

## **Carr's Spirit Collection of Kinabalu Orchids Recovered, with Some Notes on *Bulbophyllum* Species Present in This Collection**

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### **Abstract**

In 1933, C.E. Carr assembled a large collection of orchids from Gunung Kinabalu, Sabah, Malaysia. The herbarium specimens were duly processed and distributed, but the matching alcohol samples remained inaccessible until recently. Now, these samples have also been processed and are available for examination in the Singapore Botanic Gardens Herbarium. The material of the genus *Bulbophyllum* was studied; it yielded three new species and two new records for the Kinabalu area. These are described and annotated.

### **Carr's spirit collection of Kinabalu orchids recovered**

Cedric Errol Carr's career in orchid taxonomy was cut short by his untimely death in 1936, from blackwater fever contracted during fieldwork in what is now Papua New Guinea (Holtum, 1936). Nevertheless, his botanical legacy is considerable. Among other things, Carr was an extremely productive collector. He amassed large numbers of specimens during his voyages, and extensively annotated each collected specimen. He was well aware of the fact that herbarium material of orchids is often insufficient to properly interpret and to draw the complicated structure of the flowers, and he therefore preserved flowers in spirit with most of his herbarium specimens. His orchid specimens are so complete that it is very clear that he intended to describe them himself at a later date. It was not to be.

After his death, the herbarium specimens were distributed to various institutes around the world, sometimes with labels reproducing all his field notes (his 1934–1936 New Guinea specimens), sometimes with concise labels only mentioning the area where the plant was found, the altitude and the collecting date (his 1933 Kinabalu specimens). As to the Kinabalu collection, the Singapore Botanic Gardens Library still keeps Carr's notebook with extensive colour descriptions and other field observations of all the orchids collected there, in his very neat, minute handwriting. It appears that Carr used two parallel series of numbers for the orchids that he collected on Gunung Kinabalu. Most (not all) herbarium specimens

were given an SFN (Singapore Field Number), together with collected herbarium specimens of all other plant families. The alcohol samples with the herbarium specimens, however, received a separate number, ranging from 3001 to 3771. Carr's notebook is the only document in which the two number series are matched: the 3000 series are written in pencil, as are all other notes, and the corresponding SFN numbers are added, presumably later, in ink. It is likely that Carr intended to re-number the whole collection. But here things went wrong; Carr processed a very minor part of his spirit samples only, and most of the collection fell into neglect. It was left in the Singapore Botanic Gardens Herbarium (SING), in jars each containing two to ten different species. Each jar contained a scrap of thin paper with, in his own handwriting, Carr's number in the 3000 series and the genus name of each sample. Quite often two different samples of one genus shared a jar, and in one case even five *Bulbophyllum* species were found in one jar, each marked with a genus name only.

During the current re-organisation of the SING spirit collection the collection was recovered, its value was recognised, and immediate action was taken to stop further deterioration. The contents of 130 jars were taken out, split into species, and matched with the field notes and herbarium material to assign the correct number to each species. The collection was in a rather sorry state. The contents of a number of bottles had become reduced to a pulp beyond recognition, the contents of others only came out as a single lump, retaining the inner mould of the jar. Such samples have been discarded, we saw no use in keeping loose tissue of mixed orchid species. Most other samples are extremely fragile, and some consist of fragments of flowers only, but all are still recognisable.

Carr collected 771 herbarium specimens of orchids on and around G. Kinabalu, according to his own numbering, and excluding the A, B, and C numbers that, in Carr's view, usually refer to the same species. Often, the herbarium specimens are sterile. To some 260 of these, we now have matched flowers preserved in alcohol, enabling a re-identification of the herbarium specimens. This makes the alcohol collection particularly valuable. There are some 90 more alcohol samples without matching herbarium specimens.

I closely studied the alcohol material of the genus *Bulbophyllum*. Most species that I 'discovered' during my fieldwork in Sabah, in 1986—1987, and that were subsequently described (Vermeulen, 1991), appear to have been collected by Carr half a century earlier. His collection also includes several new species, some of which have never been re-collected, and several specimens constitute new records for the Kinabalu area. These are described and annotated below, as a late homage to an eminent orchidologist and a superb collector.

