



## Lectotypification and new data on distribution of *Glyptopetalum sclerocarpum* (Celastraceae)

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### Abstract

Taxonomy and geographical distribution of *Glyptopetalum sclerocarpum* are revised. Type material of this species is analyzed and lectotypification is provided; the specimen from CAL (CAL0000007365) is designated as a lectotype. Distribution area of *G. sclerocarpum* is circumscribed and a number of inconsistencies found in earlier works are resolved. Occurrence of *G. sclerocarpum* in Myanmar, Thailand, Laos, Cambodia, Vietnam and southern China is confirmed. The presence of this species in Guangxi of China is reported for the first time; its presence and distribution in Vietnam are substantiated by herbarium collections. Map of distribution of *G. sclerocarpum* and *G. vidalii*, a poorly known and morphologically similar species, is provided.

**Keywords:** Celastraceae, China, *Glyptopetalum sclerocarpum*, Indochina, lectotypification, Myanmar, plant diversity, plant taxonomy

### Introduction

*Glyptopetalum sclerocarpum* (Kurz 1872: 299) M.A. Lawson (1875: 613) is a species of Celastraceae described more than 100 years ago and now known to possess rather broad distribution range across the Mainland Southeast Asia. However, the information on the occurrence of this species in particular regions and even countries is still scarce and controversial. For instance, this species is listed in the Flora of Vietnam (Ho 2003) but not included into a checklist of this country by Ban (2003). As indicated in the treatment for “Flora of China” (Ma *et al.* 2008), *G. sclerocarpum* is only found in India outside the territory of the Flora; nevertheless, the presence of this species in India has not been confirmed by any other source. Myanmar, the type locality of this species, is not included. At the same time, a lot of recent collections of *G. sclerocarpum* provide detailed information on its distribution.

Circumscription of the distribution range of *G. sclerocarpum* is further complicated by the recent description of a morphologically similar species, *G. vidalii* Savinov (2014: 187). These two species are known to possess overlapping distribution ranges. In order to improve understanding of delimitation of these two species, we included both of them into the distribution analysis. It should be noted that more morphological data including the information on flower structure of *G. vidalii* are required for the final resolution of this question.

Here we provide the first revision of distribution area of *G. sclerocarpum* substantiated by the study of available collections. In addition, lectotypification is required for this species, as far as the holotype of *G. sclerocarpum* has not been selected yet; this is also done in the current paper.

## Material & Methods

This study is mainly based on examination of the herbarium collections kept in BKF, CAL, CMU, FU, HITBC, IBSC, K, KUN, L, LE, MBK, MO, P, PE, PEM.

The specimens were collected from Guangxi, the border region between China and Vietnam, in November 2016 by M.S. Nuraliev, N.A. Vislobokov, Pan Bo and Wen Fang, during an expedition conducted under collaboration between Guangxi Institute of Botany and Moscow State University. They are deposited at IBK and MW (Seregin 2018). The photographs of living plant were taken with a Pentax Optio W80 digital camera.

The detailed information on herbarium collections of *Glyptopetalum sclerocarpum* and *G. vidalii* examined during this study is provided in the Appendix.

## Taxonomic treatment

*Glyptopetalum sclerocarpum* (Kurz 1872: 299) M.A. Lawson (1875: 613)

**Literature:**—Prain (1891: 210), Brandis (1906: 159), Craib (1926: 280), Tardieu-Blot (1948: 785), Fan (2006: 254, fig. 67 1–2), Ho (2003: 145, fig. 4512), Kress *et al.* (2003: 191), Gardner *et al.* (2007: 128, fig. and photo 255, 2015: 323, fig. and photo 491); Ma *et al.* (2008: 464), Hou *et al.* (2010: 163, fig. 7); Savinov (2014: 187).

**Basionym:**—*Euonymus sclerocarpus* Kurz (1872: 299). Kurz (1877: 250).

**TYPE:**—BURMA [MYANMAR]. [Bago region]: Pegu, 23 February, *S. Kurz 1923* (lectotype: CAL: CAL0000007365!, designated here; isolectotypes: CAL: CAL0000007366!, CAL0000007367!, CAL0000007377!, K: K000669663!, K000669664!).

