

## **Two interesting wild *Musa* species (*Musaceae*) from Sabah, Malaysia.**

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### **Abstract**

Two new species of *Musa* are described and illustrated. *M. suratii* Argent is described from Sabah with an additional locality in Sarawak. *M. monticola* Hotta ex Argent is known only from the two montane localities in Sabah, Mt. Kinabalu and the Sinsuron road in the Crocker Range.

### **Introduction**

There is still a lot to be learnt about the relatively small genus *Musa* as the wild plants are very often neglected by botanists in the field and herbarium specimens will always be poor material to work from. Our knowledge of the Bornean species goes back to the classic work of Odoardo Beccari (1902) based on his field work from 1865 but the species of this genus had been all but neglected on the island until Mitsuro Hotta made a series of expeditions and described several additional species. One of the new species described here was recognised by Hotta and given the name, which has been adopted here, but he never described it.

Terminology is inevitably somewhat specialised in a group of large and unwieldy plants that have enormous economic importance. The descriptive terms here follow the tradition of banana taxonomy as used by Simmonds (1962, 1966) and as modified in Argent (1976), which is particularly important in standardising leaf measurements to the 4<sup>th</sup> last to emerge before the inflorescence.

### ***Musa suratii* Argent *sp. nov.***

Ab omnibus aliis speciebus generis *Musae* pseudocaulis tenuissimo usque ad 4 cm diametro, gemma mascula tenuissima usque ad 3 cm lata et semine in genere minimo cognito 2.5 mm tantum diametro differt.

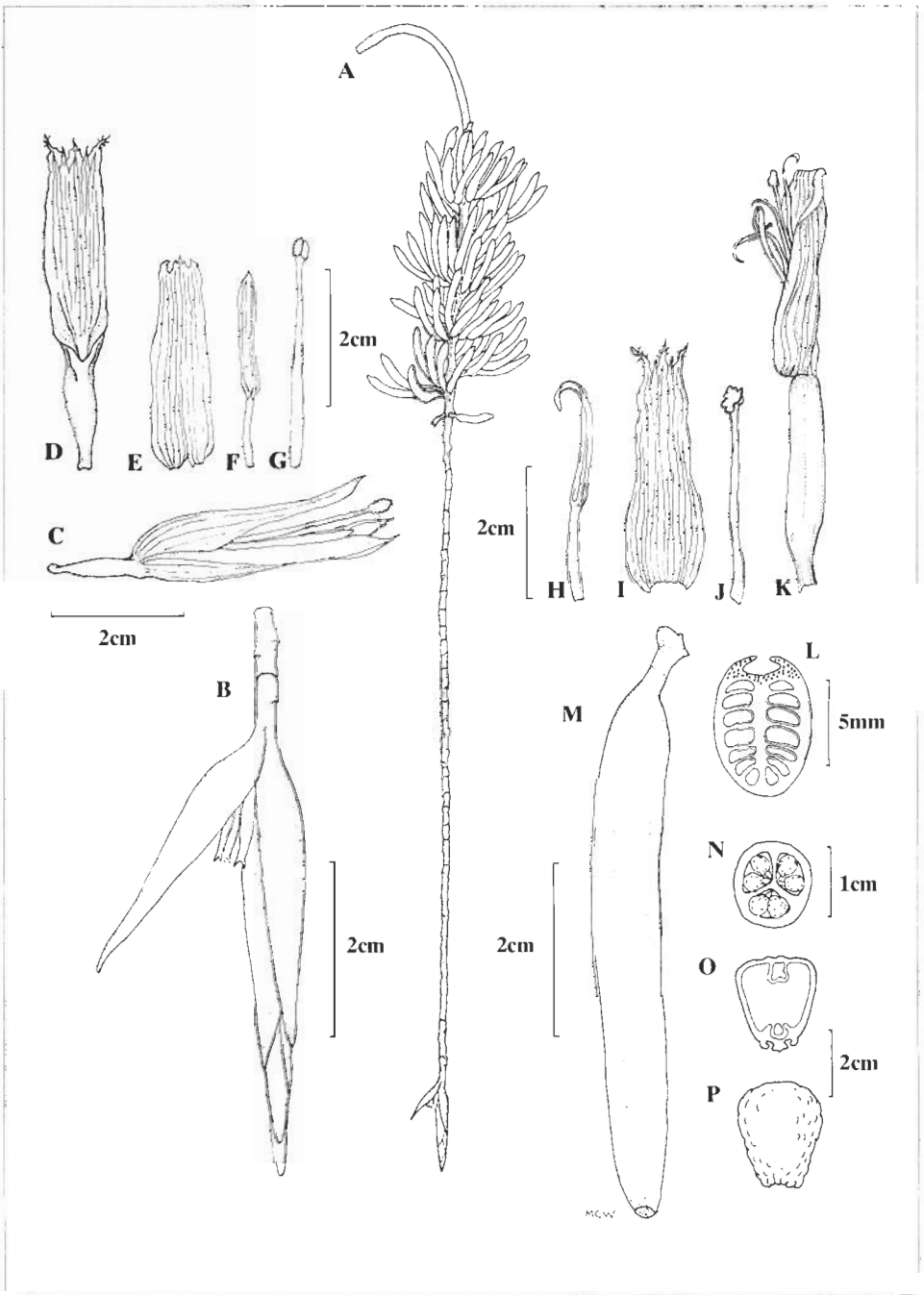
**Typus:** Sabah: Kallang, Tenom District *Andy Surat* & *A. Lamb* 268/89, 8 Sept. 1989 (holo SAN; iso E).