So far, only a small fraction of the spirit collection with his New Guinea orchids has been recovered. About 10 jars were found in which flowers were stored in much the same way as the Kinabalu material. Next to the label listing the genera present in the jar, some jars contained a second slip of paper with a number. The highest number found was 75. This could well mean that the original series included at least 75 bottles, because these numbers were only found in jars containing New Guinea material. The search continues; we are not at all convinced that we have recovered all that is left of Carr's spirit collection, either from Gunung Kinabalu, or from Papua New Guinea.

Carr's Kinabalu field book will be photocopied, and a list of matching 3000-series numbers and SFN numbers will be added to make his field notes accessible. The copies will be distributed to institutes who have a set of the herbarium collection. The spirit material will be available for examination soon. However, those interested are invited to visit the Singapore herbarium, as it is not possible to send the material on loan because of its extreme fragility.

### **Some notes on *Bulbophyllum* species present in the Carr collection**

#### ***Bulbophyllum elachanthe* J.J. Verm. (sect. *Aphanobulbon*)**

*Bulbophyllum elachanthe* J.J. Verm., *Orchids of Borneo* 2 (1991) 49. — TYPUS: Malaysia, Sabah, Ulu Padas, *Vermeulen & Duistermaat* 902 (L, holo.).

*Colours (from Carr's field notes)*: "Sepals ochre-tipped, olive brown. Petals p[ale] yellowish tipped d[ark] olive brown. Lip olive brown. Column greenish, arms d[ark] olive brown, foot suffused olive brown. Anther pale yellow, beak d[ark] yellow green".

*Distribution and habitat*: Malaysia, Sabah, Ulu Padas and Kinabalu area. Montane forest at 1000—1700 m altitude. Flowering observed in July and December.

*Notes*: Many species of sect. *Aphanobulbon* look the same when not in flower, and Carr's sterile herbarium specimen was provisionally identified as *B. unguiculatum* Rchb. f., until the matching spirit sample was found. It is the second known collection of the rare *B. elachanthe*, and a new record for the Kinabalu area.

*Other material seen*: MALAYSIA, SABAH. Kinabalu area, near Bundu

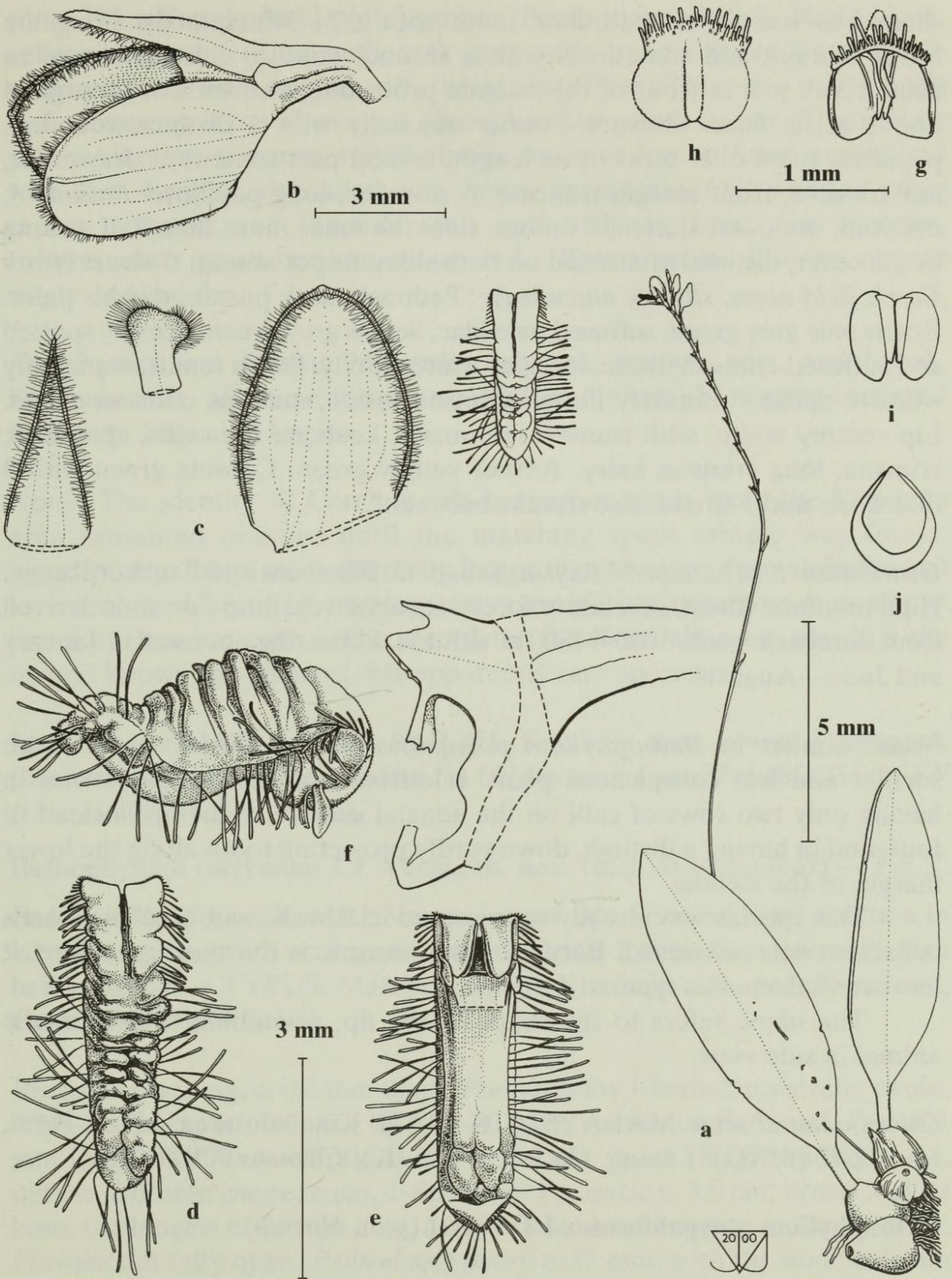
Tuhan, Carr 3612 (spirit, SING) & SFN (Carr) 27850 (herbarium specimen, SING).

