



วารสารราชบัณฑิตยสถาน  
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# Taxonomic Revision of the Genus *Hedychium* J. König (Zingiberaceae) in Thailand (Part 2)

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## Abstract

The genus *Hedychium* J. König (Zingiberaceae) in Thailand is taxonomically revised, result of which 21 species and 6 varieties are enumerated. In Part 1, description of the genus with key to species were given, and 10 species and 4 varieties were listed. *H. forestii* Diels were recognized as one of the 4 varieties of *H. coronarium* J. König in this first part. In continuation of the first part, 11 species and 2 varieties are listed, of which descriptions, ecological data, geographical distributions and some illustrations are provided. Diagnostic characters of each taxon are also discussed. Two new synonyms, *H. samuiense* Sirirugsa (synonymous to *H. roxburghii* Blume) and *H. thaianum* Mookamul & Picheans. (synonymous to *H. pauciflorum* S.Q. Tong), are proposed.

**Key words:** taxonomic revision, Zingiberaceae, *Hedychium* J. König, Thailand

**11. *Hedychium muanwongyathiae*** Picheans. & Wongsuwan, J. Jpn. Bot. 84: 330-337. 2009 [Type: Thailand: Northtern, Chaing Mai, Doi Angkhang, N 19° 50' 48", E 99° 03' 004", alt. 1,044 m, 10 August 2008; *Picheansoonthon & Wongsuwan* 064 (holotype BKF, paratypes BK, SING)]. Figures 6A, 6B and 6C.

Terrestrial, perennial herb. Pseudostems 0.7-1.3 m high, bladeless sheaths 2-4. *Ligule* oblong, 2.4-3.1 by 3.3-4.6 cm, apex round, membranous, pubescent, reddish. *Leaves* sessile; lanceolate-oblong, 38.3-48.5 by 17.8-19.4 cm, base cuneate, apex acuminate-caudate, margin entire, upper surface glabrous, lower surface pubescent. *Inflorescence* a terminal spike, erect, 21.6-28.2 cm long; peduncle 5.5-7.6 cm long, glabrous; bracts lax, folded, oblong, 4.3-4.5 by 1.4-1.8 cm, apex acute, glabrous, greenish, each subtending a cincinnus of 2-4 flowers; primary bracteole tubular, 2.4-2.9 by 1.3-1.9 cm, apex acute, membranous, glabrous except apex hairy; second bracteole tubular, ca. 2.2 by 0.1-1.1 cm, apex acute, glabrous except apex hairy; third brac-



teole tubular, 1.5-1.8 cm. by 7-9 mm, apex acute, membranous, glabrous except apex hairy; fourth bracteole tubular, 1-1.4 cm by 4-5 mm membranous. *Flowers* white to pale yellow, fragrant; calyx tubular, 3.9-4.45 cm by 4-5 mm, apex acute to 3-dented, hairy; corolla tube slender, 5-7.6 cm by 2-3 mm, 3-lobed, lobes linear, 3.6-4.6 cm by 4-6 mm, apex hooded, yellowish; lateral staminodes linear-oblong, 4.2-4.3 cm by 4-5 mm, base attenuate into a 1-1.2 cm by 3-4 mm claw, pale salmon; labellum elliptic-obovate, *ca.* 4.3 by 2.5-2.8 cm, base attenuate into a 1-1.1 cm by 4-5 mm claw, apex deeply divided, 2.2-2.5 cm, white with pale salmon red patch at base; filament 3.2-3.4 cm long, salmon red; anther dorsified, 1.3-1.5 cm by 2-3 mm, base divaricate, yellowish; ovary 5-6 by 3-4 mm, 3-loculed, placentation axile, villose; epigynous glands 2, slender, 3-4 by 2-3 mm yellowish; stigma densely ciliate, green. *Fruits* not seen.

Thailand.—NORTHERN: Chiang Mai [Doi Angkhang]; Mae Hong Son [Doi Keiw Lom].

Distribution.—Endemic to Thailand.

Ecology.—Lower montane scrub at the altitude of 1,000-1,500 m.

Phenology.—Flowering from August-September, fruiting from October- November.

Vernacular name.—Ta Hoen Pa (ตาเหินป่า).

Note.—Four taxa of the *Hedychium* in Thailand, *H. muanwongyatiae*, *H. phuluangense*, *H. spicatum* var. *acuminatum* and *H. spicatum* var. *spicatum*, possess white elliptic-obovate labella and filaments shorter or as long as labella. *H. muenwongyatiae* is distinguished by its 2-4-flowered bracts, hairy calyx tubes and villous ovaries.

**12. *Hedychium neocarneum*** T.L. Wu, K. Larsen & Turland, *Novon* 10: 91. 2000 [Type: China : Yunnan, Simao, alt. 1000-1900 m; *Y.Y. Qian* 1832 (holotype SMAO)]; T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, *Fl. China* 24: 376. 2000.—*H. carneum* Y.Y. Qian, *Acta Bot. Austron Sin.* 9: 48. 1994; Not Loddiges, *Bot. Cab.* 7: t. 693. 1823. Figures 6D, 6E and 6F.

Terrestrial, perennial herb. *Pseudostems* 0.6-1.5 m high, leaf sheaths greenish, bladeless sheaths 2-4. *Ligule* oblong, 2.3-4.0 by 1.3-2.8 cm, apex bilobed-rounded, membranous, pubescent, greenish. *Leaves* sessile; blade elliptic-oblong, 16.5-32.4 by 7.2-12 cm, base cuneate, apex acute-acuminate, margin entire-slightly undulate, upper surface glabrous, lower surface pubescent. *Inflorescence* a terminal spike, erect, 11.2-24.5 cm long; peduncle 3.3-4.8 cm long, hairy; bracts, folded, green, obovate-lanceolate, 3.4-4.2 by 1.6-2.8 cm, apex acute, pubescent, each subtending a cincinnus of 2-4 flowers; first bracteole ovate-broadly ovate, 2.3-3 cm by 6-7 mm, apex acute, pubescent, greenish; second bracteole ovate, 1.3-1.6 cm by 4-8 mm, apex acute, pubescent; *Flowers* white to pale yellow, fragrant; calyx tubular, 3.9-4.6 by 0.3-0.4 cm, apex 3-dented, pubescent except apex; corolla tube slender, 5.3-5.8 cm by *ca.* 3 mm, 3-lobed, lobes linear, 3.7-5 cm by 2-3 mm,



apex hooded, yellowish; lateral staminodes oblanceolate, 2.8-3.3 cm by 4-5 mm, base attenuate into a 3-5 by 2-3 mm claw, apex rounded; labellum elliptic-suborbicular, 2.4-2.6 by 1.5-2.4 cm, base attenuate into 6-8 by 3-4 mm claw, white with yellow-red patch at base, apex 2-cleft, 0.4-1 cm; filament pale salmon red, 4.1-5.3 cm long; anther dorsifixed, base divaricate, 1.1-1.2 cm by 2-3 mm, yellowish; ovary 4-5 by 3-4 mm, 3-loculed, placentation axile, pubescent; epigynous glands 2, slender, ca. 3 by 1 mm, yellowish; stigma densely ciliate, green. *Fruits* ovoid to oblong, 2.7-3 by 2.1-2.2 cm, pubescent, green. *Seeds* numerous, ellipsoid to globose, 4-9 by 4-6 mm, reddish orange.

Thailand.-NORTHERN: Nan [Doi Phu Kha National Park]; Pitsanulok [Phu Hin Rong Kla]; NORTH- EASTERN: Loei [Phu Luang Wildlife Sanctuary; Phu Ruea National Park].



