

TWO NEW SPECIES OF *DIBAMUS* (SQUAMATA: DIBAMIDAE) FROM BORNEO

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ABSTRACT. – Two new species of *Dibamus* are described from Sabah, east Malaysia (Borneo), one each from the highlands of Mendolong, Sipitang District, and the other from the lowland rainforests of Danum Valley, Lahad Datu District. The new highland species from Mendolong, *Dibamus ingeri*, differs from all congeneric species in the following combination of characters: SVL 96.0 mm; body relatively stout, body width 4.7% SVL, postoculars two; midbody scale rows 20; subcaudals 36; frontonasal divided; incomplete rostral sutures, preanal pores absent; nuchal collar starts from back of head, and relatively short tail (14.8% SVL). The new lowland species from Danum Valley, *Dibamus vorisi*, differs from all congeneric species in the following combination of characters: SVL to 90.1 mm; body relatively slender, body width 3.9% SVL, postoculars two; midbody scale rows 20; subcaudals 33 in a male, 11 in a female; frontonasal entire; nasal suture complete; labial suture absent; preanal pores absent; nuchal collar absent; pale body band situated in the anterior half of body, and a relatively short tail (14.2% SVL in a male; 6.1% SVL in a female).

KEY WORDS. – *Dibamus ingeri*, *D. vorisi*, Dibamidae, systematics, new species, Sabah, Malaysia, Borneo.

INTRODUCTION

The genus *Dibamus* at present contains 15 nominal species (see Darevsky, 1992; Das, 1996; Das & Yaakob, 2003; Honda et al., 1997; Ineich, 1999; Honda et al., 2001), in addition to one unnamed population, from Pulau Tioman, Pahang State (Lim & Lim, 1999). This is a substantial increase since the review by Greer (1985), when nine nominal species were recognised. An important aspect of the biology of *Dibamus* that affects our understanding of their systematics is their rarity in collections, most species being known from a single or a few specimens (except arguably the widespread *D. leucurus*). Many species show inexplicably disjunct populations, which call for systematic comparisons to verify whether they are indeed conspecific. If they are conspecific, it would reinforce the importance of field collections of these poorly known lizards in understanding geographical variation and other aspects of their population biology.

Dibamus alfredi was described by Taylor (1962) from “Na Pradoo, Pattani, Thailand at base of Bukit Besar”, in extreme southern Thailand, and subsequently reported from the island of Nias, off the western coast of Sumatra (Greer, 1985) and

from Danum Valley in Sabah State, East Malaysia, Borneo (Tan, 1993). A specimen reported by Boulenger’s (1912) from Bukit Besar and recently assigned to *D. alfredi* by Underwood & Lee (2000). Field collections undertaken by the Field Museum of Natural History, Chicago, in collaboration with the Sabah Parks resulted in the collection of two distinctive species of *Dibamus* from Borneo, one from montane forest (Mendolong, Sipitang District), the other from a lowland rainforest situation (Danum Valley, Lahad Datu District), both in the state of Sabah, East Malaysia, in Borneo. The second species has been referred to *D. alfredi* in the checklist of lizards of Sabah by Tan (1993). It is the purpose of this paper to diagnose these two species and describe them as new to science.

MATERIALS AND METHODS

The type series of the two new species were examined over 10 years after collection. Scute nomenclature follows Greer (1985) and scale counts and external observations of morphology were made using an Olympus SZX9 stereo dissecting microscope. The following measurements were taken with Mitutoyo™ dial caliper (to the nearest 0.1 mm);

except for snout-vent length (SVL; from tip of snout to vent), which was measured with a ruler: body width (BW; greatest width of body); tail length (TL; from vent to tip of unregenerated tail); tail width (TW; measured at base of tail); head length (HL; distance between posterior edge of last supralabial and snout-tip); head width (HW; measured at angle of jaws); head depth (HD; maximum height of head, from occiput to throat); eye to nostril distance (E-N; distance between anteriormost point of eyes and nostrils), eye to snout distance (E-S; distance between anteriormost point of eyes and tip of snout); internarial distance (IN; distance between nares); and interorbital distance (IO; shortest distance between orbits). Radiographic examination was done at 40 Kv (2 mA) for 30 secs.