**Bulbophyllum dracunculus J.J. Verm., sp. nov.** (sect. *Hirtula*) — Fig. 1.

*Bulbophyllum dracunculus* J.J. Verm., a *B. polygaliflori* J.J. Wood callis in seriebus 2 in labelli latere adaxiali, dentibus loriformibus deorsum procurrentibus secus stelidiorum margines inferiores differt. — TYPUS: Malaysia, Sabah, NE flank of G. Alab, LEI cult 30978 (L, holo.; SING, iso.).

*Bulbophyllum polygaliflorum* auct. non J.J. Wood, in Kew Bulletin 39 (1984) 96; J.J. Wood, Orchids of Borneo 3 (1997) 247 (colour photo only).

*Rhizome* creeping, 2.5—2.7 mm diam. *Pseudobulbs* 1-leafed, ovoid, touching or to 1 cm apart, 0.7—1.6 by 0.4—1.4 cm, not laterally flattened. *Petiole* 4—13 mm long. *Leaf blade* elliptic to ovate, 5.1—8.1 by 1.2—3 cm, index (length/width) 2.7—5, obtuse to acute. *Inflorescence* 15—24 cm, 11—20-flowered. *Peduncle* approx. patent, 10—18 cm; bracts 4, the longest 4—6 mm, the upper acuminate, the lower cuspidate. *Rhachis* arching, not swollen, 5—7 cm, glabrous. *Floral bracts* triangular, 1.5—2.8 mm long, slightly acuminate. *Flowers* spirally arranged, in a lax raceme, one open at a given time, not much opening. *Pedicel and ovary* 4—4.5 mm long. *Median sepal* hardly recurved, slightly concave, triangular, 4—5 by 1.3—2 mm, index 2.5—3.1, acute to acuminate, margins folded inwards, long ciliate; base rather broadly attached; rather thick; surface glabrous. *Lateral sepals* free, recurved, not concave, somewhat oblique, ovate, 4.5—6.3 by 2.8—4.2 mm, index 1.2—1.6, rounded to obtuse, otherwise as the median sepal. *Petals* not recurved, not concave, somewhat falcate, spatulate, 1.6—2.3 by 1.1—1.5 mm, index 1.1—1.9, tip truncate to retuse, margins long ciliate; base rather broadly attached; rather thick; adaxial surface with two hirsute patches near the top, abaxial surface glabrous. *Lip* curved in the basal half, general outline oblong, 3.5—4.2 by 0.8—1.2 mm, index 3.5—4.3 (not spread out), tip obtuse, margins slightly erose, with long, slightly club-shaped hairs increasing in length and thickness towards the tip of the lip; very thick; surface finely papillose; adaxially almost flat near the base, with a thin median slit up to c. 1/3 of the length of the lip, with two ridges over most of its length with large, transverse calli on the crest, the calli on opposite crests partly fused about half way the lip; abaxially with a truncate ridge divided in two rows of fat calli near the tip of the lip; auricles present close to the ligament, elliptic, obtuse. *Column* from ovary to the tip of the stelidia 1.2—1.8 mm. *Stelidia* distinct, triangular, 0.5—0.7 mm long, obtuse, without teeth along the upper margin, with a distinct, downwards projecting, strap-



