

**Systematic notes on *Ophiorrhiza trichocarpon* Blume (Rubiaceae)
and some related species**

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ABSTRACT. Three closely related species of *Ophiorrhiza* L. (Rubiaceae), viz. *O. trichocarpon*, *O. pedunculata*, and *O. villosa* are considered as to their nomenclature, differential characters, distributions, and presence of heterostyly. *O. pedunculata* is suggested as a new name to substitute *O. hispidula* var. *longipedunculata* after raising its rank to species level. A new variety *O. trichocarpon* var. *glabra* is described from Khao Takrup in E Thailand.

Ophiorrhiza trichocarpon Blume was described by Blume from Java in 1825. Over the 19th and 20th centuries quite a number of collections of were this species accumulated from different parts of Java, as well as from neighbouring islands of Bali and Bawean. However, it has never been reported from any other of the Sunda Islands.

G. Don (1834) described plants that were collected in Southern Burma and were very similar to *O. trichocarpon* as *O. hispidula* Wall. ex G. Don. J. D. Hooker (1880) seems to be the first who synonymised this with the Blume's species. Pitard (1923) followed this point of view in his treatment of *Ophiorrhiza* in the "Flore Générale de l'Indo-Chine". Deb and Mondal (1997 publ. 2001) also accepted this approach in the revision of the genus for the Indian subcontinent, but not the authors in Thailand and Malay Peninsula (King and Gamble, 1903; Ridley, 1923; Craib, 1932). On the contrary, Craib (1932) underlined the status of *O. hispidula* as a separate species by putting *O. trichocarpa* Hook. f. non Blume to its synonymy. He also described a peculiar variety *O. hispidula* var. *longipedunculata* with long peduncled inflorescences from W Thailand.

Revision of many herbarium collections for the upcoming treatment of the genus *Ophiorrhiza* for the Flora of Thailand lead me to the conclusion, that plants of *O. trichocarpon* from Java, and *O. hispidula* from the mainland belong to the same species. This species varies in overall dimensions and hairiness over its range but no clear pattern can be seen. The only exception is a single population from Khao Takrup in E Thailand, at the eastern limit of *O. trichocarpon* distribution, plants of which are completely glabrous except for only loosely hairy peduncles and rudimentary hairs on the ovary surface. Since the distribution of this is exceptionally limited it is recognised below as a variety; *O. trichocarpon* var. *glabra*. The other variety, *O. hispidula* var. *longipedunculata*, possesses a number of substantially stable characters that can discriminate it from typical *O. trichocarpon*, and is confined to mountainous areas of N, NW, and W Thailand within the general range of the latter. I suggest recognising it as a new separate species. In the course of field investigations of the author in Thailand in 1999

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and 2002 both of the species were repeatedly collected from many localities close to each other, but they seemed never to occur in mixture, and were always clearly separable from each other (Figs. 2, 3).

In 1824 Wallich described *O. villosa* from Chittagong (now in Bangladesh), another species very similar to *O. trichocarpum*. The first indication of its occurrence in Thailand was made by Craib (1932), who cited in his work a single specimen from N Thailand (Doi Chiang Dao, *Kerr* 5618), however, doubtfully determined since it was in young bud. The revision of collections from N and W Thailand loaned from L and AAU revealed a number of specimens that can be identified as *O. villosa*. However, Thai specimens differ from the type in having shorter, caducous stipules, denser pubescent leaves, and white rather than rusty villous pubescence on the peduncles. A compact long peduncled inflorescence is regarded as a characteristic feature of *O. villosa* (Wallich, 1820; Hooker, 1882; Deb & Mondal, 1997 publ. 2001). Our plants have shorter peduncles and inflorescence branches very short during anthesis, but usually somewhat elongating afterwards. *O. villosa* deserves more study to finally confirm whether Thai populations are actually conspecific with the Indian ones.

Differential characters of the three species are summarised in Table 1.

A few words must be added on the heterostyly within these species. Heterostyly in *Ophiorrhiza* is a special issue for discussion. Usually *Ophiorrhiza* is not considered among heterostylous genera of Rubiaceae (Verdcourt, 1958; Darwin, 1976). However, in more recent revisions of *Ophiorrhiza* at least some taxa are considered heterostylous (Lo, 1990; Deb & Mondal, 1997 publ. 2001). As far as I could find out in this study, in the above species plants with both homostylous and heterostylous flowers occur over their ranges (Fig. 1).

O. trichocarpum is usually homostylous, with the stigma positioned at the anthers level in the middle part of the corolla tube. Corollas are small, up to 5 mm long. However, a specimen with a stigma positioned at the tube throat clearly above the anthers was collected from Krabi in Peninsular Thailand (*Supapol* 177). In the revision by Deb and Mondal (1997 publ. 2001) a long styled flower is also depicted in the figure showing this species. I have not seen any plant of *O. trichocarpum* with short styled flowers. However, it seems probable they can rarely occur, since the reciprocal form does exist.