Comparative material examined is in Appendix I. Additional information on character states and distribution was obtained from Darevsky (1992), Das (1996), Greer (1985), Honda et al. (1997; 2001), Ineich (1999), Manthey & Grossmann (1997), Smith (1935), and Taylor (1963). Institutional abbreviations follow Leviton et al. (1985), except ZRC is retained for USDZ, following conventional usage.

SYSTEMATICS

Dibamus ingeri, new species

(Fig. 1)

Material examined. – Holotype - FMNH 239756, km 13.9, Mendolong Camp (04° 45'N; 115° 40'E), Sipitang District, Sabah, East Malaysia (Borneo); adult male; coll. R. F. Inger & Tan Fui Lian, 2 Aug. 1989. The type locality is shown in Fig. 3.

Diagnosis. – SVL 96.0 mm in the single male examined; body relatively stout, body width 4.7% SVL, postoculars two; midbody scale rows 20; subcaudals 36; frontonasal divided; incomplete rostral sutures, preanal pores absent; nuchal collar starts from back of head, and tail relatively short (14.8% SVL).

Description (based on the holotype). – SVL 96.0 mm, TL 14.2 mm; snout bluntly rounded, distinctly conical (IN/IO ratio 0.41), projecting beyond jaws; nostril laterally oriented, oval, situated closer to snout-tip than to orbit (E-N/E-S ratio 0.68); head shorter than wide (HL/HW ratio 0.81), not flattened (HL/HD ratio 0.88); rostral pad with a large number of evenly distributed sensory papillae, nasal and labial sutures complete, extending from ocular to nostril; posterior border of rostral curved; frontonasal divided, width 0.6 mm; frontal single, width 0.9 mm, wider than long, x 1.50 times wider than frontonasal; interparietal single, not enlarged, narrower than frontonasal and frontal, posteriorly bordered by three slightly smaller nuchal scales; postoculars two; supralabial single, elongated, bordering ocular ventrally; infralabial lanceolate, length 2.6 mm (infralabial length/HW ratio 0.70), the pair separated by a smaller, trapezoid mental; scales bordering posterior edge of infralabial, three bilaterally; ear opening absent; eyes dimly visible through ocular; tongue short, undivided anteriorly, pointed; teeth small, acute.

Body relatively stout, BW 4.5 mm (BW/SVL ratio 0.05); head slightly distinct from neck and from body; tail short (TL/SVL ratio 0.15), its tip rounded, not bulbous, wider than rest of tail; tail base thick (TW/TL ratio 0.42); body scales smooth, subcycloid, including near preanal region; transverse scale rows posterior to head 24, at midbody 20, and anterior to vent 20; ventrals 163; subcaudals 36; presacral vertebrae 97; postsacral vertebrae 21 (tail complete); hind limbs reduced; flattened left hindlimb 4.7 mm, covered with three scales basally, three pairs of scales along its length, and terminating in a single scale; an enlarged median scale on preanal region, overlapped by those on sides; preanal pores absent; postanal scales not reduced.