Figure 6

A. B. & C. *H. muanwongyathiae* Picheans. & Wongsuwan (A. Ligule B. Inflorescence C. Close-up flowers).  
D. E. & F. *H. neocarneum* T.L. Wu (D. Inflorescence E. Close-up flowers F. Infructescence). Photographed by Pornpimon Wongsuwan.



Distribution.—China (Simao Xian) and Laos (Champasak).

Ecology.—Lower montane scrub, at the altitude of 1,000-1,500 m.

Phenology.—Flowering from June-August, fruiting from July-September.

Note.—This species can be recognized by its oblanceolate staminodes, elliptic-suborbicular labellum with yellow-red patch at base, 2-cleft apex and pale salmon red filament, twice as long as the labellum.

**13. *Hedychium pauciflorum*** S.Q. Tomg, Acta Bot. Yunnan. 8: 43. 1986; T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, Fl. China 24 : 55. 2000.—*H. thianum* Mookamul & Pichens., Folia Malaysiana 6: 18-19, 21, 24-25; Figs. 1, 3-6. 2005 [Type: Thailand: Chiang Mai, Doi Inthanon; Mookamul & Pichensoonthon 588 (holotype BKF, paratypes SING, PEK)].

Epiphytic, perennial herb. *Pseudostems* 35.5-60 cm high, leaf sheaths green, bladeless sheaths 2-3. *Ligule* shortly oblong, 2-7 mm long, apex bilobed, lobe rounded, membranous, glabrous, greenish. *Leaves* sessile, blade elliptic-oblong, 24.9-31.7 by 7-7.2 cm, base cuneate, apex acuminate, margin slightly undulate, both surfaces glabrous. *Inflorescence* terminal spike, erect, 7.4-15.3 cm long, laxly few-flowered; peduncle 3.7-5.1 cm long, glabrous; bract lanceolate-oblong, 1.6-2 by 0.9-1 cm, apex acute or rounded, glabrous, green, each subtending a cincinnus of 1 flower; bracteole oblong, 1.3-1.5 cm by 5-6 mm, apex acute, membranous. *Flowers* white to pale yellow; calyx tubular, 1.7-1.8 cm by 2-3 mm, apex emarginate-acute membranous; corolla tube, 3.9-4.1 cm long, 3-lobed, lobe linear, 2.1-2.4 cm by 2-3 mm; lateral staminodes narrowly lanceolate-oblong, 1.6-1.7 cm by 2-4 mm; labellum narrowly elliptic-oblong, 1.5-1.7 cm by 3-4 mm, apex deeply divided to the base, lobe narrowly oblong, ca. 2 mm wide; filament yellowish, 1.9-2 cm long; anther dorsifixed, 0.8-1 cm long, base divaricate, yellowish; ovary, ca. 3 by 2 mm, glabrous, green; epigynous glands 2, ca. 2 mm long, yellowish; stigma densely ciliate, orange. *Fruits* globose, 1.2-1.5 by 1.2-1.3(-1.5) cm, trilocular, glabrous, green. *Seeds* numerous, aril reddish.

Thailand.—NORTHERN: Mae Hong Son [Pang Mapha, Ban Mae Aumong]; Chiang Mai [Doi Suthep, Sahn Goo-Puping area; Doi Suthep-Pui National Park]; Tak [Mae Moei National Park, road to Mon Kra Ting]; NORTH- EASTERN: Loei [Phu Luang Wildlife Sanctuary].

Distribution.—China (W Yunnan).

Ecology.—Lower montane pine-oak forest or lower montane scrub, at the altitude of ca. 1,000 m.



Phenology.—Flowering from June-July, fruiting from July-September.

Note.—This species can be easily distinguished by its lax, few-flowered-or-1-flowered bracts; deeply divided labellum with narrowly oblong lobes and the thoroughly glabrous plant.

**14. *Hedychium phluangense*** Picheans. & Wongsuwan, J. Jpn. Bot. 84: 330-337. 2009 [Type: Thailand: Northeastern, Changwat Loei, Phu Luang Wildlife Sanctuary, N 17 ° 16'36.18", E 101 ° 31'5.70", alt. 1,474 m, 26 July 2007; *Picheansoonthon & Wongsuwan* 060, (holotype BKF, isotypes BK, SING). Figure 7.

Terrestrial, perennial herb. *Pseudostems* 1.14-1.56 m high, bladeless sheaths 2-4. *Ligule* oblong, 1.8-2.1 by 1.2-1.6 cm, apex acute, membranous, pubescent, reddish. *Leaves* sessile, blade lanceolate-oblong, 42.1-50.3 by 9.8-13.4 cm, base cuneate, apex acute-acuminate, margin entire, both surfaces glabrous. *Inflorescence* a terminal spike, erect, 11.6-18.2 cm long; peduncle 5.4-10.6 cm long, glabrous; bracts lax, folded, oblong, 2.9-3.1 by 0.8-1.1 cm, apex acute, glabrous, greenish, each subtending a cincinnus of 1 flower; bracteole, oblong, 1.4-1.6 by 0.9-1.1 cm, apex acute, membranous. *Flowers* white to pale yellow, fragrant; calyx tubular, 2.7-2.8 cm by 3-4 mm, apex 3-lobed, glabrous; corolla tube slender, 5.2-6.1 by 0.2-0.3 cm, 3-lobed, lobes linear, 3.4-4.7 cm by 4-5 mm, apex hooded, yellowish; lateral staminodes oblanceolate-linear, 3.8-4.8 cm by 4-5 mm, base attenuate into a 1.6-1.9 cm by 2-3 mm claw; labellum elliptic, 2.9-3.5 by 1.5-1.6 cm, base attenuate into a 1.1-1.3 cm by 3-4 mm claw, apex bifid, 6-7 mm, white with pale salmon red patch at base; filament 3.3-4.1 cm long, salmon red; anther dorsifixed, 1.5-1.6 cm by 3-4 mm, base divaricate, salmon red; ovary 2-4 by 2-3 mm, 3-loculed, placentation axile, glabrous; epigynous glands 2, slender, 2-3 by ca. 0.5 mm, yellowish; stigma densely ciliate, green. *Fruits* suborbicular, 1.2-1.6 by 1.2-1.5 cm, glabrous, green. *Seeds* numerous, ellipsoid to orbicular, 4-5 by ca. 3 mm, reddish orange.

Thailand.—NORTH-EASTERN: Loei [Phu Luang Wildlife Sanctuary].

Distribution.—Endemic to Thailand.

Ecology.—Lower montane scrub, at the altitude of 1,000-1,500 m.



**Figure 7** *Hedychium phuluangense* Picheans. & Wongsuwan

A. Plant habit B. Inflorescence C. Infructescence. Photographed by Pornpimon Wongsuwan.

Phenology.—Flowering from July-August, fruiting from August-September.

Vernacular name.—Hong Hoen (หงส์เหิน).

**15. *Hedychium roxburghii*** Blume, Enum. Pl. Javae, 1 : 57. 1827 [Type: Indonesia: Java; *C.L. Blume* s.n. (Type L)]; Miq. Fl. Ind. Bat. 3 : 609. 1854; Horan. Monogr. 26. 1862; K. Schum. in Engl., Bot. Jahrb. 27 : 340. 1899, in Engl., Pflanzenr. 4(46) : 58. 1904; Fl. Java 3 : 64-67. 1968.—*H. spanogheanum* Wall., in Hook. J. Bot. Kew Gard. Misc. 5 : 375. 1853.—*Gandasulium roxburghii* (Blume) Kuntze, Revis. Gen. Pl. 2 : 690. 1891.—*G. spanogheanum* (Wall.), Kuntze, Revis. Gen. Pl. 2 : 690. 1891.—*H. samuiense* Siriruga & K. Larsen, Nord. J. Bot. 15: 301, Fig. 1 A-D. 1995. [Type : Thailand : Surat Thani, Koh Samui, on rocks in stream through evergreen forest, alt. *ca.* 100 m, 8 April 1927, *Kerr* 12540 (holotype K, isotypes AAU, BM, C, L)]. Figures 8, 9A, 9B and 9C.