**Nomenclatural notes:**—The protologue of *Euonymus sclerocarpus* (Kurz 1872) includes a description of the species together with the type locality as “Pegu” (Myanmar). Kurz visited Burma (Myanmar) in 1867–1868 and 1870–1871 (Grout 2004). Six duplicates of the collection *Kurz 1923* matching the protologue description and collected in Pegu, Myanmar, were found at CAL (CAL0000007365, CAL0000007366, CAL0000007367, CAL0000007377) and K (K000669663, K000669664). These specimens include the name “*Glyptopetalum sclerocarpum* Kurz” written in Kurz’s handwriting, as confirmed by checking van Steenis-Kruseman & van Steenis (1950, p. CL); this name (combination) was indicated in the protologue as provisional: “*Evonymus (Glyptopetalum) sclerocarpum*” (Kurz 1872). Though labels of these specimens do not include collection date, the two duplicates kept in K contain the date of material reception by Kew staff from Kurz in Calcutta: 15 August 1872, which is after Kurz’s expeditions to Burma and before publication of the protologue (Kurz 1872). Therefore, these specimens are expected to have been used in the protologue.

We select the CAL specimen (barcode CAL0000007365; Fig. 1) as the lectotype since it is the only specimen bearing both fruit and inflorescence with flower buds. Other specimens (at CAL and K) are isolectotypes.

**Ecology and phenology:**—Evergreen, broad-leaved and mixed forests, in moist shady areas, sometimes on limestone; 100–2500 m. Flowering and fruiting all year round.

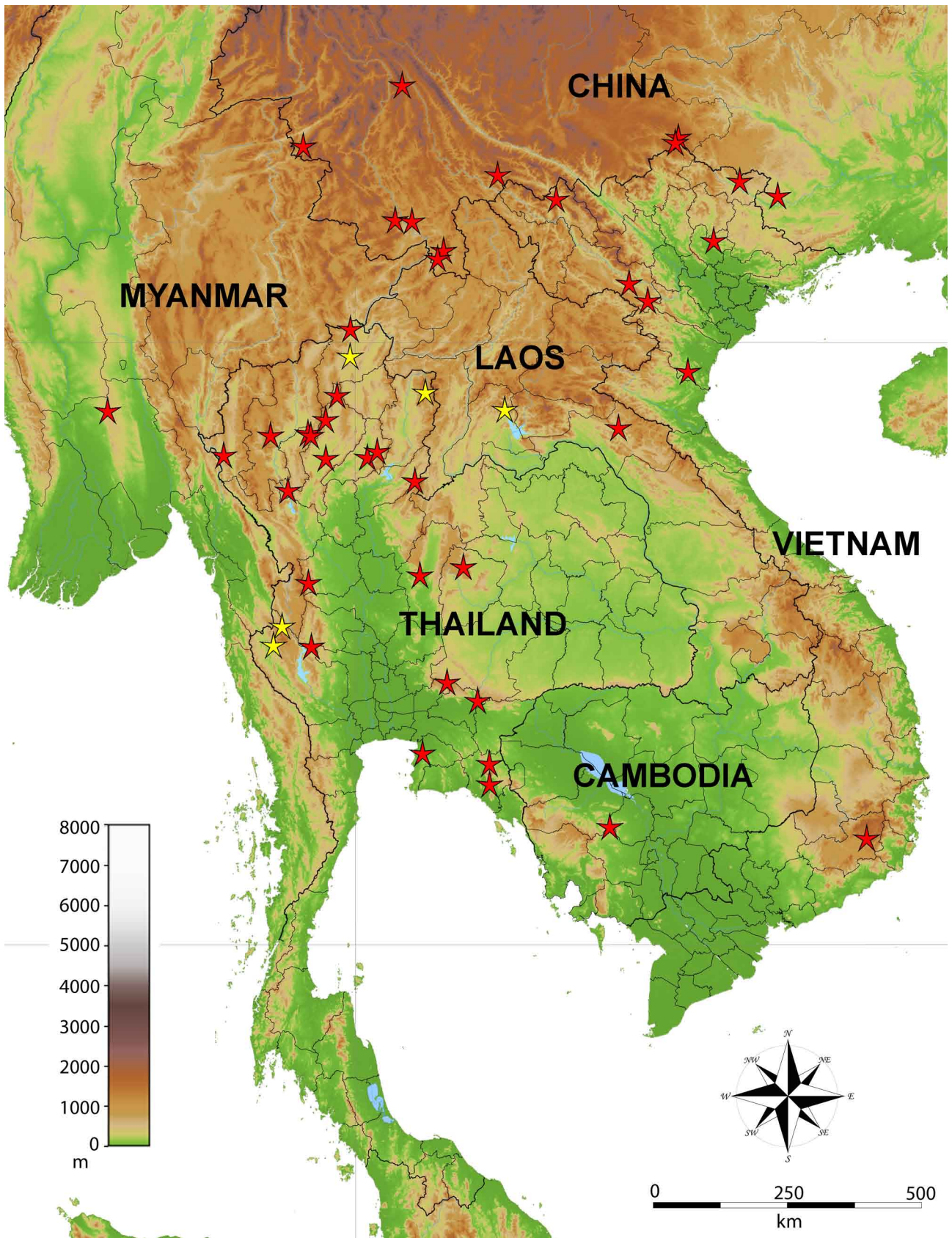
**Distribution:**—MYANMAR (Bago region), THAILAND (provinces: Mae Hong Son, Chiang Mai, Chiang Rai, Lamphun, Lampang, Phrae, Uttaradit, Kamphaeng Phet, Uthai Thani, Phetchabun, Chaiyaphum, Prachinburi, Chonburi, Chanthaburi), LAOS (Bolikhamsai province), CAMBODIA (Kampong Speu province), VIETNAM (provinces: Lai Chau, Cao Bang, Son La, Thai Nguyen, Thanh Hoa, Lam Dong), CHINA (Yunnan, Guangxi).