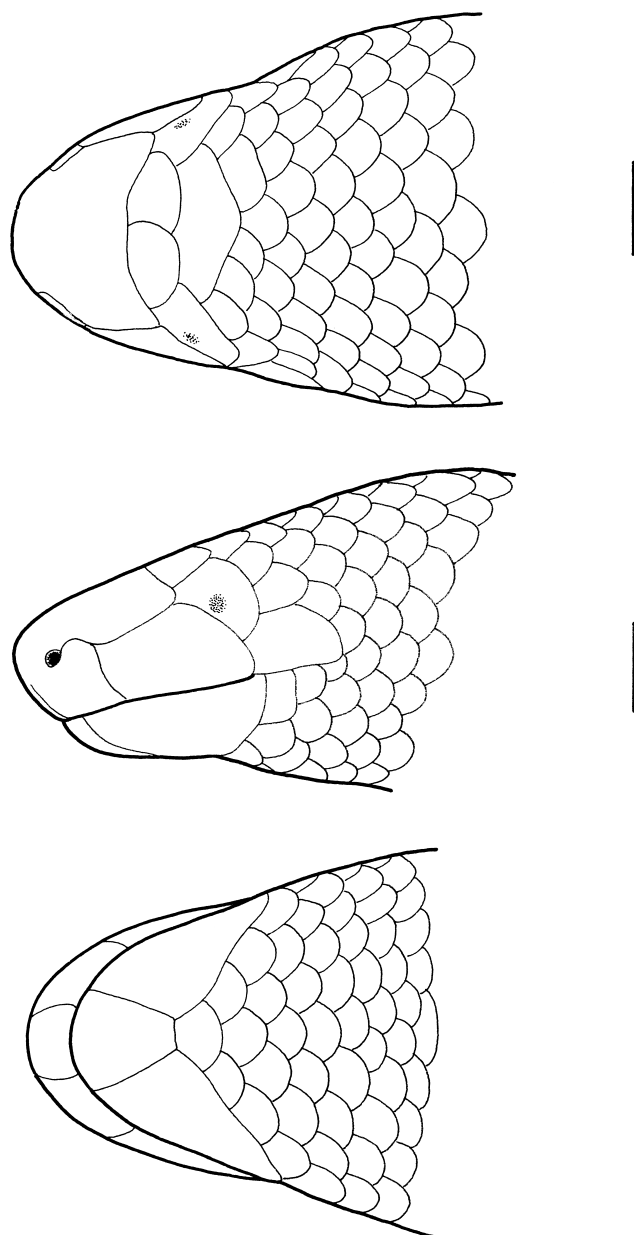


Fig. 1. Head of holotype of *Dibamus ingeri*, new species (FMNH 239756) in dorsal (top), lateral (middle) and ventral (bottom) views. Scale bars = 5 mm.

Measurements (in mm). – SVL 96.0; BW 4.5; TL 14.2; TW 6.0; E-N 1.9; E-S 2.8; IN 1.1; IO 2.7; HL 3.0; HW 3.7; HD 3.4.

Colouration. – Colour in life unknown. In preservative, dorsum tan brown, unpatterned, except on posterior half of body, which has pale linear blotches; venter slightly paler; snout-tip, sides of head, including supralabials, throat, hindlimbs and preanal region yellowish-cream; wide nuchal band cream, its anterior edge 8.9 mm from snout-tip, corresponding to the back of head, measuring 14.5 mm at its greatest width dorsally, 16.8 mm ventrally, with a few brown linear blotches.

Etymology. – The species name honours Robert Frederick Inger, Curator Emeritus at the Division of Herpetology, Field Museum of Natural History, Chicago, and also the collector of the holotype of the new species.

Natural history. – The holotype of the new species was found inside a rotting log, in a disturbed forest, at around 1,180 m ASL (R. F. Inger, pers. comm., 2002). Mendolong, situated in western Sabah State, has been selectively logged (Inger & Voris, 1993).

Comparisons. – The new species of *Dibamus* from Mendolong, Sabah, is compared with all nominal and one undescribed species (from Pulau Tioman, Pahang, in West Malaysia).

In showing two postoculars, *Dibamus ingeri*, new species, can be separated from the following congeners that possess a single postocular: *D. bogadeki* Darevsky, 1992 (distribution: Hong Kong, eastern China), *D. bourreti* Angel, 1935 (distribution: Vietnam, China, including Hong Kong), *D. deharvengi* Ineich, 1999 (distribution: Binh Châu, Vietnam), *D. greeri* Darevsky, 1992 (distribution: Vietnam), *D. leucurus* Bleeker, 1860 (distribution: Pulau We, Sumatra, Borneo and southern islands of the Philippines), *D. montanus* Smith, 1921 (distribution: Vietnam), *D. nicobaricus* Fitzinger in Steindachner, 1867 (distribution: Nicobar Islands, India), *D. smithi* Greer, 1985 (distribution: Vietnam), *D. somsaki* Honda et al., 1997 (distribution: Thailand) and new species from Batu Gua Madu (Das & Yaakob, 2003). It differs from *D. taylori* Greer, 1985 (distribution: Lombok and Wetar in the Lesser Sundas, Indonesia), which has three postoculars.

Its midbody scale row counts of 20 separates it from the following additional species – *D. celebensis* Schlegel, 1858 (distribution: Sulawesi, Indonesia: 26-30); *D. kondaoensis* Honda et al., 2001 (distribution: Kondao Island, Vietnam: 23), *D. novaeguineae* Duméril & Bibron, 1839 (distribution: southern islands of the Philippines, Halmahera, Sulawesi and West Papua Province of Indonesia on western New Guinea: 22-26); and *D. seramensis* Greer, 1985 (distribution: Seram, Indonesia: 33). In the dichotomous key to the genus by Greer (1985), the new species falls out as *D. alfredi* Taylor, 1963 (distribution: southern Peninsular Thailand), but can be distinguished from this species in showing complete (vs incomplete) nasal and labial sutures; preanal pores absent (vs present); a relatively short tail (14.8% vs 17-18% of SVL) and lower subcaudal counts for males (36 vs 46-47).