**Fig. 1.**

Clump forming herbaceous plant to c. 4 m high. *Suckers* emerging from below ground level on the corm, initially near vertically, up to 10 cm from the parent; suckers slightly waxy, vertical in young clumps but becoming angled outwards in the larger older clumps. *Mature pseudostem* up to 3.5 m high, slender to 4 cm in diameter at 30 cm above the ground, tapering gradually upwards and spreading at between 30–45° from the vertical; dark purplish black and somewhat shiny in the basal half, dull yellowish green in the upper half, swollen at junction with the corm which is c.10 cm in diameter. Inner sheath cream tinged with purple, undersheath yellow, shiny. *Sap* watery. Upper margin of sheath (shoulder) smooth, appressed, not scarious. *Fourth last leaf*: right handed to 3 cm; petiole 16–20 cm x 8 mm, dull yellowish with a pinkish edge to the margins, petiole channel closed in the proximal half, open distally, the channel small, about one quarter of the depth of the petiole; blade 120–150 x c.20 cm; more or less narrowly elliptic, broadest about or slightly above the middle, broadly pointed but often tattered at the apex, cuneate at the base, very white waxy underneath, dull green not waxy above.

*Inflorescence* hanging vertically downwards, peduncle slightly waxy, glabrous, smooth. *Female bud*, 40 x 4 cm, orange to slightly pink, pruinose with wax outside, imbricate for nearly half the length. Bracts lifting to c.45°, straight, not curling back but somewhat channelled, bright shining orange underneath. *Basal flowers* mostly fully hermaphrodite, c. 9 cm long, the ovary cream, the compound tepal green, pale proximally, darker distally, the free tepal unwrinkled, or wrinkled irregularly, more or less truncate but with three short points. Stamens 5, variously ranging in size from fully developed with apparently fertile pollen to tiny staminodes. Style green, as long as the flower, stigma globose, cream. Fruit bunch hanging vertically down, fairly lax, the fruits reflexed upwards, 8–10 'hands' with the bananas in two rows with 8–10 fruits in the second 'hand'. *Fruits* pale whitish-green, ripening pale yellow, not splitting open, ovules in two rows per loculus. Pedicel c.10 x 5 mm, fruit 6–9 x 0.8–1.0 cm, straight or curved, almost smoothly cylindrical hardly angled, contracted at the apex to a darker green 'beak' for 5–6 mm. *Seeds* dark greyish-black, slightly elongated, small c.2.5 x 2 mm, almost smooth but with irregular very low tubercles.

Male axis vertical, glabrous, pruinose, pinkish-purple, 30–140 cm long, the scars somewhat prominent, the peduncle almost smooth and only very weakly vertically striate, the bract scars well-spaced 1.5–2.5 cm apart in the same rank. *Male bud* slender, from 15–22 x 1.8–3 cm, broadest at about one quarter of its length from the base, imbricate for between one



**Figure 1.** *Musa suratii*: A. inflorescence with submature fruit bunch, B. male bud, C. male flower. Male flower parts: D. compound tepal, E. free tepal, F. stamen, G. style and stigma. Hermaphrodite flower parts: H. stamen, I. compound tepal, J. style and stigma, K. flower (free tepal missing). L. TS. of petiole, M. single fruit, N. TS. fruit. Seed: P. in LS, Q. entire.