Distribution of *G. sclerocarpum* is presented in Fig. 2, basing exclusively on the specimens examined in our study (see Appendix). This map also includes all known specimens of *G. vidalii*, a species which is morphologically very close to *G. sclerocarpum* and not yet fully understood. The type locality of *G. vidalii* is Vang Vieng area in Laos (Vientiane province); the other specimens provisionally assigned here to this species are found in Chiang Rai, Nan and Kanchanaburi provinces of Thailand.

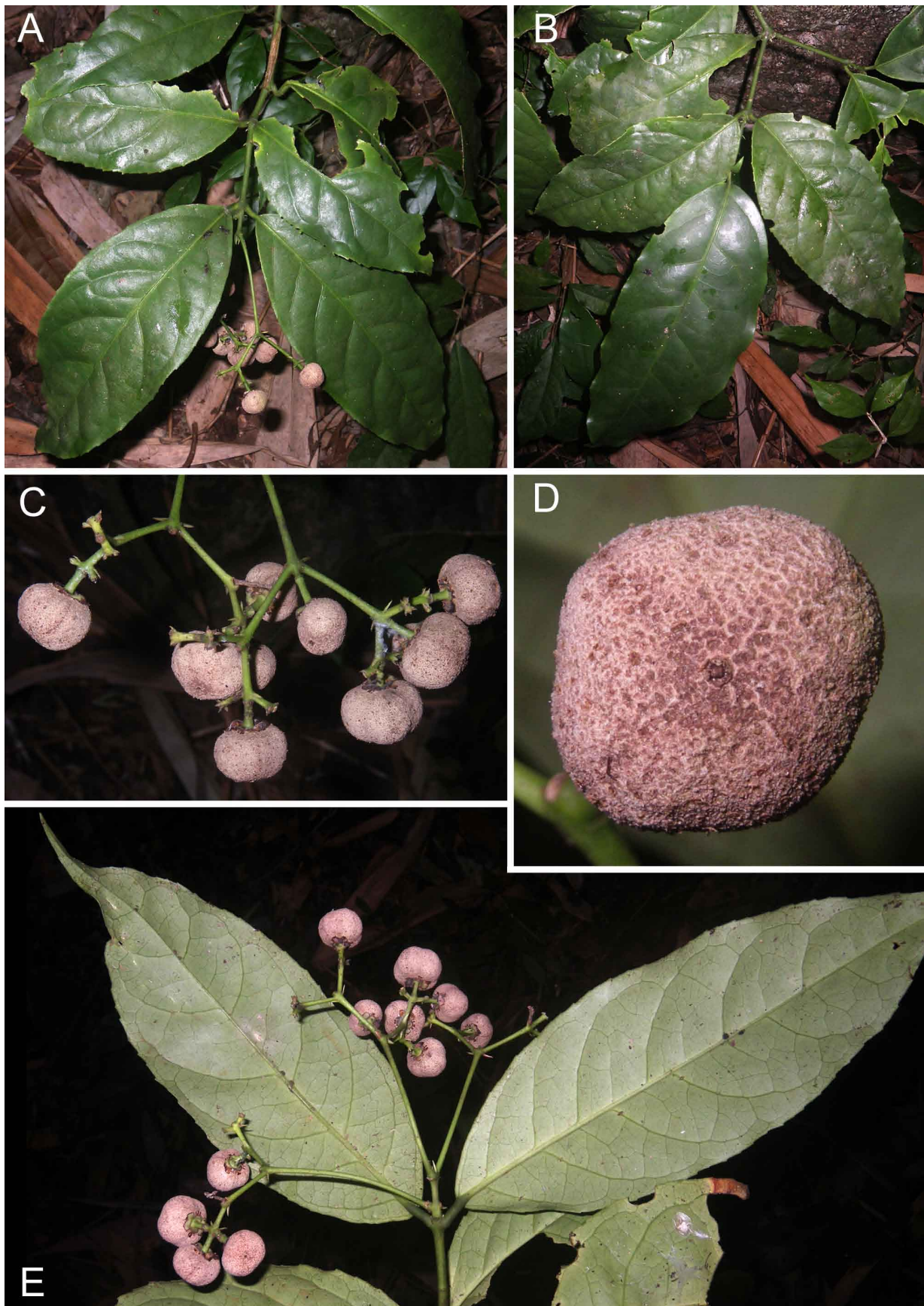
The occurrence of *G. sclerocarpum* in Laos was documented only recently; this record was published by Tagane *et al.* (2017). Only one of their specimens (*Tagane et al. L1061*, FOF) was cited, while the other one collected in the same location (*Tagane et al. L1057*, FOF) was not referred and may be identified by the authors as other species of this genus.



**FIGURE 1.** Image of the lectotype of *Glyptopetalum sclerocarpum* (CAL: CAL0000007365). Reproduced with permission of the Director, Botanical Survey of India.



**FIGURE 2.** Distribution map of *Glyptopetalum sclerocarpum* (red stars) and *Glyptopetalum vidalii* (yellow stars).



**FIGURE 3.** *Glyptopetalum sclerocarpum*, the living plant of Nuraliev *et al.* G80 collected from Guangxi. A, B. Branches. C. Fruiting inflorescences. D. Undehisced capsule, top view. E. Fruiting branch, leaves viewed from abaxial side. All photos by M. Nuraliev.

The current treatment appears to be the first work which confirms the presence of *G. sclerocarpum* in Vietnam by citing its specimens, though it was previously reported by Ho (2003) and Hou *et al.* (2010). Meanwhile, *G. sclerocarpum* is most likely widely distributed in this country, currently known in five provinces of northern Vietnam and one province of southern Vietnam.