***Dibamus vorisi*, new species**
(Fig. 2)

Material examined. – Holotype – FMNH 230187, Danum Valley Field Centre (05° 01'N; 118° 03'E), Lahad Datu District, Sabah, East Malaysia (Borneo); adult male; coll. Robert Inger & Sharon Emerson, 30 Nov.1986. The type locality is shown in Fig. 3.

Paratype – FMNH 246232, paratopotype, adult female; coll. Harold Voris & Daryl Karns, 8 Nov.1990.

Diagnosis. – SVL to 90.1 mm; body relatively slender, body width 3.9% SVL, postoculars two; midbody scale rows 20; subcaudals 33 in a male, 11 in a female; frontonasal entire; nasal suture complete; labial suture absent, preanal pores absent; nuchal collar absent; a pale brown (in preservative) body band situated in the anterior half of body; and a relatively short tail (16.8% SVL in a male; 6.1% SVL in a female).

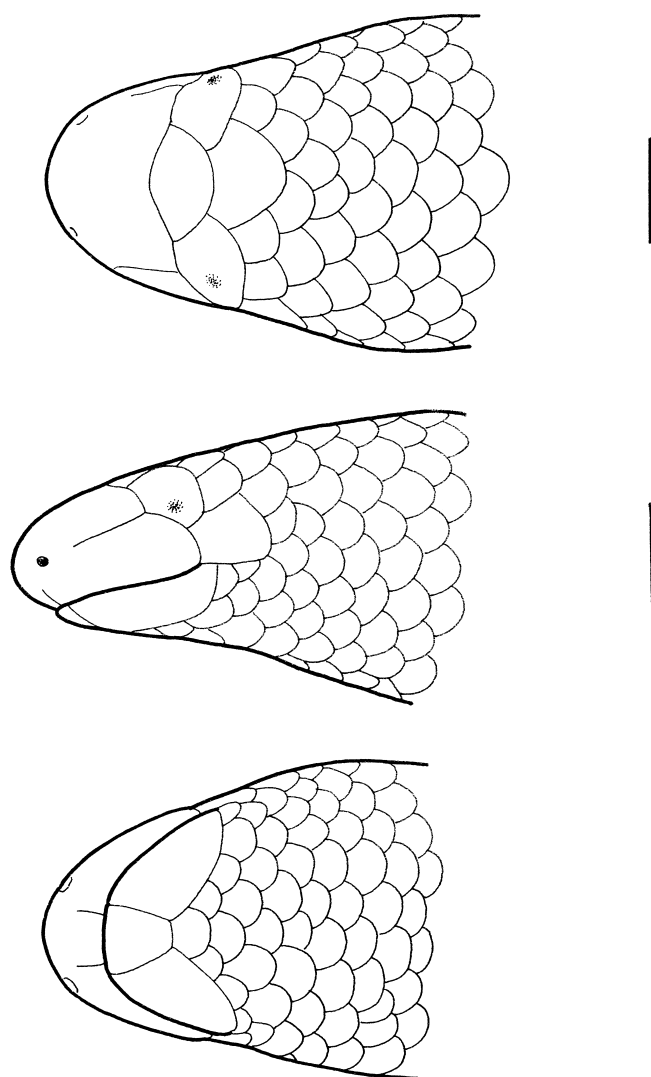


Fig. 2. Head of holotype of *Dibamus vorisi*, new species (FMNH 230187) in dorsal (top), lateral (middle) and ventral (bottom) views. Scale bars = 5 mm.

Description (based on the holotype). – SVL 89.2 mm, TL 12.7 mm; snout bluntly rounded, distinctly conical (IN/IO ratio 0.44), projecting beyond jaws; nostril laterally oriented, oval, situated closer to snout-tip than to orbit (E-N/E-S ratio 0.79); head shorter than wide (HL/HW ratio 0.82), not flattened (HL/HD ratio 0.69); rostral pad with a large number of evenly distributed sensory papillae, rostral suture incomplete, nasal suture complete, extending from ocular to nostril; labial suture absent; posterior border of rostral nearly straight; frontal single, width 0.6 mm; frontonasal entire, width 0.6 mm; frontal wider than long, x 1.20 times wider than frontonasal; interparietal single, not enlarged, narrower than frontonasal and frontal, posteriorly bordered by three slightly smaller nuchal scales; postoculars two; supralabial single, elongate, bordering ocular ventrally; infralabial lanceolate, length 1.6 mm (infralabial length/HW ratio 0.73), separated by a smaller, trapezoid mental; scales bordering posterior edge of infralabial, three bilaterally; ear opening absent; eyes dimly visible through ocular; tongue short, undivided anteriorly, pointed; teeth small, acute.