Lithophytic or epiphytic, perennial herb. *Pseudostems* 50.1-133.5 cm high, leaf sheaths green, bladeless sheaths 1-2. *Ligule* oblong, 5.7-6.9 by 2.1-3.4 cm, apex obtuse-acute, membranous, pubescent, greenish. *Leaves* sessile to petiolate, 0.7-2.2 cm; blade oblong, 38.9-49.7 by 8.6-14.2 cm, base cuneate, apex acute, margin slightly undulate, lower surface glabrous. *Inflorescence* a terminal spike, erect, 10.6-45.2 cm long; peduncle 3.5-9.2 cm long, pubescent; bracts lax, folded, triangular 2.2-2.5 by 1.1-1.4 cm,



apex acute, pilose, green, each subtending a cincinnus of 2-4(-8) flowers; primary bracteole, triangular, 1.5-1.8 by 1.1-1.2 cm, apex acute, membranous, pubescent, yellowish to brownish; second bracteole, triangular, 1.4-1.6 cm by 7-8 mm, apex acute to 2-dentate, membranous, pubescent, yellowish or brownish; third bracteole, triangular, 1.2-1.3 cm by 5-6 mm, apex acute, membranous, pubescent, yellowish or brownish; fourth bracteole, triangular, 0.8-1 cm by 2-4 mm, apex acute, membranous, pubescent, yellowish or brownish. *Flowers* white to pale yellow, fragrant; calyx tubular, 3.8-5.3 cm by 3-4 mm, apex acute to 3-dentate; corolla tube slender, 6.5-8.3 cm by *ca.* 3 mm, 3-lobed, lobes linear, 4.7-5.3 cm by 3-4 mm, apex hooded, yellowish; lateral staminodes narrowly lanceolate-oblong or spatulate, 4.8-5.2 cm by 5-8 mm, base attenuate into a 0.6-1.4 cm by 2-3 mm claw; labellum ovate to suborbicular, white with pale greenish patch at base, 4.1-4.3 by 1.9-2.2 cm, base attenuate into *ca.* 7.5 by 3-4 mm claw, apex 2-cleft, 2.5-2.6 cm; filament 5.2-8.9 cm long, salmon red; anther dorsifixed, 6-8 by 3-4 mm, base divaricate, salmon red; ovary oblong, 3.5-5 by 2-3 mm, 3-loculed, placentation axile, pubescent; epigynous glands 2, slender, *ca.* 3 by 0.5 mm, yellowish; stigma densely ciliate, green. *Fruits* obovoid to oblong, 2.8-3.2 by 1.3-1.5 cm, pubescent, scarlet. *Seeds* numerous, ellipsoid to oblong, 0.4-1 cm by 4-5 mm, aril reddish.

Thailand.-PENINSULAR: Phang-Nga [Kapong]; Ranong [Khlung Naka Wildlife Sanctuary]; Suratthani [Ko Samui].

Distribution.-Indonesia (Java).

Ecology.-On rocks or trees near stream in tropical evergreen rain forest, at the altitude of *ca.* 141 m.

Phenology.-Flowering from April-May, fruiting from May-June.

Vernacular name.-Wan Chai Dam (ว่านใจดำ)

Note.-The flowers of this plant appear earlier in summer to early rainy season.

**16. *Hedycium siamense*** Picheans. & Wongsuwan [Type: Thailand: Ranong, Klong Naka Wildlife Sanctuary, Mueng Chone, N 09° 19.082', E 98° 30.943', alt. 943 m, 21 November 2008; *Picheansoonthon & Wongsuwan* 73, in spirit no. 32 (holotype BKF)]. Figures 9D, 9E and 9CF.

Epiphytic, perennial herb with tuberous rhizomes. *Pseudostems* 48-81 cm high, leaf sheaths green, bladeless sheaths 1-2. Ligule oblong, 5.7-6.4 by 2.2-2.8 cm, apex acute-acuminate, membranous, glabrous, pale greenish. *Leaves* elliptic-lanceolate, 22.2-27.5 by 9.9-10.5 cm, base cuneate, apex acute to shortly acuminate, margin slightly undulate, both surfaces glabrous.



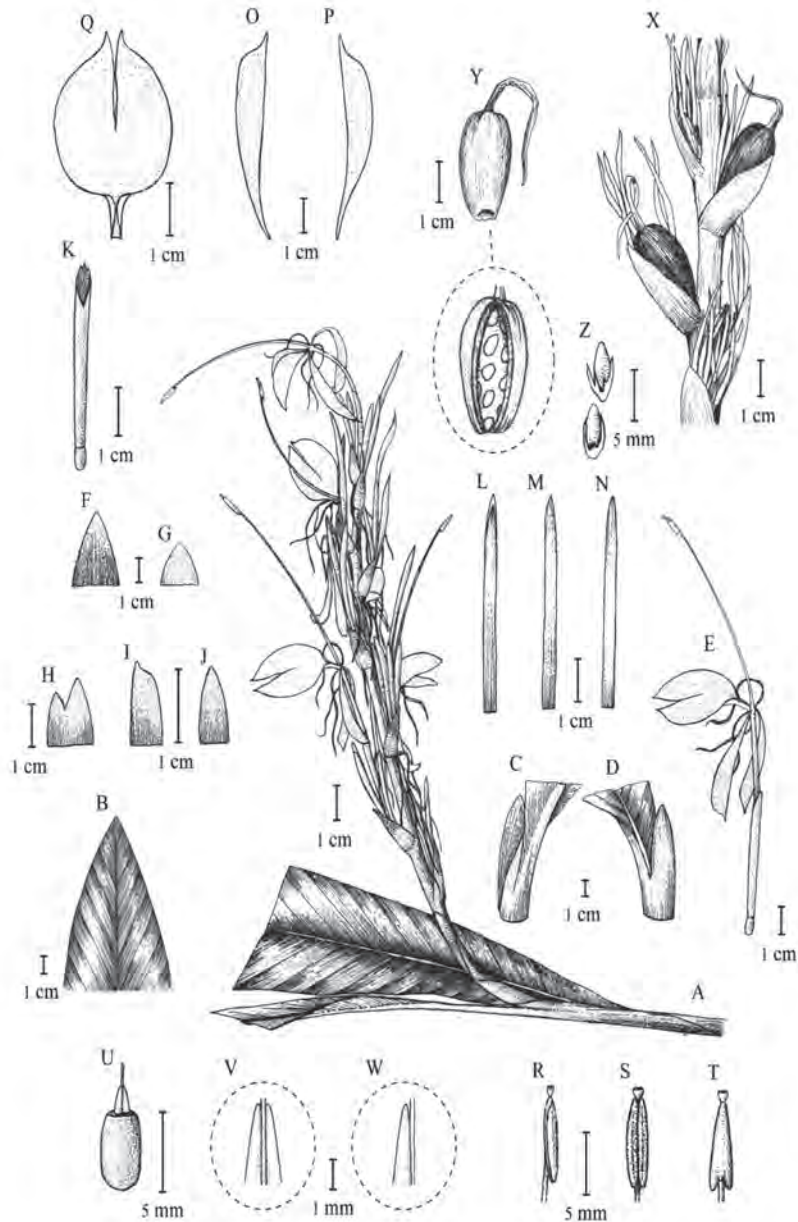
*Inflorescence* a terminal spike, cylindrical, erect, *ca.* 14.5 cm long, hairy; peduncle *ca.* 5.3 cm long, hairy; bracts imbricate, overlapping, broadly ovate, 5.5-5.6 by 3.7-4.1 cm, apex obtuse-acute, green with brownish, lower half sparsely hairy, each subtending a cincinnus of 1 flower; bracteoles tubular, 5.2-5.4 by 2.1-2.3 cm, apex acute, split on one side to a depth of 1.3-1.5 cm, hairy, greenish. *Flowers* white; calyx tube slender 4.4-4.6 cm long, apex acute or 2-dented, hairy; corolla tube 9.4-10.5 cm by 3-4 mm, 3-lobed, lobe linear, 4.4-5.4 cm by 4-5 mm, apex hooded, lower half hairy; lateral staminodes narrowly lanceolate-oblong, 3.8-4.5 cm by 5-6 mm. apex emarginate; labellum shorter than staminodes, obovate, 3.2-3.4 by 1.9-2.2 cm, base attenuate into a 0.8-1.2 cm by *ca.* 3 mm claw, apex bilobed; filament 4.6-5.5 cm long, anthers dorsifixed, 0.9-1 cm long, base divaricate, yellowish; ovary *ca.* 1.3 cm by 7-8 mm, brownish, hairy; epigynous glands 2, *ca.* 3 mm long, yellowish; stigma densely ciliate, greenish. *Fruits* broadly ellipsoid to broadly ovoid, (3.1-) 3.3-4.4 by (1.9-)2.2-2.8 cm, trilobed, hairy, greenish, crowned with persistent calyx. *Seeds* numerous, oblong *ca.* 5 by 2-3 mm, reddish aril.

