

Studies on Schismatoglottideae (Araceae) of Borneo LVIII – Further novelties described for the genus *Piptospatha*, and a note on *Piptospatha* Sect. *Gamogyne*

Wong Sin Yeng*

Department of Plant Science & Environmental Ecology

Faculty of Resource Science & Technology

Universiti Malaysia Sarawak

94300 Kota Samarahan

Sarawak, Malaysia

sywong@frst.unimas.my

Associate Researcher

Harvard University Herbaria

22 Divinity Avenue

Cambridge, MA 02138 USA

*corresponding author

Peter C. Boyce

Honorary Research Scientist

Ludwig-Maximilians-Universität München

Department Biologie I

Systematische Botanik und Mykologie

Menzinger Straße 67, 80638 München Germany

boyce@biologie.uni-muenchen.de

ABSTRACT

Piptospatha bella S. Y. Wong & P. C. Boyce and *Piptospatha lurida* S. Y. Wong & P. C. Boyce are described and illustrated from Sarawak, Malaysian Borneo. Their recognition takes *Piptospatha* to 18 described species. *Piptospatha lurida* is most similar to

P. burbidgei, a species formerly allotted its own genus, *Gamogyne*, later made into a section of *Piptospatha*. Notes on *Gamogyne* are provided and a correction to published information on the placentation of *Gamogyne* offered.

KEY WORDS

Rheophyte, sandstones, shales, placentation.

INTRODUCTION

Piptospatha N.E. Br. in our research collection continue to reveal additional taxonomic novelties. Here we describe two new species that have recently flowered with us for the first time. One of them, here named ***Piptospatha bella* S.Y. Wong & P.C. Boyce, sp. nov.**, has long puzzled us as to its identity since in habit it much better matches species of the genus *Bucephalandra* Schott, although production of numerous adventitious plantlets upon the main roots is reminiscent of *Ooia* S.Y. Wong & P.C. Boyce. The other species, here described as ***Piptospatha lurida* S.Y. Wong & P.C. Boyce, sp. nov.**, was initially assumed to be *Piptospatha burbidgei* (N.E. Br.) M. Hotta so closely does the sterile plant resemble that species, but on flowering proved to be a quite distinct species.

Dimensions used in the descriptions are derived from fertile (i.e., mature) plants. Seedlings have overall smaller measurements.

Interpretation of the intricate geology of Borneo relies as ever on Tate (2001).

Piptospatha bella S. Y. Wong & P. C. Boyce, **sp. nov.** Type: Malaysian Borneo, Sarawak:

Bintulu, Tatau, Sungai Bawang, 02°42'01.6"N 112°40'47.9"E, c. 60 m asl, 9 May 2012, *M. Lo 3909* (holo SAR!). **Figure 1, Figure 4B.**

Diagnosis

Piptospatha bella is unique in the genus by the diminutive oblanceolate to spatulate leaf blades with undifferentiated primary lateral veins and by producing stiffened stilt-roots. Among *Piptospatha* species with green syncarpous pistils and a spathe lacking rostral keels (= *Piptospatha* Sect. *Gamogyne*), *P. bella* is distinguished by the above characteristics and (except for *P. burbidgei*) by producing abundant plantlets from the spreading roots.

Tufted rheophytic herb to 10 cm tall. **Roots** composed of several stiffened stilt-roots c. 3 mm in diameter and penetrating deeply into mud and extensive spreading roots from which are produced numerous plantlets. **Stem** condensed, to 5 mm in diameter, obscured by leaf bases. **Leaves** many together, arching, forming a rosette; **petiole** 3–4 cm long, c. 2 mm in diameter, weakly D-shaped in cross-section, minutely scabrous, especially dorsally, with dorsal edges minutely crispulate-alate, dull reddish olive-green; **petiolar sheath** with free ligular portion c. 2 cm long, these briefly marcescent, ultimately deciduous, dark reddish brown; **leaf blades** oblanceolate to somewhat spatulate, stiffy chartaceous, 5–10 cm long × 2–3.5 cm wide, base cuneate, apex subacute with stout tubule c. 5 mm long, margins wavy, semi-glossy medium to