Body relatively slender, BW 3.5 mm (BW/SVL ratio 0.04); head slightly distinct from neck and from body; tail short (TL/SVL ratio 0.14), its tip rounded, not bulbous, wider than rest of tail; tail base thick (TW/TL ratio 0.28); body scales smooth, subcycloid, including near preanal region; transverse scale rows posterior to head 22, at midbody 20; and anterior to vent 18; ventrals 147; subcaudals 33; presacral vertebrae 97; postsacral vertebrae 20; hind limbs reduced; flattened left hindlimb 3.1 mm, covered with three scales basally, three pairs of scales along its length, and terminating in a single scale; an enlarged median scale on preanal region, overlapped

by those on sides; preanal pores absent; postanal scales not reduced.

Measurements (in mm; holotype followed by paratype in parentheses). – SVL 79.2 (90.1); BW 3.5 (3.5); TL 13.3 (5.5); TW 3.6 (3.1); E-N 1.1 (1.4); E-S 1.4 (1.9); IN 0.7 (0.8); IO 1.6 (1.8); HL 1.8 (1.7); HW 2.2 (2.2); HD 2.6 (2.1).

Variation in paratype. – The paratype, an adult female, differs in the following additional characters: hindlimbs absent; frontonasal partially divided; subcaudals 11.

Colouration. – Colour in life unknown. In preservative, dorsum brown, unpatterned; venter slightly paler; snout-tip, sides of head, including supralabials, throat, hindlimbs and preanal region yellowish-cream; no nuchal band; a pale brown body band on anterior half of body, in holotype, commencing 30.6 mm from snout-tip, measuring 13.5 mm in width both dorsally and ventrally; in paratype, commencing 34.4 mm from snout-tip, measuring 13.9 mm in width both dorsally and ventrally; tip of tail cream.

Etymology. – The species name honours Harold Knight Voris, Curator at the Division of Herpetology, Field Museum of Natural History, Chicago, an important worker on the herpetology of Southeast Asia, and also one of the collectors of the type series of the new species.

Natural history. – The holotype was found 5 cm below the surface of the soil, within the confines of the buttresses of a tree, within a primary forest; the paratype from under dead leaves, also within a primary forest (R. F. Inger, pers. comm., 2002). Danum Valley is situated in eastern Sabah State, is at an elevation of under 300 m ASL. The Danum Valley Conservation Area, located at the upper catchment of the Segama River, is a 43,800 ha area of undisturbed forest within the 972,000 ha concession area of the Sabah Foundation, most of which have been selectively logged. The topography is hilly, supporting primary lowland dipterocarp forest (Inger & Voris, 1993). Rainfall averages about 2,700 mm per year, although droughts are of regular occurrence, especially associated with the El Niño Southern Oscillation years.

Comparisons. – The new species of *Dibamus* from Danum Valley, is compared with all nominal and one undescribed species (from Pulau Tioman, Pahang, in West Malaysia), besides the species from Mendolong described above.

In showing two postoculars, *Dibamus vorisi*, new species, can be separated from the following congeners that possess a single postocular: *D. bogadeki*, *D. bourreti*, *D. greeri*, *D. leucurus*, *D. montanus*, *D. nicobaricus*, *D. somsaki*, *D. smithi*, a new species from Batu Gua Madu (Das & Yaakob, 2003) and an undescribed species from Pulau Tioman. The new species differs from *D. taylori* which shows three postoculars.