The presence of this species in Guangxi, China (Fig. 3) is reported here for the first time. The specimens of *G. sclerocarpum* from Vietnam and Guangxi of China significantly expand its known distribution range eastward. The specimen Gardner *et al.* 149 from Lam Dong is the most eastern one, while Nuraliev *et al.* G80 from Guangxi is the most eastern within China.

A number of records at the level of provinces or regions which are found in earlier works are not confirmed in our study; they can possibly be represented by some collections overlooked here. These are Phangnga province of Thailand (Hou *et al.* 2010) and Mandalay Region of Myanmar (Kress *et al.* 2003). Gardner *et al.* (2015) included *G. sclerocarpum* into their book dedicated to the Thai section of the Malay Peninsula; this is most likely based on indication of Phangnga province mentioned above. However, we were not able to locate any specimens of this species from Peninsular Thailand. The report of *G. sclerocarpum* from Kanchanaburi province of Thailand (Hou *et al.* 2010) most likely corresponds to the specimens assigned earlier to this species but here treated as *G. vidalii* (see also Savinov 2014). Finally, we could not match any specimen of *G. sclerocarpum* with the Cocos Island mentioned by Tardieu-Blot (1948), which most likely refers to the Coco Islands belonging to Myanmar.

Though *G. sclerocarpum* is indicated to occur in India in “Flora of China” (Hou *et al.* 2010), this report is not confirmed by any other treatment, and no specimen of this species from India is available. This inconsistency may originate from the fact that the combination *Glyptopetalum sclerocarpum* was originally published in “Flora of British India” (Lawson 1875); British India included the territory of modern Myanmar, where the type of this species was collected.

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## APPENDIX

A list of herbarium collections examined.

Additional specimens of *Glyptopetalum sclerocarpum* (Kurz) M.A.Lawson:

**CAMBODIA.** Mt. Sral [Schral], 29 April 1870, *Pierre L. 6210* (L: L.2276368, P: P00276690, P00276691, P00276692, P00276693, P00276694, P00276695, P05526450, P05526451, P05526453, P05526454, P05526456, P05526457, P05526458, P05526459, P05526460, P05526461, P05526462, P05526463, P05526464, P05526465, P05526466, P05526467, P05526468, P05526469, P05526470, P05526471, P05526472, P05526473, P05526474, P05526475, P05526476, P05526477, P05526478, P05526479, P05526480, P05526481, P05526482, P05526483). **VIETNAM.** Lai Chau: Sin Ho district, Ta Phin municipality, remnants of broad-leaved evergreen closed primary forest on steep mountain slopes composed with solid crystalline highly eroded limestone, on shady cliffs, 22°27'13"N 103°16'31"E, 1100–1200 m, 17 November 2006, *Hiep N.T., Averyanov L.V., The P.V. HAL 9888* (LE: LE01042103); Cao Bang: Tra Linh district, Quoc Toan municipality, vicinities of Lung Tao village (22°45'N 106°19'E), about 12 km NNE of Cao Bang town, primary semideciduous open evergreen forest on steep slopes and bluffs of remnant limestone ridge, 600–800 m, 14 December 2006, *Averyanov L.V., Binh N.Q., Hiep N.T., Loc P.K., Tam N.X. CBL 1245* (LE: LE01041965); Son La: Yen Chau district, Muong Lum municipality, Na Lang village, broad-leaved evergreen dry forest on steep slopes and on tops of ridge composed with rocky crystalline solid marble-like highly eroded limestone, 21°01'17"N 104°30'47"E, 900–1000 m, 03 November 2006, *Hiep N.T., Averyanov L.V., The P.V. HAL 9459* (LE: LE01042102); Son La: Moc Chau district, Van Ho municipality, Hua Tat village, broad-leaved evergreen forest with *Pinus kwangtungensis* and *Podocarpus pilgeri* on tops of ridge composed with rocky crystalline solid marble-like highly eroded limestone, 20°46'16"N 104°47'44"E, 1200–1350 m, 29 October 2006, *Hiep N.T., Averyanov L.V., The P.V. HAL9368* (P: P00784815); Thai Nguyen: Dong Hy district, Tan Long municipality, Mo Ba village, slopes of logged closed evergreen broad-leaved lowland forests of limestone mountains, 21°45'24"N 105°52'34"E, 439 m, 23 August 2006, *Loc P.K., Vinh N.T., Khang N.S. HAL 9101* (LE: LE01041992, MO: MO6211978); Thanh Hoa: Ben En National