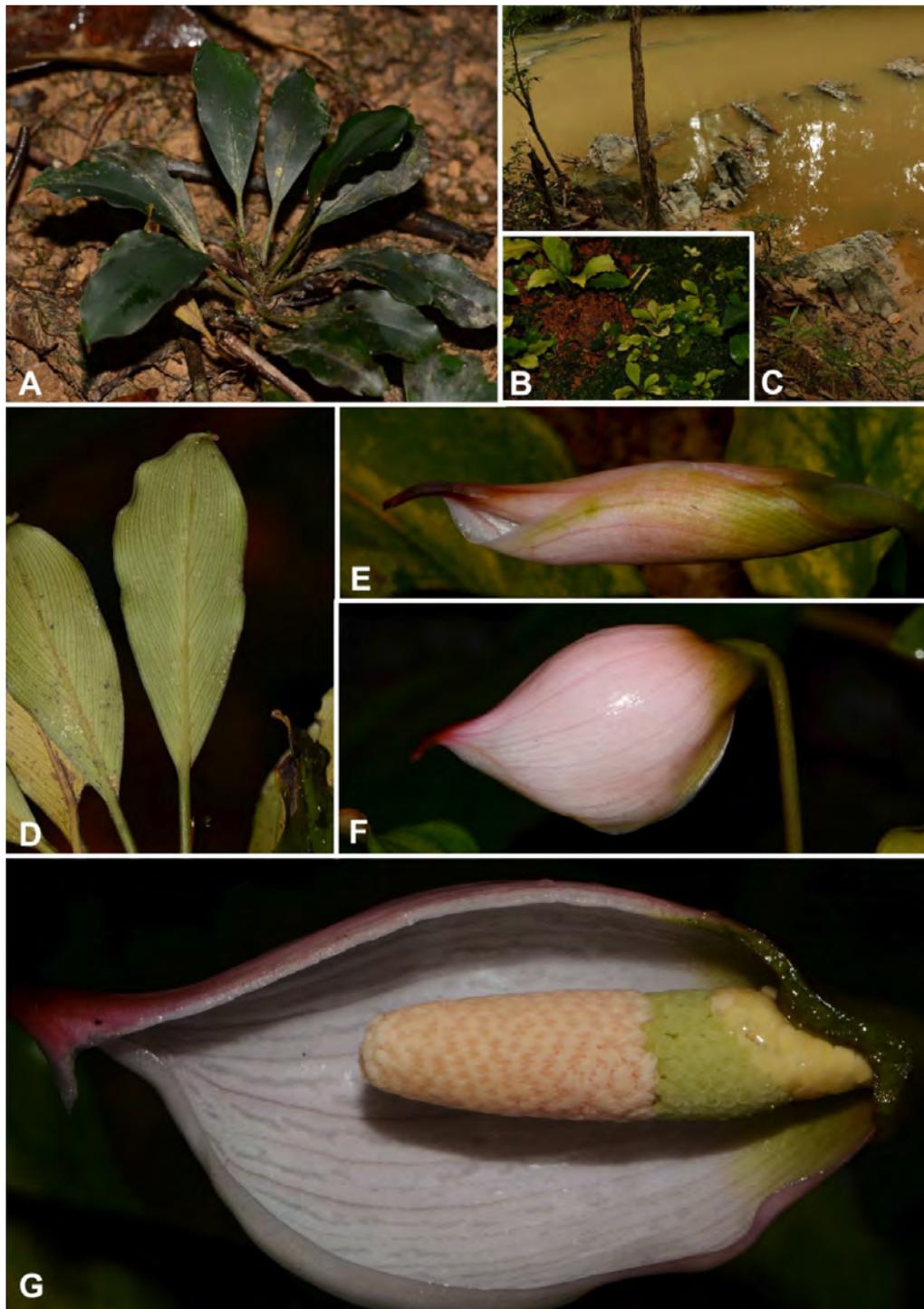


Figure 1. *Piptospatha bella* S. Y. Wong & P. C. Boyce. **A.** Plant in Type habitat. **B.** Detail of adventitious plantlets arising from roots. **C.** Habitat during wet season. *Piptospatha bella* grows on the mud protected by submerged shale rocks. **D.** Leaf blades, abaxial surface. **E.** Inflorescence at pistillate anthesis. The tubular spathe with the oblique terminal orifice is diagnostic. **F.** Inflorescence at late pistillate anthesis. **G.** Spadix at pistillate anthesis, nearside spathe artificially removed. All from P.C. Boyce & S.Y. Wong AR-3909. Images © P.C. Boyce.

