hairs; apex acute, edges involute and overlapping; bracts subtending (2–)3 flowers; *bracteole* 2.0–3.3 cm (first; second and third decreasing in size), 2-keeled, generally longer and opposite to the bract, wrapped tightly around the flower(s), slit to the base, edges overlapping, covered in short spiky hairs; *calyx* with ovary 12–13 mm long, fissure *c.* 4 mm, with rounded to acute, irregularly tridentate apex with a scattering of short spiky hairs, otherwise glabrous; *corolla tube* 2.4–4 cm long, glabrous, corolla lobes white, linear, 1.5 x 0.5 cm, apex mucronate and hooded; *staminodes* oblong, 1.2 x 0.3–0.4 cm wide, papillose, apex obtuse; *labellum* 1.4–1.7 x 0.9–1.1 cm, spatulate, apex bilobed (indented 3–4 mm), lobes overlapping, white with pale yellow-green centre; *stamen* 11–12 mm; filament 5–7 x 2 mm, anther thecae 4–5 x 1.5 mm, not spurred, dehiscent

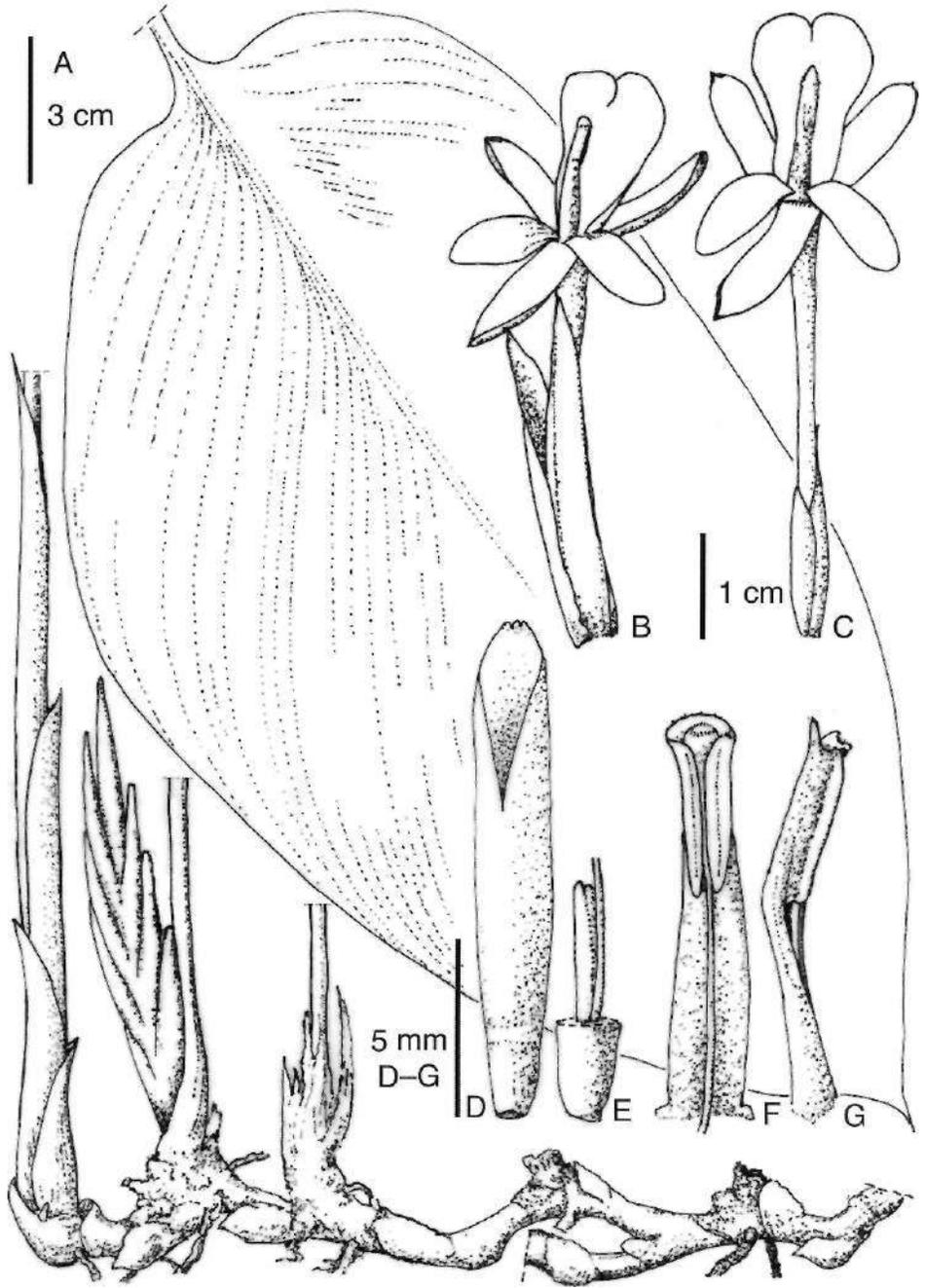


Figure 1. *Scaphochlamys calcicola* A.D. Poulsen & R.J. Searle. A. Habit, leaf and inflorescence with the sheaths removed; B & C. Flowers (manipulated). Bract and bracteole removed on flower to the right exposing calyx and second bracteole; D. Ovary and calyx (corolla tube removed); E. Ovary with epigynal gland and base of style; F. Stamen, style and stigma, ventral view; G. Stamen, style and stigma, side view. *Drawn by A. D. Poulsen from the type.*

Table 1. A comparison of key characters between the new species, *Scaphochlamys*, *Distichochlamys* and *Boesenhergia*. Traditionally six characters have been used (Smith, 1987; Newman, 1995) to which we have added the splitting of the bracteole.

	<i>Scaphochlamys</i>	<i>Scaphochlamys calcicola</i>	<i>Distichochlamys</i>	<i>Boesenhergia</i>
Bract arrangement	spiral	distichous	distichous	distichous
Flowering mode	base to apex	base to apex	base to apex	apex to base