**Figure 1. *Bulbophyllum dracunculus* J.J. Verm.**

a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, adaxial side; e. Lip, abaxial side; f. Column and lip, lateral view; g. Anther, adaxial side; h. Anther, abaxial side; i. Pollinia; j. Pollinia, single pair. All from *LEI cult 30978* (spirit sample).

shaped to somewhat spatulate tooth with a 2—3-furcate tip along the lower margin, and sometimes with a second, minute, deltoid, obtuse to acute tooth just in front of this, stigma protruding and with two marginal knobs at its base, obovate. *Anther* abaxially with a distinct, rounded, papillose ridge over most of its length, frontal part somewhat drawn out, not concave, front margin truncate to rounded, long papillose. *Pollinia* 4, obovoid, the outer flattened on one side, the inner more than half as long as the outer, distinctly flattened on both sides. Stipes absent. *Colours* (from Carr's field notes, slightly amended): "Peduncle dark purple, rhachis paler. Bracts pale grey green, suffused pale lilac. Sepals grey-green, densely spotted and suffused crimson inside, margins white-woolly. Petals semitransparently whitish, densely minutely dotted crimson inside, margins crimson ciliate. Lip creamy white, with transverse crimson keels on the sides, apex dark crimson, long crimson hairy. Anther yellow green. Capsule green with 3 lilac keels and 3 broad lilac streaks between".

*Distribution and habitat*: Malaysia, Sabah. G. Kinabalu and Crocker Range. High montane forest, secondary forest, shrubby vegetation on soils derived from ultrabasic rock. 1000—1800 m altitude. Flowering observed in January and June—August.

*Notes*: Similar to *Bulbophyllum polygaliflorum* J.J. Wood, but a much smaller and less conspicuous plant. It differs from *B. polygaliflorum* in having only two rows of calli on the adaxial surface of the lip, instead of four, and in having a distinct, downwardly projecting tooth along the lower margin of the stelidia.

This species was already represented in BM, K, and L before Carr's collection was recovered. Because the L sample is the most complete, it has been selected as type.

The name refers to the shape of the lip, resembling a pre-historic animal in side view.

*Other material seen*: MALAYSIA, SABAH. Kinabalu area: Marei Parei, Carr 3647 (SING); Libang, Collette 535 (K); Clemens 32908 (BM).

***Bulbophyllum polygaliflorum* J.J. Wood** (sect. *Hirtula*)

*Bulbophyllum polygaliflorum* J.J. Wood, in Kew Bull. 39 (1984) 96. — TYPUS: Malaysia, Sarawak, G. Mulu N.P., Hansen 499 (C, holo.; K, iso.).

*Colours* (from Carr's field notes, slightly amended; detailed drawings of the pollinia also present): "Sepals olive green outside, creamy green inside,

some [?] suffused v[ery] p[ale] purple. Petals clear whitish, blade black, yellow ciliolate. Lip beneath dark grey with creamy green base, above creamy green, sides keeled with the keels yellow ciliate, two warty keels and numerous warts above, all d[ark] blackish olive clearly [?] minutely yellow ciliolate. Column whitish, inside more or less suffused purple and with 2 or 4 purple dots some way below the stigma, foot white. Anther cream suffused, red towards apex and with the front rim crimson. Inflorescence green but sometimes red. Bracts green. Flowers appear singly and last for..."

*Distribution and habitat:* Malaysia, Sarawak, eastern part, and Sabah, Kinabalu area. Montane forest at c. 1700 m altitude. Flowering observed in March, July, and August.