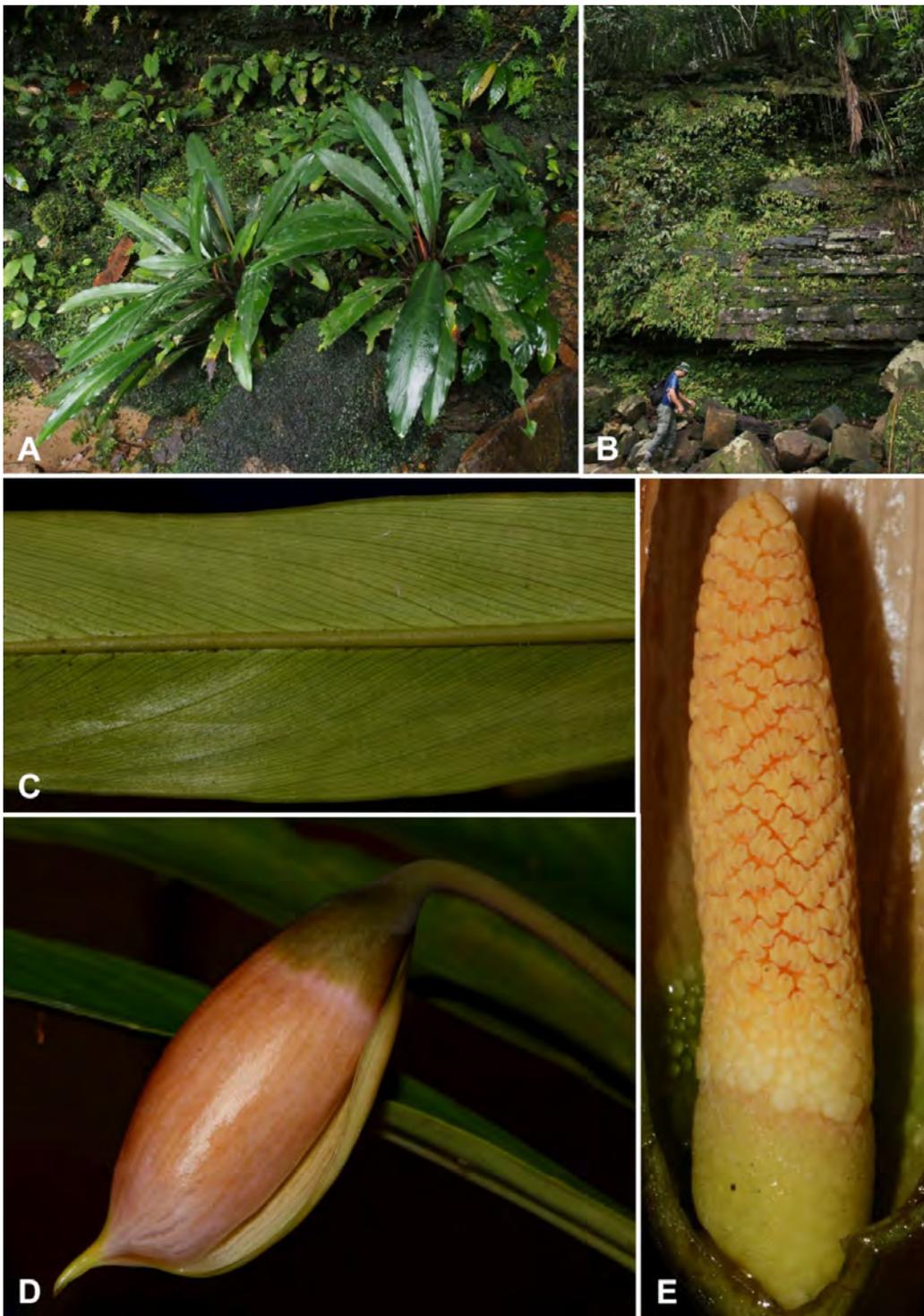


Figure 2. *Piptospatha lurida* S. Y. Wong & P. C. Boyce. **A.** Plants in Type habitat. **B.** Habitat during dry season. *Piptospatha lurida* grows at the base of the stratified waterfall. **C.** Leaf blades, abaxial surface. **D.** Inflorescence at pistillate anthesis. **E.** Spadix at finish of pistillate anthesis, nearside spathe artificially removed. All from *M. Lo AR-4917*. Images **A & B** © M.Lo; images **C – E** © P.C. Boyce.

deep green adaxially, pale ochre abaxially with newer leaves tinged reddish; **mid-rib** bluntly raised adaxially, rounded-raised and minutely scabrous adaxially; **primary lateral veins** c. 5 per side, parallel pinnate, almost indistinguishable from the more numerous interprimaries, both sets arising at c. 60° from mid-rib and joining a sub-marginal collecting vein. **Inflorescence** solitary, erect; **peduncle** c. 10 cm long, c. 2 mm in diameter, minutely scabrous, dull olive green. **Spathe** initially erect, later held at c. 90° to peduncle, not constricted, dull olive green and pale pink in late bud, spathe limb opening mainly in shades of glossy medium pink with darker staining, with terminal rostrum glossy deep purple-pink and lower spathe and ventral mentum dull olive green; **spathe limb** c. 4 cm long, remaining cylindrical with an oblique terminal orifice for much of pistillate anthesis before inflating to c. 1.5 cm, terminating in a rostrum c. 1 cm long, lacking rostral keels. **Spadix** c. 2 cm long × 5 mm in diameter, strongly obliquely inserted on spathe/peduncle; **pistillate flower zone** pale jade-green, cylindrical, basally obliquely contiguous with infrapistillar