Flower arrangement	cincinni	cincinni of 2–3 flowers	cincinni	single
First bracteole (shape and position)	more or less keeled, arising opposite to bract	2-keeled, opposite to bract	2-keeled, opposite to bract, tubular	boat-shaped, arising at right angle to bract
Bracteole splitting	split to base	split to base	tubular, split 2/3	split to base
Labellum	bilobed or entire, lobes overlapping	bilobed, flat, lobes overlapping	bilobed, not saccate lobes not overlapping	usually saccate, entire, rarely emarginate, margin recurved
Base of thecae	with very short free basal spurs	no spurs	no spurs	no spurs

for their entire length; crest rounded, to 2 mm; *stigma* 1 mm across, club-shaped with two dorsal knobs, ostiole ciliate, forward-facing; *ovary* 2 mm, glabrous, epigynous glands 4–5.5 mm, bilobed, needle-shaped. Fruit not seen.

Distribution: Endemic to Borneo in lowland forest. So far, only documented from near Bau, southwest Sarawak.

Ecology and etymology: From information on labels, this species seems to be found exclusively on limestone, which is the reason for the choice of epithet. The species occurs at the base or shoulder of limestone hills, on boulders near streams.

Notes: The 2-keeled bracteole is an unusual character for *Scaphochlamys*. This, however, is characteristic for the genus *Distichochlamys* M.F.Newman, a genus recently described from Vietnam with three species (Newman, 1995; Larsen & Newman, 2001; Rehse & Kress, 2003). Comparing the new taxon to the most closely related genera (Table 1), one could be tempted to think it is actually a species of *Distichochlamys*. However, it does not have the distinctly tubular bracteole of *Distichochlamys*.



Figure 2. *Scaphochlamys calcicola* A.D. Poulsen & R.J. Searle. Photographs of *Connie Geri et al.* SBC 3849; same population as the type. Photos: A. D. Poulsen.