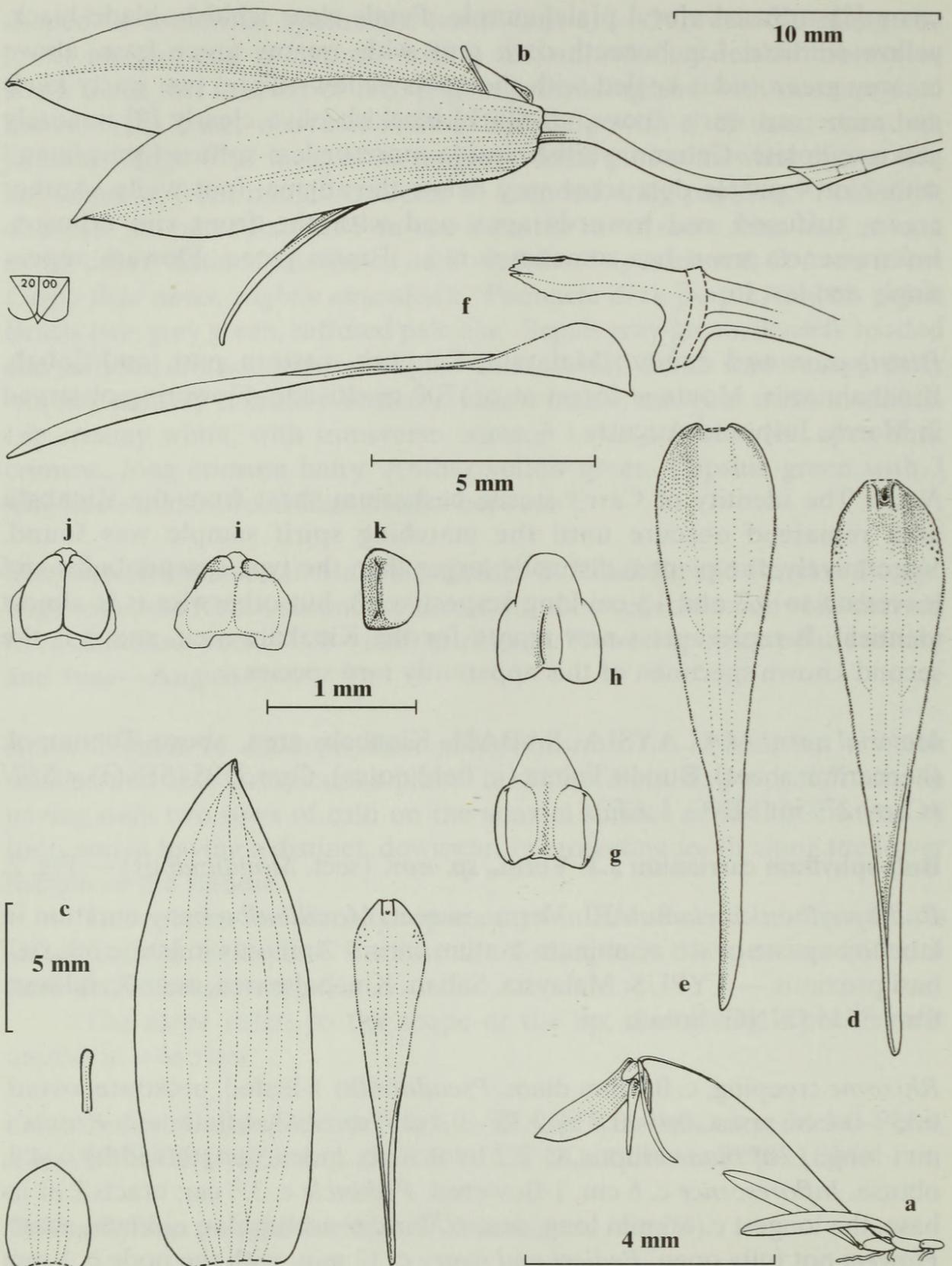
*Notes:* The identity of Carr's sterile herbarium sheet from the Kinabalu area remained obscure until the matching spirit sample was found. Vegetatively, the plant is distinctly larger than the type (pseudobulbs and leaves up to 4.2 and 18 cm long respectively), but otherwise it is almost identical. It represents a new record for the Kinabalu area, and it is the second known specimen of this apparently rare species.

*Material seen:* MALAYSIA, SABAH. Kinabalu area, above Tenompok (herbarium sheet), Bundu Tuhan (in field notes), Carr 3595 (SING) = SFN (Carr) 27956 (SING, LAE).