The midbody scale row counts of the new species (20) separates it from the following additional species- *D.*

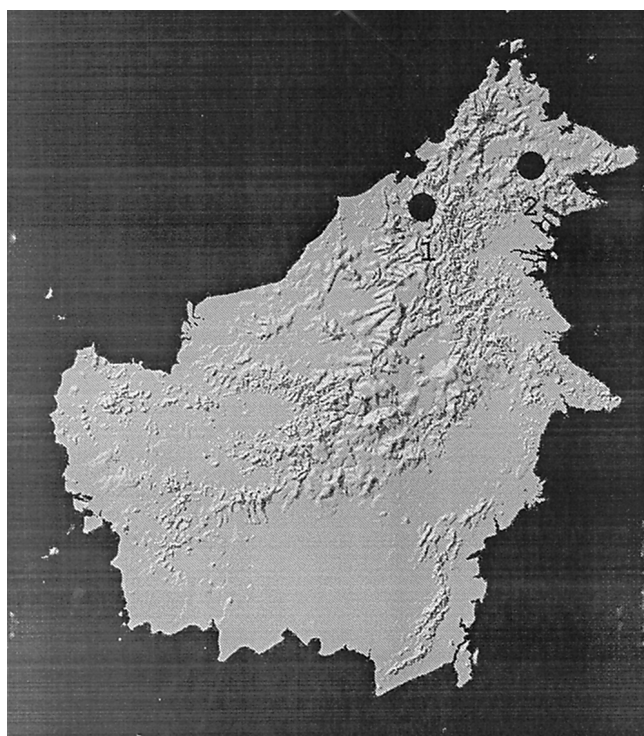


Fig. 3. Relief map of Borneo, showing the type localities of *Dibamus ingeri*, new species, at Mendolong (1) and *Dibamus vorisi*, new species, at Danum Valley (2), both within Sabah State, East Malaysia.

celebensis, 26-30; *D. kondaoensis*, 23; *D. novaeguineae*, 22-26; and *D. seramensis*, 33. The new species can be distinguished from *D. alfredi* in showing complete (vs incomplete) nasal suture, preanal pores absent (vs present); and fewer subcaudals in males (33 vs 46-47).

Finally, *D. vorisi* differs from *D. ingeri* in showing a relatively slender body (width 3.9 vs 4.7% of SVL); presence of a midbody band (vs a nuchal collar); frontonasal scale entire (vs divided); labial suture absent (vs present), and tail with a cream-coloured tip (vs unicoloured).

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APPENDIX I

Comparative material examined

- Dibamus alfredi* Taylor, 1962. – FMNH 178336 (holotype), from “Na Prado, Pattani, Thailand at base of Bukit Besar” (= Maprado, Pattani, 06° 52’N; 101° 16’E, Pattani Province, southern Thailand).
- Dibamus celebensis*. – ZMA 10153, Loewoe, Sulawesi, Indonesia.
- Dibamus leucurus*. – BMNH 63.12.4.29 (holotype of *Typhlina leucurus* Bleeker, 1860; specimen ‘h’ of Boulenger, 1887: 435), “Agam” (00° 15’S; 100° 05’E, north of Bukittinggi, Sumatera Barat Province, Indonesia); FMNH 138679, FMNH 145666, Nanga Tekalit Camp at Sungei Mengiong, Kapit, Sarawak, East Malaysia (Borneo); ZMA 11736, Kajoe Tanam, at present spelt Kayutanam, Sumatera Barat Province, Indonesia; ZMA 15501, Deli, at present spelt Delitua and equivalent to Medan, Sumatera Utara Province, Indonesia.
- Dibamus nicobaricus*. – BNHM 977, Great Nicobar, India; MCZ 181338, Shompen Hut, Great Nicobar, India; ZSI 6970, Kamorta, Central Nicobar, India; ZSI 7036, “Nicobars”, India; ZSI 22511, Station 10, Casuarina Bay, Great Nicobar, India; ZSI 22512, Casuarina Bay, Great Nicobar, India.
- Dibamus novaeguineae*. – ZMA 15500, Sinabang, Pulau Simeulue, Aceh Province, Indonesia.
- Dibamus taylori*. – ZMA 15499 (paratype of *Dibamus taylori* Greer, 1985), Kamanggan, Pulau Sumba, Nusa Tenggara Province, Indonesia.
- Dibamus* sp. (Lim & Lim, 1999) – ZRC 2.3418, Pulau Tioman, Pahang, West Malaysia.
- Dibamus* sp. (Das & Yaakob, 2003) – ZRC 2.1944 and 2.5368, Batu Gua Madu, near Gua Musang (04° 50’ 14.3” N; 101° 56’ 58.7”E), Kelantan State, Malaysia.