pistillode zone, dorsal side c. 3 mm long, ventral side c. 5 mm long, × c. 5 mm in diameter; **infrapistillar staminodes** in c. 2 rows, c. 1 mm diam., truncate, white; **pistils** syncarpous, individually slightly tapering-cylindrical, truncate, c. 0.6 mm diameter; **placentation** parietal; **stigma** capitate, papillate, wider than ovary; pistillate and staminate zones contiguous; **staminate flower zone** pale cream, c. 1 cm long × 5 mm in diameter at base, slightly tapering,

apex blunt; **staminate flowers** congested, mostly weakly defined as individual flowers, where distinct then flowers comprised of paired stamens; **stamens** irregularly oblong and very weakly butterfly shaped, c. 0.5 mm wide × c. 1 mm long, connective broad, truncate, glabrous; **thecae** lateral, c. 0.3 mm, ellipsoid with a narrow rim. **Infructescence** and **fruits** not observed.

Ecology — Obligate rheophyte on seasonally flooded riverine dense mud protected by semi-submerged shale rocks under perhumid lowland forest; c. 60 m. asl.

Distribution — Known only from the Type locality.

Etymology — From Latin adjective, *bellus*, in the feminine nominative form – *bella*: beautiful, coined for the attractive inflorescence of this species.

Notes — *Piptospatha bella* is remarkable by its diminutive size, it is the smallest tufted *Piptospatha* species yet described, the *Bucephalandra*-like stiffly chartaceous spatulate to oblanceolate leaf blades, and uniquely stiffened stilt-roots. The habitat of seasonally inundated bare alluvial consolidated mud to which the species is restricted is extraordinary – in wet weather plants are often submerged by turbid water for several days on end.