***Bulbophyllum carrianum* J.J. Verm., sp. nov.** (sect. *Monilibulbus*) — Fig. 2.

*Bulbophyllum carrianum* J.J. Verm., in sect. *Monilibulbo* bene notatum in labello anguste ovato acuminato tantum carinis 2 minutis in latere adaxiali basi proximis.— TYPUS: Malaysia, Sabah, Kinabalu area, near Kundasan, Carr 3636 (SING, holo.).

*Rhizome* creeping, c. 0.8 mm diam. *Pseudobulbs* 1-leafed, prostrate, ovoid, 0.35—0.4 cm apart, 0.4—0.5 by 0.35—0.4 cm, somewhat flattened. *Petiole* 1 mm long. *Leaf blade* elliptic, c. 2.2 by 0.5 cm, index (length/width) c. 4.4, obtuse. *Inflorescence* c. 6 cm, 1-flowered. *Peduncle* c. 3.8 cm; bracts 2 at its base, the longest c. 4.5 mm long, acute. *Floral bract* tubular, c. 3 mm, acute. *Flowers* not fully open. *Pedicel and ovary* c. 12 mm, with the node c. 1 mm from the floral bract. *Median sepal* not recurved, not concave, elliptic, c. 4 by 3.2 mm, index c. 1.25, obtuse, base rather broadly attached; thin; with 5 veins that are not prominent abaxially; glabrous. *Lateral sepals* free, more or less spreading, flat, not falcate, hardly oblique, c. 20 by 7 mm, index c. 2.9; acute, with 9 veins; otherwise as the median sepal. *Petals* not recurved,



**Figure 2.** *Bulbophyllum carrianum* J.J. Verm.

a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, adaxial side; e. Lip, abaxial side; f. Column and lip, lateral view; g. Anther, adaxial side; h. Anther, abaxial side; i. Pollinia, a pair, adaxial side; j. Pollinia, a pair, abaxial side; k. Pollinium, single. All from *Carr 3636* (spirit sample).

flat, not falcate, linear with a somewhat spatulate tip, c. 2.6 by 0.5 mm, index c. 5.2, acute, base broadly attached; thin but with a thickened top; with 1 vein; glabrous, top very finely papillose. *Lip* hardly curved, general outline ovate, c. 14 by 2.8 mm, index c. 5 (not spread), acuminate, margins finely papillose-ciliolate in the basal half; thin but somewhat thickened towards the tip; adaxially with two minute, parallel, rounded ridges close to the base, basal part concave, top half with margins rolled upwards, surface glabrous except for a few scattered papillae near the margin just before the widest part of the lip; abaxially convex at the base, without median ridge, surface glabrous. *Column* from ovary to the tip of the stelidia c. 3.8 mm long. *Stelidia* distinct, not falcate, triangular, c. 1.4 mm, acute; with a distinct, forwards directed, obliquely ovate, obtuse tooth with a deeply erose top along the upper margin; lower margin finely erose; stigma not protruding at its base, semi-elliptic; column foot with a small central knob. *Anther* abaxially with a ridge near the base; front margin protruding, not concave, rounded. *Pollinia* 2, ovoid, obtusely triangular in section. *Stipes* a thin layer of tissue covering most of the lower side of the pollinia. *Colours* (from Carr's field notes): "Dorsal [=median] sepal short, semitransparent, white with 5 red nerves. Lateral sepals: base pale flesh, middle deep ochre, apex ochre-yellow, 7 dull red streaks. Petals whitish, tipped dark blackish red. Lip dull red purple with 5 darker streaks. Column dull red with whitish base, arms cream with dull red median streak, foot white. Anther bright yellow".

*Distribution and habitat*: Malaysia, Sabah. Lower slopes of G. Kinabalu, at c. 800 m altitude. Flowering observed in August.

*Notes*: Well characterised among *Bulbophyllum* sect. *Monilibulbus* by the narrowly ovate, acuminate lip without any ornaments on the adaxial side except for two minute keels close to the base. The shape of the column and stelidia is similar to *B. dibothron* J.J. Verm., *B. lambii* J.J. Verm., and *B. longhutense* J.J. Sm.

As to the locality, Carr's field notes read "Near Kundasan, c. 2500 ft". The only area in the vicinity of the village at that altitude is the river valley south of the village. Nowadays, no primary forest is left in the area, and the species has never been collected again, in spite of intensive sampling by many people on the slopes of the Kinabalu. It is quite possible that the species is now extinct and that we should never have known this tiny but beautiful orchid without Carr's zeal.