Park, primary forest, limestone, 01 December 2006, *Hoang Van Sam HVS 296* (L: L.2276428, L.2276429, L.2276430); Lam Dong: Duc Trong District, Xa Hiep An (Elephant Mountain), remnant warm temperate forest with *Taxus wallichiana* and *Cephalotaxus mannii* locally dominant, 11°51'02"N 108°26'29"E, 1300–1500 m, 07 September 2001, *Gardner M.F., Thomas P., Luu N.D.T., Chi N.V. 149* (BKF: 180132). **CHINA.** Yunnan: Lincang city, Cangyuan county, Banhong town, under-forest, 23°18'N 99°06'E, 900 m, 31 October 1989, *Tao G.-D., Li X.-W. 40039* (HITBC: HITBC025026, KUN: KUN0414053); Yunnan: Puer city, Jingdong county, Anshi dishuiyan, evergreen broad-leaved forest, 2350 m, 26 October 1993, *Peng H. 1618* (KUN: KUN0414042, KUN0414043); Yunnan: Xishuangbanna city, Jinghong county, Naban mandian, riverside, wet, 22°07'N 100°39'E, 800 m, 10 November 1988, *Tao G.-D. 44963* (HITBC: HITBC025025); Yunnan: Xishuangbanna city, Cheli county, Xiaomengyang, mt. slope, woods, 1200 m, September 1936, *Wang C.W. 75886* (IBSC: IBSC0286029, IBSC0769745, KUN: KUN0414050, PEM: PEM0006721, PEM0006724); Yunnan: Xishuangbanna city, Mengla county, Mengyuan, riverside, 21°36'N 101°23'E, 17 May 1982, *Tao G.-D. 32519* (HITBC: HITBC025027, IBSC0739774); Yunnan: Xishuangbanna city, Mengla county, Mengpengxinzhai, hillside, dense forest, dry, 21°27'N 101°19'E, 17 February 1976, *Li Y.-H. 20083* (HITBC: HITBC025023, HITBC025024, HITBC025028); Yunnan: Lüchun, Mt. Huanglianshan, Sha-du-ya-kou, 1900–2500 m, 27 October 1995, *Wu S.K., Shui Y.M., Yang Y.P., Liu L.H., He J.H., Murata J., Nagamasu H., Sugawara T., Chen X., Murakami N. 714* (KUN: KUN0414054); the same location, 28 October 1995, *Wu S.K., Shui Y.M., Yang Y.P., Liu L.H., He J.H., Murata J., Nagamasu H., Sugawara T., Chen X., Murakami N. 755* (KUN: KUN0414055); Yunnan: Malipo county, Mengtong town, Laoshan, 1300 m, 19 September 2001, *Zhao C.-J. 329* (PE: PE01680536, PE01850304); Yunnan: Foo-ning [Funing County], long-may [Longmei Village], rocky hill, 1000 m, 3 May 1940, *Wang C.W. 89161* (IBSC: IBSC0769744); Yunnan: 1957, *Qiu B.-Y. 56139* (KUN: KUN0414051); Yunnan: April 1957, *Qiu B.-Y. 57930* (KUN: KUN0414052); Yunnan: 60-13858 (KUN: KUN0414044, KUN0414045, KUN0414046, KUN0414047, KUN0414048, KUN0414049); Guangxi Zhuang Autonomous Region: Longzhou County, Zhubu town, Nongzai village, Path to Sancunshan hill, near entrance, foot of limestone hill, 22°29'25"N 106°56'10"E, 250 m, 25 November 2016, *Nuraliev M.S., Vislobokov N.A., Pan Bo, Wen Fang G80* (IBK, MW: MW0753850). **THAILAND.