Solely on vegetative form it is far from clear to what *P. bella* may be most closely allied since out of flower the plant resembles

persuasively species of the genus *Bucephalandra*. On flowering we were surprised to discover that the pistils were connate and that the spathe lacked rostral keels, indicating placement of *P. bella* in the group of species around *P. burbidgei*.

Brown (1882) based his genus *Gamogyne* on what is now *Piptospatha burbidgei*, comparing it with the then only known species of *Piptospatha* (*P. insignis* N.E. Br.) and citing united ovaries and different stamens (*Piptospatha insignis* has a uniquely extended connective) as the differentiating characteristics. Subsequent additional species discoveries have excluded the staminate flower difference, but the characteristic of the connate pistils remains reliable, and was used by Hotta (1965) in recognizing sect. *Gamogyne* (N.E. Br.) M. Hotta. Based on our observations of many more species, we would add the character of the spathe limb lacking internal rostral keels as a feature for species of Sect. *Gamogyne*.

Brown reported *Gamogyne* to have parietal placentation (as does *Piptospatha*). However, Mayo et al. (1997) depicted *P. burbidgei* with basal placentation (GoA: Plate 50E) and Bogner & Hay (2000: 201) also reported basal placentation for *P. burbidgei*. Examination of the material used for Plate 50 (*P.W. Richards 1091*) reveals it to be incorrectly determined as *P. burbidgei* (it is, in fact, an undescribed species of *Hottarum*, for which basal placentation is perfectly in order). It would appear that the basal placentation statement in Bogner & Hay

(2000) resulted directly from this illustration of an erroneously determined collection.

Piptospatha lurida S. Y. Wong & P. C. Boyce, **sp. nov.** Type: Malaysian Borneo, Sarawak: Limbang, Lawas, Maligan, Air Terjun Payeh Maga, near Camp, 04°26'16.3"N 115°30'42.8"E, 820 m asl, 9 Sep 2014, *M. Lo 4917* (holo SAR!). **Figure 2, Figure 4A.**

Diagnosis

Piptospatha lurida most closely resembles *Piptospatha burbidgei* by the deep metallic green leaf blades with undifferentiated primary lateral veins, and blunt-tipped spathe, but is readily distinguished by the spadix lacking pistillodes below the pistillate flower zone, the shorter interstice zone (c. 1/10th vs 1/6th of the entire spadix length), and lax (vs densely arranged) pale orange (vs cream) staminate flowers, and in lacking plantlets arising from the roots.

Solitary rheophytic herb to 20 cm tall. **Roots** strong, adhering to rocky substrate. c. 3 mm in diameter. **Stem** short, condensed, to 20 mm in diameter, obscured by leaf bases. **Leaves** several together, spreading, forming a loose rosette; **petiole** 4–5 cm long, c. 3.5 mm in diameter, almost terete, scabrous, glossy medium olive green; **petiolar sheath** with free ligular portion c. 3 cm long, these caducous, liquefying, rather bright brownish-pink when fresh; **leaf blades** oblong-elliptic to narrowly oblong oblanceolate, 13–22 cm long × 2.5–3.5 cm