third to one half of its length, bright orange except for the tips of the bracts which are green. Male bracts lifting to 45°, straight, not curling back but the margins slightly inrolled longitudinally; slightly pruinose-waxy, orange with green tips outside, bright, somewhat shiny not waxy orange inside. *Male flowers* 30—45 mm long, creamy at the base, green in the distal half, compound tepal with the three major lobes up to 4 mm acutely pointed and irregularly fimbriate with long hairs to c.1 mm long, the two minor lobes free for c.1 mm and minutely mucronate, free tepal c.4 mm shorter than the compound tepal, translucent white, irregularly three-pointed the lateral points broad the central point smaller, firmer, greenish-yellow. Stamens 5, creamy white, the anther over half the length of the stamen. Style slender, the length of the flower, broadened slightly towards the stigma.

*Additional specimen:* Sarawak: River Delok, Lubok Antu District Christensen 1066 (AAU, E!, SAR).

*Notes:* Named in honour of Aninguh (Andy) Surat, plant collector for the Orchid Centre, the Agricultural Park, Tenom, Sabah, who first found this species.

This delicate species looks from a distance more like a *Heliconia* than a *Musa* as, in addition to the very slender habit, the leaves although actually spirally arranged are displayed more or less distichously in a single plane. The original population was along a logging road that had opened up the forest canopy of mixed lower montane forest with some Dipterocarpaceae at about 750 m altitude. This population, the only one known in Sabah, is rapidly shrinking as the forest re-grows and the canopy is closing. A second population was reported from Sarawak by Dr. Christensen (*pers. comm.*) and confirmed from herbarium material. She reported it to be common and used as a food plant by the local people. It is speculated that, in the absence of any further reports from Sabah, the population may have been introduced by logging equipment, used elsewhere, with the minute seed brought in on clinging soil. It is now being cultivated in the Tenom Agricultural Park. The tiny seeds, by far the smallest in the genus, give no clue as to its identity at sectional level.

***Musa monticola* [Hotta ex] Argent sp. nov.**

*Musae textili* similis sed pseudocaulibus multo minoribus 1—2 m tantum altis, pedunculo masculino brevissimo usque ad 12 cm longo et gemma mascula anguste acuta cum imbricatione 1—2 cm longo apicali differt.

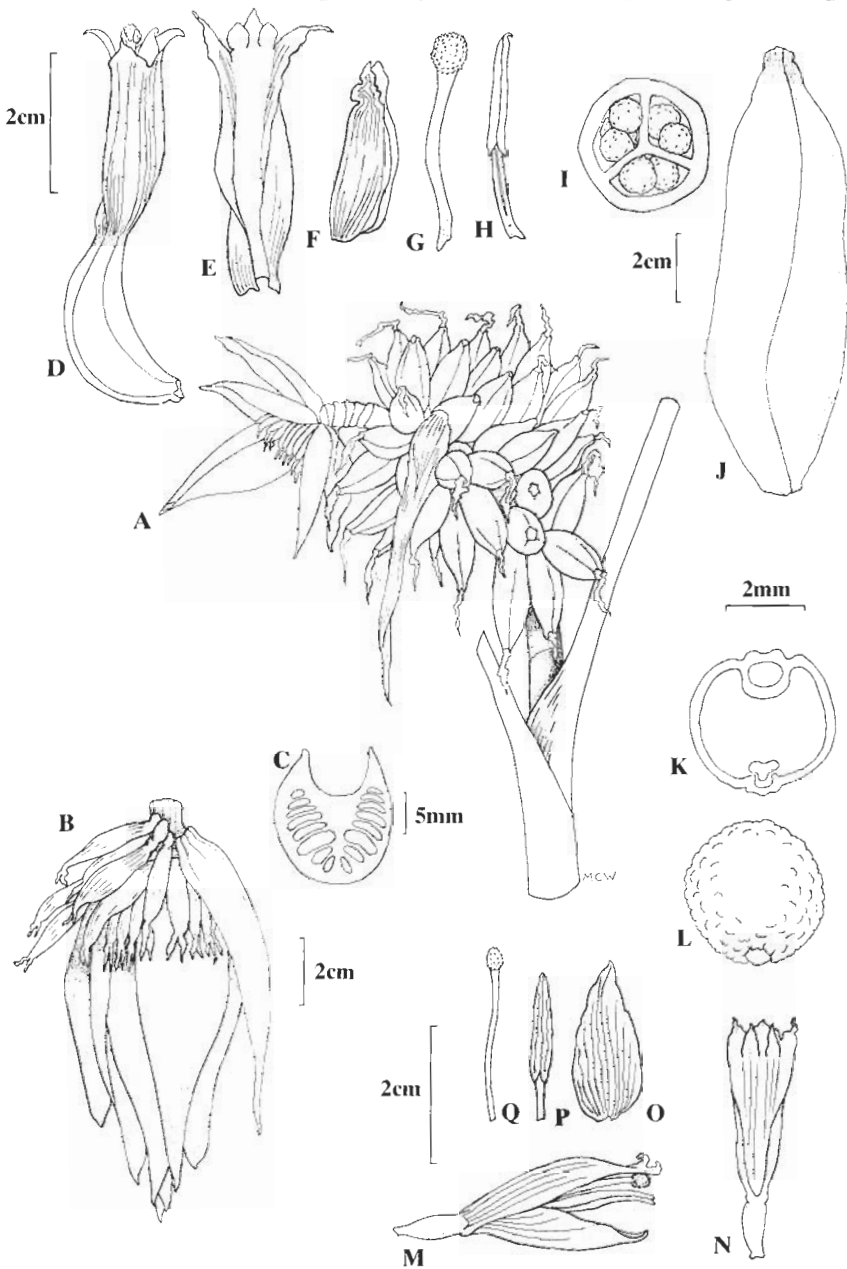
**Typus:** Sabah: Kinabalu Park Headquarters, Kinabalu, Ranau District *Argent* 2195, 20 Sept.1995 (holo SAN; iso Kinabalu Park Herbarium, E).