** Mae Hong Son: Mae Sariang District, Mae Sae, Salawin Wildlife Sanctuary, near stream in semi-evergreen forest, 350 m, 22 February 2007, *Watthana S. 2304* (BKF: 178265, 178266, MBK: 0177568); Chiang Mai: Queen Sirikit Botanical Garden, thick dry evergreen forest on clay loam soil near road on hillside, 18°31.47'N 98°30.94'E, 945 m, *van der Scheur J.A., Duangdaeng C., Jantaboon A. 382* (L: L.4275895); Chiang Rai: Mae Sai district, Doi Tung, upper valley slopes north of Wat Phra That Doi Tung, Huai Khrai subdistrict, shaded places below steep limestone cliff, primary evergreen seasonal hardwood forest, rugged limestone terrain, 1275 m, *Maxwell J.F. 06-259* (L: L.3748721); Chiang Rai: Doi Tung, on rugged limestone in shaded montane forest, 1300 m, 22 October 1995, *R. Pooma 1187* (BKF: 090326); Chiang Rai: 26 December 1973, *Chaloenphol C. 413* (L: L.2276431); Lamphun: [Mueang Lamphun District], Mae Tip [Mae Tueb], 1000 ft, April 1909, *Vanpruk L. 102* (BKF: 010610, 194265); [Lamphun]: Me Tan [Mae Tha], near Lakon, by stream, 1700 ft, 09 May 1912, *Kerr A.F.G. 2569* (K); [Lamphun]: Me Khaw, in evergreen jungle, 1700 ft, 13 October 1912, *Winit K. 12* (K); Lampang: Wang Nuea district, Doi Luang National park, Wahng Gayo Falls area, shaded area in seasonal mixed evergreen-deciduous hardwood forest, shale-limestone bedrocks, 765 m, 13 July 1997, *Maxwell J.F. 97-746* (L: L.3748562); Lampang: Muang Pan [Mueang Pan] district, Jae Sorn National Park, Mae Piak waterfall, evergreen forest near stream, 600 m, 17 February 2003, *Koonkhunthod N., Johnson D.M. 363* (BKF: 147784, 147785); Lampang: Mae Long, evergreen forest, 200 m, 27 February 1926, *Winit 1615* (BKF: 184529, K); Phrae: Huai Si [Huai Sai Village], 1000 ft, 25 January 1913, *Vanpruk L. 356* (BKF: 194264, K); Phrae: Hue Kamin [Huai Khamin], limestone rocks by stream, 300 m, 13 February 1921, *Kerr A.F.G. 4844* (K); Uttaradit: Nam Pat district, Phu Soi Dao National Park, near stream in shady evergreen forest, 750 m, 20 September 1996, *Pooma R. 1339* (BKF: 090340); Uttaradit: Nam Pat district, Phu Soi Dao National Park, near stream, 650 m, 09 December 1994, *Santisuk T. s.n.* (BKF: 110468); [Kamphaeng Phet]: Huai Krasa, about 90 km S of Tak, 16°05'N 99°09'E, 900 m, 19 March 1968, *Hansen B., Smitinand T. 12959* (BKF: 010609, K, L: L.2276432); Uthai Thani: Ban Rai, Huai Ka Kaeng Game Reserve, dry evergreen forest, 500–600 m, 15°00'N 99°14'E, 21 February 1970, *van Beusekom C.F., Santisuk T. 2893* (K, L: L.2276434); Phetchabun: Kao Phya Paw, evergreen forest, 300 m, 04 March 1931, *Kerr A.F.G. 20350* (K); Chaiyaphum: Nam Phrom, dry evergreen forest on sandstone, 16°20'N 101°45'E, 600 m, 11 December 1971, *van Beusekom C.F., Geesink R., Phengkklai C., Wongwan B. 4161* (BKF: 010604, K, L: L.2276432, P: P00276687); Chaiyaphum: Nam Phrom, near Weir, dry evergreen forest, 16°20'N 101°45'E, 600 m, 20 December 1971, *van Beusekom C.F., Geesink R., Phengkklai C., Wongwan B. 4457* (BKF: 010603, K, L: L.2276369, P: P00276688, P00276689); [Prachinburi]: [Prachantakham District], Khao Yai National Park, route to Khao Laem, evergreen forest, 1000 m, 22 January 1972, *Smitinand T., Phengkklai C. 11560* (BKF: 010605, 213291); Krabin [Prachinburi]: [Na Di District], Tungpo [Thung Pho], evergreen forest, ca. 100 m, 1 January 1925, *A.F.G. Kerr 9811* (K); Chonburi: Khao Kheow Open Zoo, evergreen