wide, base cuneate, apex acute with stout tubule c. 5 mm long, glossy dark metallic bluish-green adaxially, paler abaxially; **mid-rib** bluntly raised adaxially, rounded-raised and scabrous adaxially; **primary lateral veins** c. 10 per side, parallel pinnate, very nearly indistinguishable from the much more numerous interprimaries, although slightly darker than surrounding tissue on abaxial surface of blade, both sets arising at c. 60° from mid-rib and joining a sub-marginal collecting vein. **Inflorescence** solitary, erect; **peduncle** c. 10 cm long, c. 2 mm in diameter, distinctly scabrous, semi-glossy olive-green. **Spathe** initially erect, later held at c. 95° to peduncle, caducous part of limb dirty pinkish tan in late bud, persistent part dull medium olive-green, spathe limb opening mainly in shades clouded brownish pink, with terminal portion paler pink, and rostrum olive-green; **spathe limb**, c. 4.5 cm long, base c. 1 cm wide, mid-way inflated to c. 1.7 cm, blunt-tipped and terminating in a rostrum c. 5 mm long, lacking rostral keels. **Spadix** c. 2.5 cm long × c. 5 mm in diameter, obliquely inserted on peduncle/spathe; **pistillate flower zone** dirty jade-green, slightly fusiform, basally oblique, c. 4.5 mm long (dorsal side), c. 7 mm long (ventral side) × c. 5 mm in diameter; **infrapistillar staminodes** absent; **pistils** syncarpous, individually globose-cylindrical, truncate, c. 0.6 mm diameter; pistillate and staminate zones separated by a zone c. 2 mm long comprised of c. 2 whorls of irregular polygonal, truncate, white staminodes, uppermost ones transitioning to staminate flowers and often with one end fertile and

the other sterile; **placentation** parietal; **stigma** discoid, almost as wide as pistil, orangish green; **staminate flower zone** pale orange, very slightly narrower than pistillate zone in width, c. 1.7 cm long × 4.75 mm in diameter, slightly tapering, apex blunt; **staminate flowers** somewhat lax, not obviously arranged into discrete floral clusters, comprised of paired stamens, irregularly oblong, c. 0.5 mm wide × c. 1 mm long, connective sulcate, glabrous; thecae lateral, c. 0.3 mm, ellipsoid with a conspicuous narrow rim. **Infructescence** and **fruits** not observed.

Ecology — Rheophytic in bright light on sandstone waterfalls in wet upper hill forest at about 850 msl.

Distribution — Known only from the Type locality.

Etymology — From the Latin adjective, *lurida*, dirty brown, a little clouded (Lindley 1839).

Notes — *Piptospatha lurida* is evidently very closely allied to *P. burbidgei* (**Figure 3**) with sterile plants of both virtually indistinguishable. Examination of the roots of *P. burbidgei* reveals the presence of numerous plantlets, unknown in *P. lurida*.

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Figure 3. *Piptospatha burbidgei* (N.E.Br.) M.Hotta. **A.** Flowering plant in habitat, shales. **B.** Inflorescence at pistillate anthesis. **C.** Inflorescence at onset of staminate anthesis. Note that the spathe limb has begun to senesce and has partly separated from the lower, persistent spathe. **D.** Inflorescence towards end of staminate anthesis. **E.** Spadix (spathe artificially removed) at pistillate anthesis. All from *P.C.Boyce et al. AR-1973*. Images © P.C. Boyce.



Figure 4. Spadix of *Piptospatha lurida* S. Y. Wong & P. C. Boyce (A) and *Piptospatha burbidgei* (N.E.Br.) M.Hotta (B) compared. Images © P.C. Boyce.

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References

- Bogner, J. & A. Hay. 2000. Schismatoglottideae (Araceae) in Malesia 2: *Aridarum*, *Bucephalandra*, *Phymatarum* and *Piptospatha*. *Telopea* 9(1): 179–222.
- Brown, N. E. 1882. Four new genera of Aroideae. *J. Bot.* 20: 193–197.
- Hotta, M. 1965. Notes on the Schismatoglottidinae of Borneo. I. *Mem. Coll. Sci. Univ. Kyoto, Ser. B*, 32: 19–30.
- Lindley, J. 1839. *An Introduction to Botany*, 3rd Ed. London.
- Mayo, S. J., J. Bogner & P. C. Boyce. 1997. *The Genera of Araceae*. Royal Botanic Gardens, Kew xi + 370 pp.
- Tate R. B. 2001: The geology of Borneo island [CDROM]. – Kuala Lumpur: Geological Society of Malaysia / Persatuan Geologi Malaysia.