Thailand.—NORTHERN: Tak [Mae Sot]; PENINSULAR: Ranong [Khlung Naka Wildlife Sanctuary, Mueng Chone].

Distribution.—Peninsular Malaysia, Indonesia (Sumatra).

Ecology.—Tropical evergreen rain forest, at the altitude of *ca.* 900 m.





**Figure 8** *Hedychium roxburghii* Blume

A. a flowering top with a leaf and an inflorescence. B. leaf apex. C. & D. ligule (side and rear views). E. flower. F. bract. G. first bracteole. H. second bracteole. I. third bracteole. J. fourth bracteole. K. calyx tube and ovary. L. dorsal corolla lobe. M. & N. lateral corolla lobes. O. & P. staminodes. Q. labellum. R., S. & T. anther and stigma (side, front and rear views). U. ovary and epigynous glands. V. & W. epigynous glands (rear and side views). X. infructescence. Y. fruit. Z. seeds. Drawn by Chalermchoke Boonchit.

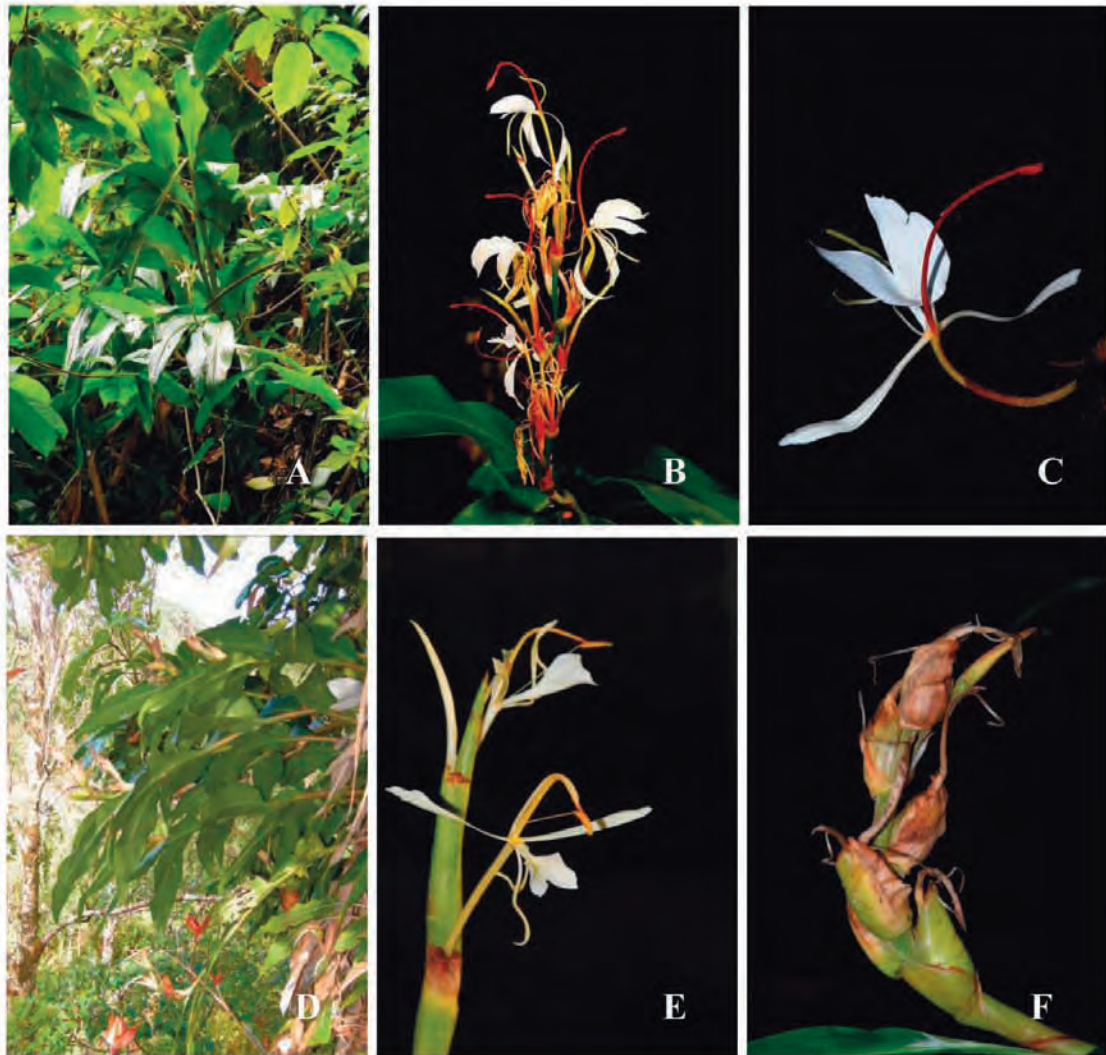


FIGURE 9

A, B. & C. *H. ROXBURGHII* BLUME (A. PLANT HABIT. B. INFLORESCENCE. C. CLOSE-UP FLOWER). D, E. & F. *H. SIAMENSE* PICHEANS. & WONGSUWAN (A. PLANT HABIT. B. INFLORESCENCE. C. INFRUCTESCENCE). PHOTOGRAPHED BY PORNPIMON WONGSUWAN (A - C AND E - F) AND SUPACHAI KOONTERM (D).



Phenology.—Flowering in November, fruiting from November-December.

Vernacular name.—

Note.—This species can be easily recognized by its cylindrical, imbricate bract, strictly 1-flowered bract and hairy ovary.