**Fig. 2.**

*Pseudostem* 1—2 m, dark shiny brown or mottled green and brown often with a little violet, waxless, sometimes almost completely covered with pale brown withered sheaths, under-sheath pale green, inner sheath white, 15 cm girth at the base. *Sap* watery or slightly creamy. Rhizomes short, the *suckers* erect arising up to 10cm away from the parent pseudostem. Suckering frequent, the plants mostly forming small clumps. Upper leaf sheath margin (shoulder), appressed, smooth with a dark brown edge c.2 mm wide, sometimes narrowly scarious for 1—1.5 mm. *Fourth last leaf:* petiole 36—48 x 1.4—1.6 cm, mostly dark rather lustrous brown, sometimes flushed with pink, without wax, the channel c. one third of the depth, (TS ratio 1/2), margins erect distally, completely enfolded in the lowest one third to one half and edged with a black or scarious margin c 1mm wide; leaf blade left-handed to c.1—1.5 cm, sometimes almost symmetrical, rounded to auriculate at the base, rarely broadly tapering, dull green above, yellowish green below, often with brown discoloured areas, sometimes with light pink on the midrib above and below, without wax. PB ratio 3.5—4, the blades being 104—160 x 32—45 cm broadest about the middle.

*Inflorescence* with glabrous, green peduncle. Bunch held semi-erect, very dense, the fruits two-rowed, in 5—7 'hands', the second 'hand' with 10—13 fruits from very short c. 5 mm pedicels. Fruits more or less ageotropic disposed almost radially from the axis. Basal bracts, long, lingulate, c.23 x 9 cm, shiny, glossy purplish-brown outside, sometimes with a little pink; passing to yellow for 1—2 cm at the base and with green margins at the tip, inside creamy yellowish with a pinkish purple edge, sub-persistent to persistent in a withered brown state, trapped between the tightly appressed fruit as they develop. *Basal flowers* hermaphrodite with a full compliment of fully developed stamens, ovary c.3 cm, compound tepal c. 3.3 cm, cream with yellowish tips; the free tepal white, strongly keeled and wrinkled; stamens cream; stigma white; style cream. Young fruits glabrous, green, 40—75 x 16—25 mm; ovules in two rows per loculus often strongly angled in cross section due to the compression between fruits. *Mature fruit* ripening dirty cream in the basal part, dirty creamy-green in the upper part, (clear pale yellow in cultivation), indehiscent, not strongly aromatic. *Seeds* small, 4—5 mm diameter, sub-spherical, only weakly angled, with a distinctly warty surface, the hilum small c.1.5 mm, smooth, apical chamber small.