***Bulbophyllum proculcastris* J.J. Verm., sp. nov.** (sect. *Monilibulbus*) — Fig. 3.

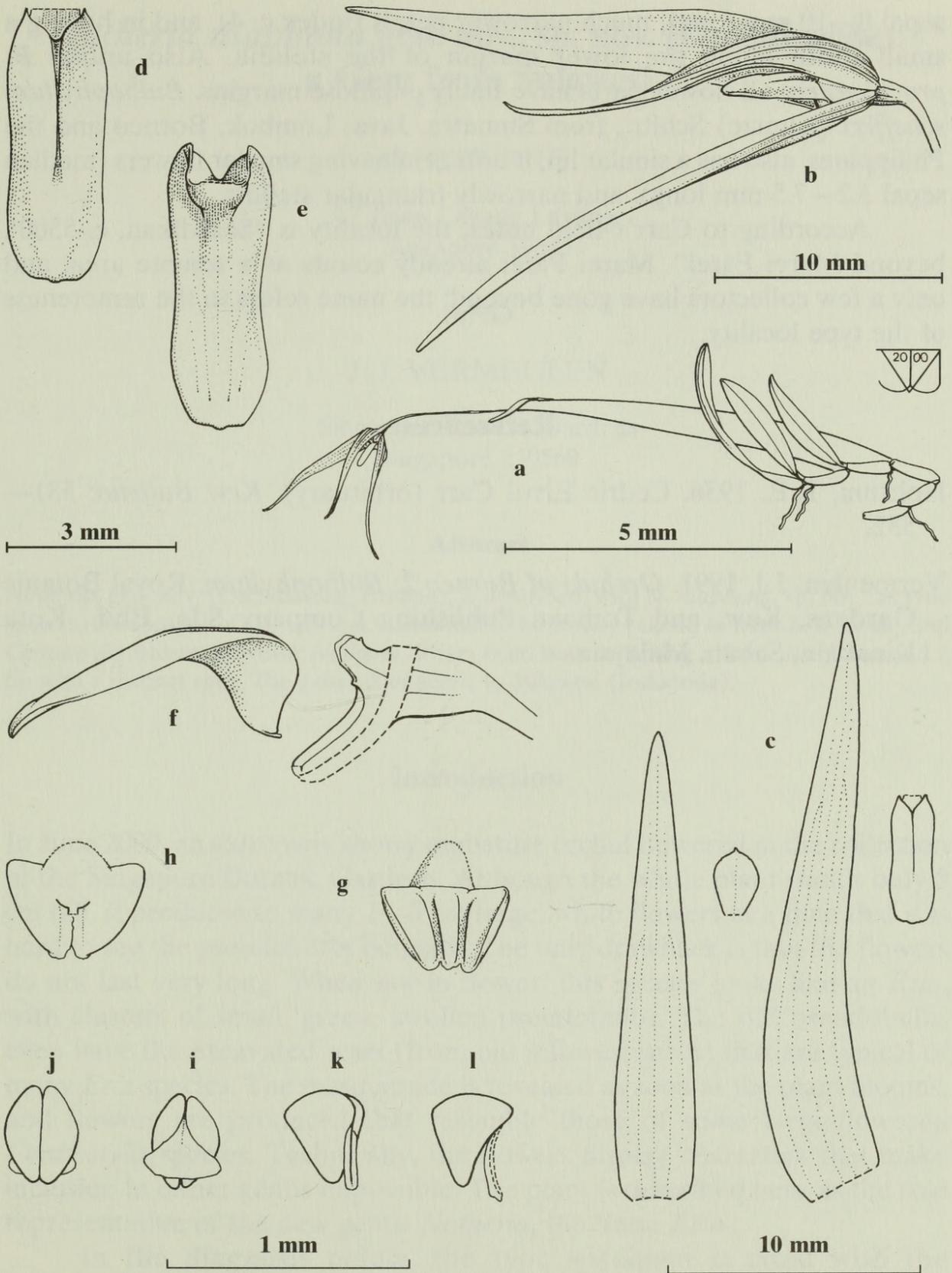
*Bulbophyllum proculcastris* J.J. Verm., a *B. mindorensi* Ames in floribus

maioribus (sepala media c. 20 mm longa), petalis latioribus, stelidiis sine dente minuto secus margines inferiores differt.— TYPUS: Malaysia, Sabah, Kinabalu area, Sasadikan beyond Marei Parei, Carr 3649 (SING, holo.).