**17. *Hedychium speciosum*** Wall. in Roxb., Fl. Ind. 1 : 13. 1820 [Type : India : Silhet, Gomez; in Wallich Cat. no. 6550 (lectotype K)]; in Pl. As. Rar. 3 : 51. t. 285. 1832; Baker in Hook.f., Fl. Br. Ind. 6: 231. 1894; K. Schum. in Engl., Pflanzenr. 4(46) : 54. 1904.—*H. gardnerianum* Wall. in Kew J. Bot. 5: 369. 1853.—*H. gardnerianum* var. *bitoran* Monogr. 25. 1862.—*Gamochilus speciosus* (Wall.) Lestib. in Ann. Sc. Nat. 2. ser. 15: 341. 1841.—*Gandasulium speciosus* (Wall.) Kuntze, Revis. Gen. Pl. 2 : 690. 1891.

Terrestrial, perennial herb. *Pseudostems* 1.1-1.5 m high, bladeless sheaths 2-3. *Ligule* oblong, 2.4-2.8 by 1.9-2.3 cm, apex obtuse-acute, membranous, hairy, reddish. *Leaves* sessile or petiolate 1.5-2 cm; blade lanceolate-oblong, 35.7-41.9 by 10.9-11.4 cm, base cuneate, apex acuminate, margin slightly undulate, upper surface glabrous, lower surface hairy along midrib. *Inflorescence* a terminal spike, erect, 6.6-9.8 cm long; peduncle 3.4-3.7 cm long, glabrous; bracts dented, folded, oblong, 2.5-2.8 by 0.8-1 cm, apex acute, pubescent, greenish, each subtending a cincinnus of 1-2 flowers; bracteole oblong, 1.2-1.5 cm by ca. 8 mm, apex acute, membranous, pubescent, second bracteole oblong, 1-1.2 cm by ca. 4 mm, apex acute, membranous, pubescent. *Flowers* white; calyx tubular, 3.1-3.2 cm by 3-4 mm, apex acute to 2-3-dented, pubescent; corolla tube slender, ca. 4.4 cm by 3 mm, 3-lobed, lobes linear 4.4-4.7 cm by 2-3 mm, apex hooded, yellowish; lateral staminodes oblanceolate, 3.6-3.7 cm by ca. 5 mm; labellum elliptic, 3.7-3.9 by 1.1-1.3 cm, base attenuate into a 7-1 cm by ca. 2 mm claw, apex bifid ca. 9 mm; filament 6-6.3 cm long, yellowish; anther dorsifixed, 1.4-1.6 cm by 3-4 mm, base divaricate, yellow; ovary 3-4 by ca. 2 mm, 3-loculed, placentation axile, hairy; epigynous glands 2, slender, ca. 2 by 1-2 mm yellowish; stigma densely ciliate, green. *Fruits* subglobose, 1.1-1.3 by ca. 1.2 cm, glabrous, green. *Seeds* numerous, ellipsoid, 3-4 by ca. 2 mm, aril reddish.

Thailand.—NORTHERN: Chiang Mai [Doi Suthep-Pui National Park, Pang Ku]; Nan [Doi Phu Kha National Park, Phu Wae].

Distribution.—India (Silhet).

Ecology.—Lower montane scrub, at the altitude of 1,000-1,750 m.

Phenology.—Flowering from July-August, fruiting from August-September.

Vernacular name.—



Note.—*H. speciosum* can be easily recognized by its 1-2-flowered bracts, hairy calyx tubes, elliptic labellum with emarginate-bifid apex, filament twice as long as the labellum and hairy ovary.

**18. *Hedychium spicatum*** Sm. in A. Ress Cycl. 17: 8. 1811 [Type: Nepal; *Wallich* s.n.]; Monandr. Pl. t. 48. 1828; Wall. in Kew J. Bot. 5: 328. 1853; Horan., Monogr.: 24. 1862; Baker. in Hook.f., Fl. Br. Ind. 6: 227. 1892; K. Schum. in Engl., Pflanzenr. 4(46): 50. 1904; T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, Fl. China 24 : 54. 2000.—*H. roxburghii* Sieb. ex Lindl. in J. Hort. Soc. 7: 281. 1852;—*H. sieboldii* Wall. in Kew J. Bot. 5: 371. 1853;—*H. album* Buch.-Ham. ex Wall. in Kew J. Bot. 5: 328. 1853;—*H. flavescens* Lodd. ex Lindl., J. Hort. Soc. London, 7 : 281. 1852;—*H. tavoyanum* Horan., Prodr. Monogr. Scitam.: 26. 1862.—*Gandasulium sieboldii* (Wall.) Kuntze, Revis. Gen. Pl. 2: 690. 1891;—*G. simile* (Blume) Kuntze, Revis. Gen. Pl. 2: 690. 1891.

#### KEY TO THE VARIETIES

- |   |                        |
|---|------------------------|
| 1. Inflorescences densely many-flowered | var. <b>spicatum</b>   |
| 1. Inflorescences laxly few-flowered    | var. <b>acuminatum</b> |

#### var. **spicatum**

Terrestrial, perennial herb. *Pseudostems* 48.6-166.3 cm high, bladeless sheaths 2-4. *Ligule* oblong, 1.0-2.2 by 2.2-2.8 cm, membranous, pubescent to sparsely pubescent, apex emarginate or acute. *Leaves* elliptic-oblong, 28.1-46.4 by 9.4-12.2 cm, base cuneate, apex acute-acuminate, margin slightly undulate, upper surface glabrous, lower surface glabrous or sparsely hairy. *Inflorescence* a terminal spike, erect, 23.1-34.2 cm long; peduncle 6.6-12.2 cm long, glabrous; bracts lax, folded, greenish, lanceolate-oblong, 2.4-4.6 by 1.0-1.9 cm, apex acute, glabrous or sparsely hairy, each subtending a cincinnus of 1 flower; bracteole tubular, (1.3-)2.1-2.9 cm by 4-6 mm, apex acute, membranous, glabrous or sparsely hairy. *Flowers* white to pale yellow, fragrant; calyx tubular, (2.8-)3.1-4.9 cm by 4-5 mm, apex acute to 3-lobed, glabrous or sparsely hairy; corolla tube slender, 5.2-7.3 (-8.1) cm by 2-3 mm, 3-lobed, lobes linear, 3.5-4.8 cm by 3-6 mm apex hooded, yellowish; lateral staminodes oblanceolate-oblong, (4.6-)5.4-5.9 cm by 3-6(-7) mm, base attenuate into a 0.9-1.2 cm by 2-3 mm claw; labellum obovate, 5-5.3(-6) by (1.9-)3-3.1 cm, base attenuate into a 0.9-2 cm by 3-4 mm claw, apex bilobed, each lobe elliptic, white with pale salmon red patch at base; filament 1.9-2.4 cm long, salmon red; anther dorsifixed, 1.2-1.8 cm by 3-4 mm base divaricate, salmon red; ovary 4-5 by 3-5 mm, 3-loculed, placentation axile, hairy; epigynous glands 2, slender, ca. 2 by 1 mm, yellowish; stigma densely ciliate, green. *Fruits* ellipsoid-oblong, 1.8-2.9 by 1.3-1.9 cm, hairy, greenish. *Seeds* numerous, ellipsoid-orbicular, 4-5 by ca. 3 mm, reddish orange.



Thailand.-NORTHERN: Mae Hong Son [Pai, Doi Kiew Lom; Pai, Doi Phak Kood]; Chiang Mai [Doi Chiang Dao Wildlife Sanctuary]; Chiang Rai [Doi Hua Chang].

Distribution.-Nepal, Bhutan, India (Sikkim; Nagaland, Zunheboto, Naltoqa), China (Guizhou, Sichuan, Xizang, Yunnan) and Myanmar.