forest, 300 m, 10 December 2000, *Phengkhai C. 12894* (BKF: 129281, 143314); Chanthaburi: Khao Soi Dao Wildlife Sanctuary, evergreen forest in transect line 1, 13°05'33.10"N 102°10'21.20"E, 370 m, 17 May 2013, *Tagane S., Rueangruea S., Suddee S. with Fuse K., Wachi N., Keiwbang W., Pansamrong P. T1578* (BKF: 206954; FU); Chanthaburi: Khao Soi Dao Wildlife Sanctuary, evergreen forest between line 1 and 2, 13°05'04.00"N 102°10'21.50"E, 430 m, 18 May 2013, *Tagane S., Rueangruea S., Suddee S. with Fuse K., Wachi N., Keiwbang W., Pansamrong P. T1604* (BKF: 207509; FU); Chanthaburi: Khao Soi Dao Wildlife Sanctuary, near fall in seasonal rain forest, 400 m, 20 August 2000, *Wongprasert T. 508-01* (BKF: 130143); Chanthaburi: Doi Soi Dao, evergreen forest along stream, acid rock, 12°45'N 102°10'E, 250 m, 13 May 1974, *Geesink R., Hattink T., Phengkhai C. 6701* (BKF: 010616, K, L: L.2276371, P: P00276686); s. loc., 13 February 1921, *A.F.G. Kerr 4844* (P: P00276684, P00276685); s. loc., 23 September 1968, *Damrongsak 863* (BKF: 107515); s. loc. (BKF: 130144). **LAOS.** Bolikhamsai: Nam Kading National Protected Area, in evergreen forest, 18°38'28.22"N 104°18'33.2"E, 539 m, 28 June 2017, *Tagane S., Souladeth P., Okabe N., Yang C.-J. L1057* (FOF); the same location, 28 June 2017, *Tagane S., Souladeth P., Okabe N., Yang C.-J. L1061* (FOF).

Specimens provisionally identified as *Glyptopetalum vidalii* Savinov:

**THAILAND.** Chiang Rai: 26 December 1973, *Chaloenphol C. 413* (BKF: 010607); Nan: Pua, Doi Phu Kha National Park, near stream in gallery montane forest, 1100 m, 22 September 1996, *Pooma R. 1369* (BKF: 090284, CMU: paratype, 11810); Kanchanaburi: Sangkhlaburi district, Mon Bala Ming, 5 km NW of Kong Mong Tha village, Tung Yai Naresuan West Wildlife Sanctuary, mixed evergreen-deciduous seasonal forest, in shady understory, limestone bedrock, 800 m, 12 February 2003, *van de Bult M. 636* (BKF: 141332, L: L.2276370, CMU: paratype, 2106a); same location, 10 December 2003, *van de Bult M. 711* (BKF: 156706, 156707, CMU: paratype, 23116); Kanchanaburi: Sangkhlaburi district, Khao Laem National Park, behind headquarter, dry shady evergreen forest, 250 m, 16 December 2005, *Poopath M. 422* (BKF: 189514). **LAOS.** Vientiane: Vang Vieng, Ban Kai So, 900 m, 20 October 1971, *Vidal J.E. 5434* (holotype: P: P05537582!).