Male peduncle growing diagonally downwards, weak, 5—12 cm long, glabrous, often terminating whilst the fruits are still very immature.



**Figure 2.** *Musa monticola*: A. inflorescence with submature fruit bunch, B. male bud, C. TS. petiole. Hermaphrodite basal flower: D. flower, E. compound tepal, F. free tepal, G. style and stigma, H. stamen, I. TS. Fruit, J. fruit. Seed: K. LS, L. entire. Male flower: M. whole flower, N. compound tepal, O. free tepal, P. stamen, Q. style and stigma.

frequently broken and appearing to be absent. *Male bud* conical with a very acute tip, 6—9 x 2.2—4 mm, imbricate for just 1—2 cm at the tip, creamy orange with a dark purple flush and blackish purple at the bract margins; bracts lifting rather irregularly to the perpendicular or slightly higher, often several opening together, intensely shiny, orange brown on the adaxial surface, not reflexing but the margins tending to inroll slightly with age, persistent or tardily deciduous. *Male flowers* up to 3 cm, cream, the tips of the compound tepal yellowish green, strongly reflexed and rolled, to 5 mm long when unrolled. Free tepal translucent white with a yellow spot at the apex, nearly as long as the compound tepal, concave and acutely pointed, sometimes with a small subapical wrinkle.

*Additional specimens:* Sabah: Mt. Kinabalu, Ranau District - Kiau View Trail *Cockburn SAN 76808* vernacular name 'Pahuo' in Dusun Bunda Tuan (SAN!), Bembangan Camp *Chew & Corner RSNB no.4576* 27 Feb.1964 (K!, SAN!), Cultivated specimen at RBGE: Crocker Range, Sinsuron Road, Argent 989 (E!), 19891874 (E!).

*Notes:* This interesting species was first noted as an annotation by Professor Hotta to a specimen in the Sandakan Herbarium. It is mentioned in his paper on the distribution of the genus *Musa* in Malesia but without any description or diagnosis of the plant (Hotta, 1987). I have used his name, which clearly relates to the somewhat unusual montane habitat of this species. It is common in the garden area around the Park Headquarters on Mt. Kinabalu where it occurs both in the gardens and in open areas of the forest from about 1200—1700 m altitude. It also occurs on the Crocker Range and can be seen from the Sinsuron Road at similar altitudes in the secondary roadside vegetation. At present, these are the only two known locations for this species, both of which were known to Hotta.

Its sectional position within *Musa* is unclear. Its seed shape and anatomy rule out its inclusion in section *Callimusa* and the male axis habit rules out section *Rhodochlamys*. Without a chromosome count it is difficult to assess whether it should be assigned to section *Australimusa* or section *Musa*. On the whole, the polished bracts and lack of wax favour its inclusion in section *Australimusa* as Hotta inferred (Hotta, 1987).

The fairly extreme montane environment of this species would tend to lend weight to the observation of Simmonds (1962) that *Musa* conforms to 'Bakers Law' - the theory that extreme environments encourage the development of hermaphrodite basal flowers instead of female, making self pollination the likely norm. In this respect *M. suratii* from lower altitude, with its partially hermaphrodite flowers appears to be a halfway house.

*Musa monticola* is a very distinct species. The short pseudostems,

rarely more than 2 m high, contrast with those of *Musa textilis* Née, which in Sabah are almost invariably over 3 m. The very short male peduncle only up to 12 cm, again contrasts with the very vigorous male phase in *M. textilis*, whose male peduncle usually grows to 1 m and often to more than 2 m. The very acutely pointed male bud with only 1—2 cm of imbrication at the tip differs significantly from the much more broadly pointed and strongly imbricated male bud of *M. textilis*, whose area of imbrication is usually more than 3 cm. The hermaphrodite basal flowers and subspherical warty seeds are other distinctive differences.

### Acknowledgements

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### References

- Argent, G.C.G. 1976. The Wild Bananas of Papua New Guinea. *Notes Royal Botanic Garden Edinburgh*, **35**: 77—114.
- Beccari, O. 1902. *Nelle Foreste di Borneo*. Firenze, Italy.
- Hotta, M. 1987. Distribution of the genus *Musa* in Malesia. *Acta Phytotaxa Geobotanica*, **38**: 292–302.
- Simmonds, N.W. 1962. *The Evolution of the Bananas*. Longmans, U.K..