Ecology.-Upper montane scrub or lower montane scrub at the altitude of 900-2,084 m.

Phenology.-Flowering from July-August, fruiting from September-November.

Note.-*H. spicatum* possesses distinctive filaments shorter than the labella, white flower with pale salmon red patch at base, obovate labellum with deeply divided apex.

var. **acuminatum** (Roscoe) Wall. in Hooker's J. Bot. Kew Gard. Misc. 5: 328. 1853; T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, Fl. China 24 : 54. 2000.-*H. acuminatum* Roscoe, Monandr. Pl. Scitam. t. 47. 1824 [Type : Kumnon to Sikkim, alt. ca. 2300 m];-*H. spicatum* var. *khasianum* C.B. Clarke ex Baker. in Hook.f., Fl. Br. Ind. 6: 227. 1894 [Type: India: Khasia Hills; Clarke s.n.];-*H. spicatum* var. *trilobum* (Wall. ex Roscoe) Wall. in Hooker's J. Bot. Kew Gard. Misc. 5: 328. 1853;-*H. trilobum* Wall. ex Roscoe, Monandr. Pl. Scitam. t. 48. 1826 [Type: Nepal; Wallich s.n.].

Epiphytic, perennial herb. *Pseudostems* 63.4-86.6 cm high, bladeless sheaths 2-4. *Ligule* oblong, 1.8-2.1 by 1.2-1.6 cm, apex acute, membranous, pubescent, reddish. *Leaves* sessile or petiolate, 0.9-1.3 cm long; blade elliptic, 33.1-34.3 by 8.3-8.6 cm, base oblique-cuneate, apex acuminate, margin slightly undulate, both surfaces glabrous. *Inflorescence* a terminal spike, erect, 11.6-18.2 cm long; peduncle 5.4-10.6 cm long, glabrous; bracts lax, few-flowered, folded, oblong, 1.7-4.2 by 1.1-1.7 cm, apex acute, glabrous, greenish, each subtending a cincinnus of 1 flower; bracteole oblong, 1.3-2.9 cm by 4-6 cm, apex acute, membranous. *Flowers* white to pale yellow, fragrant; calyx tubular, 3.1-5.8 cm by 4-5 mm, apex acute to 3-lobed, glabrous; corolla tube slender, 5.2-8.6 cm by 2-3 mm, 3-lobed, lobes linear 4-5.6 cm by 4-5 mm, apex hooded, yellowish; lateral staminodes oblanceolate-linear, 3.8-4.8 cm by 4-5 mm, base attenuate into a 1.6-1.9 cm by 2-3 mm claw; labellum obovate-elliptic, 2.9-3.5 by 1.5-1.5 cm, base attenuate into a 1.1-1.3 cm by 3-4 mm claw, apex deeply divided, 6-7 mm, white with pale salmon red patch at base; filament 3.3-4.1 cm long, salmon red; anther dorsifixed, 1.5-1.6 cm by 3-4 mm, base divaricate, salmon red; ovary 2-4 by 2-3 mm, 3-loculed, placentation axile, glabrous; epigynous glands 2, slender, 2-3 by ca. 0.5 mm yellowish; stigma densely ciliate, green. *Fruits* suborbicular, 1.2-1.6 by 1.2-1.5 cm, glabrous, greenish. *Seeds* numerous, ellipsoid-orbicular, 4-5 by ca. 3 mm, reddish-orange.



Thailand.—NORTHERN: Mae Hong Son [Pai, Doi Kiew Lom]; Chiang Mai [Doi Suthep-Pui National Park]; Nan [Doi Phu Kha National Park, Doi Phu Wae].

Distribution.—Nepal, Bhutan, India (Sikkim), China (Xizang, Yunnan).

Ecology.—Lower montane scrub, at the altitude of 900-1,000 m.

Phenology.—Flowering from August-September.

Note.—This species is similar to *H. spicatum* var. *spicatum* but differs in its lax and few-flowered inflorescens, and its epiphytic habit.

**19. *Hedychium stenopetalum*** Lodd., Bot. Cab. 20: t. 1902. 1833; Baker in Hook.f., Fl. Br. Ind. 6: 231. 1894; K. Schum. in Engl., Pflanzenr. 4(46): 58. 1904.—*H. barbatum* Wall. in Kew J. Bot. 5: 373. 1853.—*H. elatum* Horan. Monogr. 25. 1862.—*H. coccineum* Wall. in Kew J., l.c.—*H. elatum* R. Br. var. *oryale* Horan., Monogr 25. 1862.

Terrestrial, perennial herb. *Pseudostems* 0.7-2.5 m high, leaf sheaths greenish, bladeless sheaths 2-4. *Ligule* oblong, 4.3-5.9 by 5-5.8 cm, apex rounded—emarginate, membranous, hairy, greenish or reddish. *Leaves* petiolate, blade lanceolate-oblong, 36.2-48.3 by 24.1-32.4 cm, base cuneate, apex acuminate to caudate, margin entire to slightly undulate, upper surface glabrous, lower surface hairy. *Inflorescence* a terminal spike, erect, 36.7-52.3 cm long, hairy; peduncle 12.5-21.1 cm long, hairy; bracts lax, folded, green, lanceolate to obovate, 6-6.9 by 2.3-3 cm, hairy, each subtending a cincinnus of (2-3)-7-11 flowers, apex acute; first bracteole, triangular, 4.9-5.3 by 1.7-2.2 cm, apex acute, membranous, pubescent; second bracteole triangular, 3.5-3.8 by 1.3-1.5 cm, apex acute, membranous, pubescent; third bracteole triangular, 2.7-2.9 by 1.5-1.7 cm, apex acute, membranous, pubescent; fourth bracteole triangular, 2.7-2.8 by 1.4-1.6 cm, apex acute, membranous pubescent; fifth bracteole triangular, 2.2-2.8 by 1.3-1.4 cm, apex acute, membranous pubescent; sixth bracteole triangular, 2.2-2.7 cm by 8-9 mm, apex acute, membranous pubescent; seventh bracteole triangular, 1.9-2.5 cm by 7-9 mm, apex acute, membranous pubescent. *Flowers* white; calyx tubular, 6-6.2 cm by 3-4 mm, pubescent, apex 3-dent; corolla tube slender, 6.2-6.4 cm by ca. 3 mm, 3-lobed, lobes linear, apex hooded, thorn-like, white, 5.4-5.6 cm by 4-5 mm; lateral staminodes oblanceolate-oblong, 3.2-4.2 by 0.5-1 cm; labellum sub-orbicular to orbicular, 3-4.2 by 2.5-3.4 cm, base attenuate into a 0.7-1.4 cm by 4-6 mm claw, white with pale greenish patch at base, apex 2-cleft, 1.3-1.5 cm; filament 4.9-7.4 cm long, yellowish; anther dorsifixed, 1.2-1.5 cm by 2-3 mm base divaricate, yellowish; ovary pubescent, 4-5 by 6-8 mm, 3-loculed, placentation axile, epigynous glands 2, slender, 5-6 by ca. 1 mm, yellowish; stigma densely ciliate, green. *Fruits* ovoid to oblong, 3.2-3.9 by 1.4-1.8 cm, green, hairy. *Seeds* numerous, ellipsoid to sub-globose, 5-6 by 4-5 mm, reddish orange.



Thailand.—NORTHERN: Mae Hong Son [Pang Mapha; Pai, Doi Kiew Lom]; Chiang Mai [Doi Suthep-Pui National Park; Doi Angkhang; Doi Chiang Dao Wildlife Sanctuary; Doi Inthanon National Park].