Scaphochlamys calcicola also shares the distichous inflorescence and lack of spurs with *Boesenbergia* Kuntze, from which it differs in four other key characters (Table 1).

Preliminary findings from cladistic analysis of the Internal Transcribed Spacer (ITS) region of the nuclear NDA (unpublished data) support the inclusion of the new species within the genus *Scaphochlamys*, and it appears to fall within a subclade consisting of other Bornean species of this genus.

In Sarawak, the material from Bau at first seemed similar to another undescribed limestone species in southwest Sarawak, which Smith (1987) mentioned in her account as *S. sp. aff. breviscapa* Holttum (*Burt* 8798; E!, K!). Both species have shoots with a single, erect, long-petiolate (29 cm long), large leaf (24 x 12 cm). However, the *Burt* collection differs by the

leaf being ovate with a bluntly pointed apex, the peduncle being longer (c. 5 cm) and the spike being compact with spirally arranged bracts. Also, the labellum has purple around the central line of the labellum (similar to at least two other Sarawakean species – *S. petiolata* (K. Schum.) R.M. Sm. and *S. reticosa* (Ridl.) R.M.Sm.). The sterile characters of the Burt collection bear more similarity to *S. oculata* (Ridl.) Holttum than to *S. breviscapa*.

Of the other species of *Scaphochlamys* mentioned for Sarawak by Smith (1987), none has as large leaves as *S. calcicola*; the most similar being *S. petiolata* in which the lamina is up to 14 x 4 cm – much smaller than *S. calcicola*. Also, the inflorescence of *S. petiolata* is much reduced in comparison. A recent collection, *P.Boyce, J.Kisai & S.Kutuh ZI-658* (E, SAR) from near Serian also has a distichous inflorescence like those of *S. calcicola* but differs in the much smaller, cordate leaves, and the smaller flowers with a lilac labellum. The collection probably represents another new species and indicates that a distichous inflorescence in *Scaphochlamys* is not unique to *S. calcicola*. This collection and others recently made by Boyce illustrate that several new species are likely to be discovered and described from Sarawak in the future.

Considering the unifoliate species in Peninsular Malaysia, the leaf of *S. calcicola* is similar in size and shape to *S. sylvestris* (Ridl.) Holttum, *S. oculata* and *S. breviscapa*. All of these differ by having compact, spirally arranged inflorescences. In addition, *S. sylvestris* has a much longer peduncle (15 cm); *S. oculata* has a slightly longer peduncle (2–5 cm), whereas that of *S. calcicola* is within the range of *S. breviscapa* (1–3.5 cm).

The collection from the type locality shows some variation within the population, e.g. length of corolla and anther crest but the flowers are consistently white with a yellow-green centre. It seems that the colour of the labellum in *S. kunstleri* (Baker) Holttum in Peninsular Malaysia can be quite variable from almost pure white to dark red (Lim, 2001). Future studies on Bornean *Scaphochlamys* should investigate if species with a pale lilac labellum are consistently so or whether they can occasionally be white like *S. calcicola*. Clarification of this issue will be of importance for using this diagnostic character in species identification.

Other specimens examined: SARAWAK. Kuching Division, Bau area: Gunung Apin, 6 Nov 2001 *Malcom Demies et al. SBC 1123* (SAR); Gunung Krian, 27 Nov 2001 *Meekiong Kalu et al. SBC 1613* (SAR); Gunung Lanyang, 10 Apr 2002 *Julia Sang SBC 2919* (SAR); Gunung Poing, 23 Sep 2001 *Julia Sang et al. SBC 343* (SAR), 13 May 2002 *Malcom Demies et al. SBC 1547* (SAR), 11 July 2002 *Meekiong Kalu et al. 3246* (SAR); Gunung Tai Ton, 27 Mar 2002 *Julia Sang et al. SBC 2654* (SAR), 30 Oct 2002 *Connie Geri et al. SBC 3749* (SAR, SING).

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