*Rhizome* creeping, c. 0.8 mm diam. *Pseudobulbs* 1-leafed, prostrate, ovoid, 0.6—0.9 cm apart, 0.6—0.9 by 0.2—0.3 cm, somewhat flattened. *Petiole* c. 1 mm long. *Leaf blade* elliptic, 1.5—1.8 by 0.35—0.45 cm, index (length/width) 4—4.3, obtuse. *Inflorescence* 8.0—9.5 cm, 1-flowered. *Peduncle* 5—6 cm; bracts 2 at its base, the longest c. 4.5 mm, acuminate. *Floral bract* tubular, c. 2.5 mm, acuminate. *Flowers* not fully open. *Pedicel and ovary* 15—20 mm, with the node c. 1.5 mm from the floral bract. *Median sepal* not recurved, somewhat concave, ovate, c. 20 by 3.6 mm, index c. 5.6, acute, base rather narrowly attached; thin; with 5 veins, 3 of which are prominent abaxially; glabrous. *Lateral sepals* free, more or less spreading, flat, somewhat falcate, hardly oblique, ovate-triangular, c. 24 by 4 mm, index c. 6; otherwise as the median sepal. *Petals* not recurved, flat, not falcate, elliptic-obovate, c. 3 by 2.1 mm, index c. 1.4, minutely cuspidate, base rather narrowly attached; thin, with 1 vein; glabrous. *Lip* curved in the basal half, general outline oblong, c. 5 by 1.7 mm, index c. 2.9 (not spread), tip broadly rounded, rather thin, glabrous, adaxially deeply concave close to the base, surface otherwise slightly concave in the basal third, slightly convex elsewhere, with a median slit reaching up to 2/3 of the lip; abaxially with a rather inconspicuous, rounded median ridge up to 1/3 of the lip, surface otherwise slightly concave. *Column* from ovary to the tip of the stelia c. 1.1 mm long. *Stelidia* distinct, not falcate, semi-elliptic, c. 0.25 mm, obtuse; upper margin somewhat erose; stigma protruding at its base, elliptic; column foot without accessories. *Anther* abaxially with a distinct, obtuse ridge near the top and overtopping the front margin; front margin not protruding, not concave, truncate. *Pollinia* 2, subtriangular, distinctly flattened on one side. *Stipes* a layer of tissue covering half the lower side of the pollinia. *Colours* (from Carr's field notes): "Dorsal [= median] sepal transparently yellow, with 5 nerves the outer 2 crimson inner 3 orange. Laterals deep orange-yellow with crimson base. Petals crimson with an orange-red median line. Lip crimson with a large orange-red median spot. Column crimson. Anther orange-red with yellow margins."

*Distribution and habitat*: Malaysia, Sabah. Slopes of G. Kinabalu, at c. 1800 m altitude. Flowering observed in August.

*Notes*: *Bulbophyllum proculcastris* is most similar to the Philippine *B. mindorense* Ames. The latter differs in having smaller flowers (median



**Figure 3.** *Bulbophyllum proculcastris* J.J. Verm.

a. Habit; b. Flower; c. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; d. Lip, adaxial side; e. Lip, abaxial side; f. Column and lip, lateral view; g. Anther, adaxial side; h. Anther, abaxial side; i. Pollinia, a pair, adaxial side; j. Pollinia, a pair, abaxial side; k. Pollinia, a pair, lateral view; l. Pollinium single. All from *Carr 3649* (spirit sample).

sepal 8—10 mm long), much narrower petals (index c. 4), and in having a small tooth along the lower margin of the stelidia. Also unlike *B. proculcastris*, all flower parts have finely papillose margins. *Bulbophyllum schefferi* (Kuntze) Schltr., from Sumatra, Java, Lombok, Borneo and the Philippines, also has a similar lip; it differs in having smaller flowers (median sepal 3.2—7.5 mm long), and narrowly triangular stelidia.

According to Carr's field notes, the locality is "Sasadikan, c. 5500', beyond Marei Parei". Marei Parei already counts as a remote area, and only a few collectors have gone beyond; the name refers to the remoteness of the type locality.

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Vermeulen, J. J. 2000. "Carr's spirit collection of Kinabalu orchids recovered, with some notes on Bulbophyllum species present in this collection." *The Gardens' bulletin, Singapore* 52, 273–284.

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