Distribution.—Nepal, Bhutan, India (Assam), China (Yunnan), Myanmar, Vietnam.

Ecology.—Lower montane scrub or lower montane pine-oak forest, at the altitude of 1,000-1,500 m.

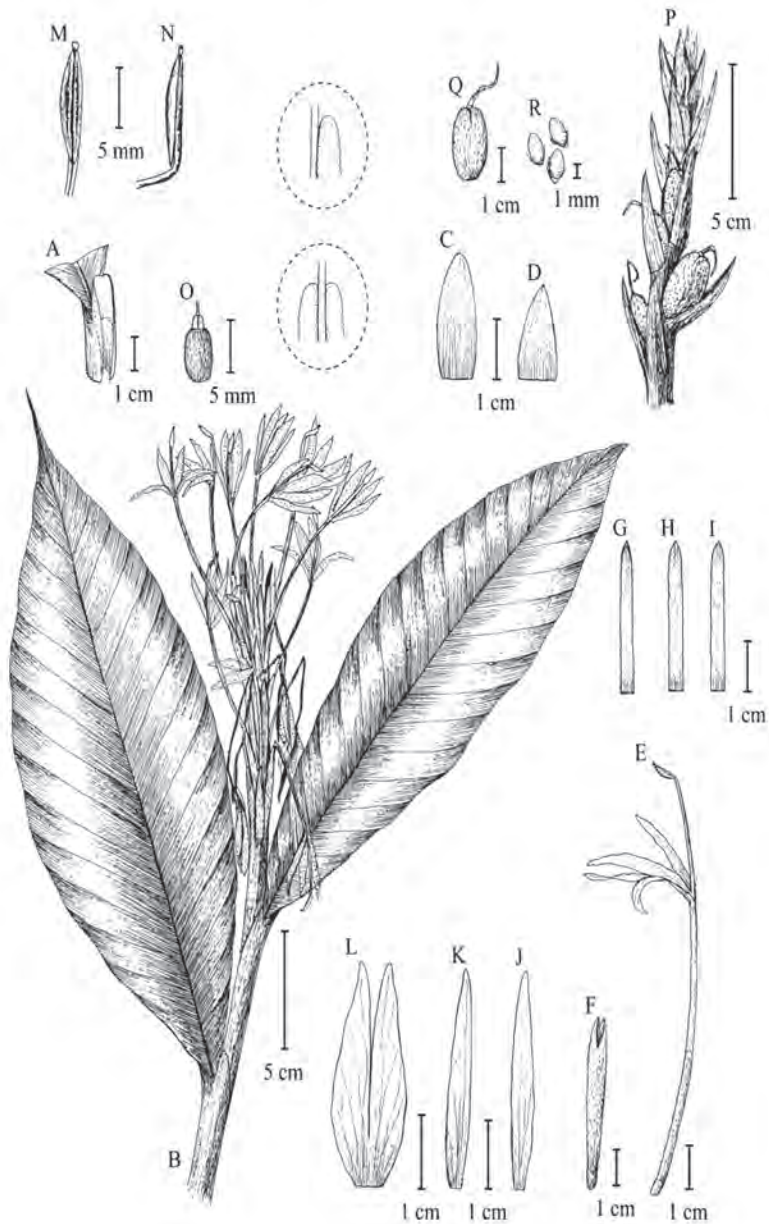
Phenology.—Flowering from August-September, fruiting from September-November.

Vernacular name.—Kaw Ya-ea (คอย่าอี), (Mae Hong Son).

Note.—This taxon is one of the *Hedychium* species which can grow well up to 1.5-2.5 m high. The inflorescence is exceptionally long (up to 52.3 cm) with a hairy rachis and 7-11 white flowers per bract. Young inflorescence is edible.

**20. *Hedychium tomentosum*** Sirirugsa & K. Larsen, Nord. J. Bot. 15: 303, Fig. 1 E-I. 1995 [Type: Thailand: Chiang Mai, Doi Chiang Dao; *Beusekom & Phengkklai* 1348 (holotype C)]. Figures 10 and 11.

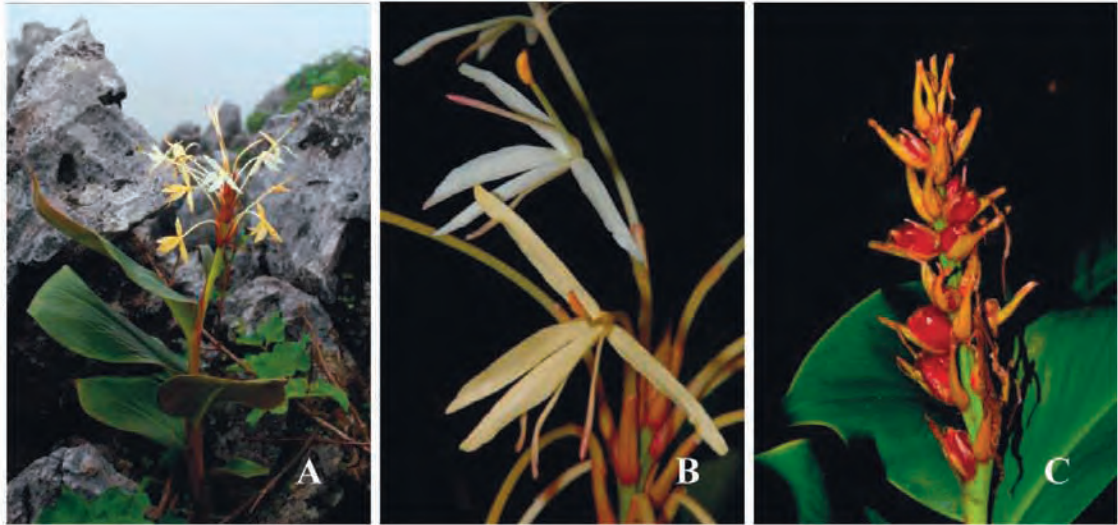
Epilithic, perennial herb. *Pseudostems* 15.0-58.4 cm high, leaf sheaths red, bladeless sheaths 2-3, tomentose. *Ligule* oblong, 1.4-2.2 by 1.2-3.1 cm, apex rounded, membranous, tomentose, reddish. *Leaves* sessile, blade elliptic-broadly elliptic, 18.9-32.8 by 9.2-15.1 cm, base cuneate-obtuse, apex acute-acuminate, margin entire-slightly undulate, upper surface glabrous, lower surface tomentose. Inflorescence a terminal spike, erect, 9.4-16.2 cm long, glabrous-pubescent; peduncle 5.2-6.8 cm long, glabrous-pubescent; bracts dense, folded, reddish or greenish, lanceolate-oblong, 2.3-2.9 cm by *ca.* 8 mm, apex acute-rounded, tomentose, each subtending a cincinnus of 1 flower; bracteole lanceolate-oblong, 1.3-1.7 cm by 7-9 mm, apex acute, tomentose, greenish or reddish. *Flowers* white to pale yellow, fragrant; calyx tubular, 3.2-3.7 cm by 3-4 mm, apex 2-3-dented, tomentose; corolla tube slender, 7.2-7.9 cm by 2-3 mm, 3-lobed, lobes linear, 3-3.2 cm by 4-5 mm, apex hooded, white-yellowish, sometime reddish; lateral staminodes lanceolate-oblong, 2.8-3.3 cm by 4-5 mm; labellum elliptic-lanceolate, 2.9-3.1 by 1.1-1.3 cm, apex deeply divided, margin entire to slightly undulate, white-yellowish; filament 3-3.2 cm long, white-pale yellow; anther dorsifixed, 7-8 by 3-4 mm, base divaricate, yellowish; ovary 4-5 by 2-3 mm, 3-loculed, placentation axile, tomentose; epigynous glands 2, *ca.* 3 mm long, yellowish; stigma *ca.* 1 by 1 mm, densely ciliate, green. *Fruits* ovoid-oblong, 2.1-2.5 by 1.5-1.8 cm, hairy, scarlet. Seeds numerous, ellipsoid, 3-4 by *ca.* 2 mm, aril white.



**Figure 10** *Hedychium tomentosum* Sirirugsa & K. Larsen

A. part of a leaf with a ligule. B. leaves and an inflorescence. C. bract. D. bracteoles. E. a flower with calyx and ovary. F. calyx tube and ovary. G. dorsal corolla lobe. H. & I. lateral corolla lobe, J. & K. staminodes. L. labellum. M. & N. anther and stigma (front and side views). O. ovary, epigynous glands and part of a style. P. infructescence. Q. fruit. R. seeds. Drawn by Chalermchoke Boonchit.





**Figure 11** *Hedychium tomentosum* Sirirugsa & K. Larsen

A. a flowering top with a leaf and an inflorescence. B. Close-up flowers. C. Infructescence. Photographed by Pornpimon Wongsuwan.

Thailand.-NORTHERN: Chiang Mai [Doi Chiang Dao Wildlife Sanctuary].

Distribution.-Endemic to Thailand.

Ecology.-Lower montane oak forest or upper montane scrub at the altitude of 1,500-2,084 m.

Phenology.-Flowering from June-July, fruiting from July-August.

Vernacular name.-Ta Hoen Chiang Dao (ตาเหินเขียงดาว).

Note.- This species can be easily recognized by its tomentose lower leaf surface, elliptic-lanceolate labella with deeply divided apices, entire to slightly undulate margin and white-yellowish flowers.

**21. *Hedychium villosum*** Wall. in Roxb., Fl. Ind. 1: 12. 1820; Monandr. Pl. 6: 54. 1828; Wall. in Kew J. Bot. 5 : 329. 1853; Horan., Monogr.: 25. 1862; Baker in Hook.f., Fl. Br. Ind. 6: 228. 1894; K. Schum. in Engl., Pflanzenz. 4(46): 51. 1904; Gagnep. in Lecomte, Fl. Gén. I.-C. 6: 74. 1908; T.L. Wu & K. Larsen in Z.L. Wu & P.H. Raven, Fl. China 24: 375. 2000.

Terrestrial, epilithic or epiphytic, perennial herb. *Pseudostems* 24.1-143 cm high, leaf sheaths red, bladeless sheaths 3-5. *Ligule* oblong, 3.3-8.3 by 1.1-1.8 cm, apex acute, membranous, villous to pubescent, reddish. *Leaves* sessile or shortly petiolate, 4-7 mm long; blade lanceolate-oblong, 13.8-37.5 by 4.2-8.8 cm, base cuneate-oblique, apex acute, margin entire to slightly



undulate, upper surface glabrous, lower surface pubescent along midrib. *Inflorescence* a terminal spike, erect, 8.3-28.3 cm long; peduncle 1.8-2.6 cm long, hairy; bracts lax, folded, elliptic, 4.6-6.4 by 1.5-1.9 cm, apex acute, pubescent, reddish, each subtending a cincinnus of 1-3 flowers; first bracteole ovate-broadly ovate, 2.6-4.8 by 1.6-1.8 cm, apex acute, greenish or reddish; second bracteole ovate, 2.8-2.9 by 1-1.5 cm, apex acute; tertiary bracteole ovate, 2-2.6 cm by 8-9 mm, membranous. *Flowers* white to pale yellow, fragrant; calyx tubular, 4-4.4 cm by 3-4 mm, apex acute; corolla tube slender, 5.2-8.4 cm by 2-3 mm, 3-lobed, lobes linear, 3-4.1 cm by 2-3 mm, apex hooded, yellowish; lateral staminodes narrowly lanceolate-oblong, 3.3-3.5 cm by 6-8 mm, base attenuate into a 5-7 by 2-3 mm claw; labellum suborbicular to orbicular, 2.2-2.8 by 2.3-2.9 cm, base attenuate into a 5-9 by ca. 4 mm claw, apex 2-cleft, 4-7 mm, white with pale greenish patch at base; filament 3.9-5 cm long, salmon red; anther dorsifixed, 5-6 by 3-4 mm base divaricate, yellowish; ovary 3-4 by ca. 3 mm, 3-loculed, placentation axile, pubescent; epigynous glands 2, slender, ca. 3 by 0.5 mm yellowish; stigma densely ciliate, green. *Fruits* ovoid-oblong, 1.3-1.6 by 1.3-1.4 cm, pubescent, greenish. *Seeds* numerous, ellipsoid-orbicular, 0.4-1 cm by 4-5 mm, aril reddish orange.

Thailand.—NORTHERN: Chiang Rai [Doi Khun Nam Nang Non]; Chiang Mai [Doi Inthanon National Park; Doi Chiang Dao Wildlife Sanctuary, Doi Sam Phi Nong; Doi Suthep-Pui National Park]; Nan [Doi Phu Kha National Park, Phu Wae]; Pitsanulok [Phu Soi Dao National Park; Phu Hin Rongkla National Park]; NORTH-EASTERN: Loei [Phu Kradueng National Park Tham Tai waterfall; Phu Luang National Park; Phu Ruea National Park].

Distribution.—India, China (Guangdong, Guangxi, Hainan, Yunnan), Myanmar, Vietnam.

Ecology.—In lower montane rain forest or lower montane scrub on sand stone, at the altitude of 1,000-1,500 m.

Phenology.—Flowering from November-February.

Note.—*H. villosum* is related to *H. collinum* in its small anther (3-5 mm long) but differs in its villous ligules, bracts and bracteoles.

### Acknowledgement

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## References

- Sirirugsa P. and K. Larsen. 1995. The genus *Hedychium* (Zingiberaceae) in Thailand. Nord. J. Bot. 15(3): 301-304.
- Picheansoonthon C. and P. Mookkamul. 2005. Two new species of *Hedychium* Koenig (Zingiberaceae) from Thailand. Folia malaysiana 6 (1&2): 17-26.
- Larsen K. and S.S. Larsen. 2006. Gingers of Thailand. Chiang Mai: Queen Sirikit Botanic Garden. Chiang Mai. pp. 68-74, 165.
- Picheansoonthon C. and P. Wongsuwan. 2008. Note on the genus *Hedychium* J. König (Zingiberaceae) in Thailand. J. Roy. Inst. Thail. 43 (3): 237-252.
- Picheansoonthon C. and P. Wongsuwan. 2009. Two new species of *Hedychium* (Zingiberaceae) from Thailand. J. Jpn. Bot. 84: 330-337.
- Picheansoonthon C and P. Wongsuwan. 2011. A new species and a new record of *Hedychium* J. König (Zingiberaceae) from Thailand. Taiwaniana 56(3): 231-239.
- Wongsuwan P. 2010. Taxonomy and molecular study of genus *Hedychium* (family Zingiberaceae) in Thailand. M.S. thesis, The Graduate School, Khon Kaen University. Khon Kaen. pp.175.
- Wongsuwan P. and C. Picheansoonthon C. 2011. Taxonomic Revision of the Genus *Hedychium* J. König (Zingiberaceae) in Thailand (Part 1). Journal of the Royal Institute (English Edition) (in press)