A similar patterns can be seen in *O. pedunculata*. Most of the examined specimens appeared to be homostylous (corolla 5–7 mm long). Only a few plants appeared to belong to heterostylous morphs. The difference between them includes not only the reciprocal position of anthers and stigma, but also the overall corolla dimensions. The longistylous plant (*Suvarnakoses* 1895) from SW Thailand has corollas to 6.6 mm long, comparable to those of homostylous plants, while the brevistylous one (*Larsen et al.* 46836), from Doi Pui in NW Thailand, has exceptionally large corollas to 9–11 mm long, which is untypical for the bulk of homostylous flowers. Similar differences in corolla size in different flower types were also reported in some other rubiaceous genera, viz. *Rudgea*, *Palicourea*, *Luculia*, *Guettarda*, *Manettia*, *Hedyotis*, *Gaertnera*, and *Bouvardia* (Faivre & McDade, 2001). So, both *O. trichocarpum* and *O. pedunculata* are usually homostylous, with rarely occurring heterostylous plants.

Table 1. Differential characters of *O. trichocarpon*, *O. pedunculata*, and *O. villosa*

<i>O. trichocarpon</i>	<i>O. pedunculata</i>	<i>O. villosa</i>
Inflorescence bracts minute, appressed to branches, < 2 mm long	Inflorescence bracts linear to narrow lanceolate, up to 5 mm long	Inflorescence bracts minute, appressed to branches, < 1 mm long
Upper leaf surface: loosely scattered with short 0.1–0.3 mm appressed hairs or glabrous (var. <i>glabra</i>)	Upper leaf surface: leaves, especially young, densely to loosely scattered with 0.2–0.5 mm appressed hairs	Upper leaf surface: leaves, especially young, densely to loosely scattered with 0.2–0.6 mm appressed hairs
Lower leaf surface: loosely short hairy along nerves or glabrous (var. <i>glabra</i>)	Lower leaf surface: scatteredly to rather densely hairy throughout surface, especially on young leaves	Lower leaf surface: scatteredly to rather densely hairy throughout surface, especially on young leaves
Flower buds rounded or slightly angular in the upper part and at the top	Flower buds rounded or slightly angular in the upper part and at the top	Flower buds with small conical appendages at the top
Peduncle in fruit up to 3 cm long	Peduncle in fruit up to 10 cm long	Peduncle in fruit up to 4–5 cm long
Pedicels short, to 1.5 mm	Pedicels short, to 1.5 mm	Pedicels up to 4 mm long

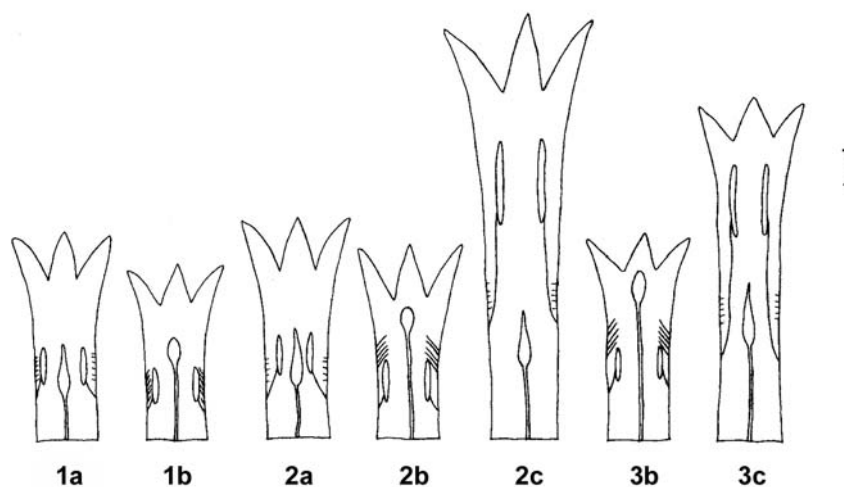


Figure 1. Diagrams of corollas of *O. trichocarpon*, *O. pedunculata*, and *O. villosa*, showing relative position of anthers and stigmas in different types of flowers. Scale bar = 1 mm.: 1. *O. trichocarpon*: a. homostylous flower; b. longistylous flower; 2. *O. pedunculata*: a. homostylous flower; b. longistylous flower; c. brevistylous flower; 3. *O. villosa*: b. longistylous flower; c. brevistylous flower.

The opposite situation is characteristic of *O. villosa*. All the specimens examined were either long or short styled. The short styled flowers are almost twice as long (8–9 mm) the long styled (5–6 mm), similar to the pattern observed in *O. pedunculata*. Yet homostylous flowers can probably occur in *O. villosa*, too, since such a flower is shown in the figure in Deb & Mondal (1997 publ. 2001) for an Indian plant. The isotype specimen at K is, however, brevistylous.

Different types of flowers share several common features in all these and many other species that I have examined. Short-styled flowers in all cases possess a loose ring of relatively short (to 0.1–0.3 mm) hairs, more or less normal to the inner wall of the corolla tube. The stigma here is long (usually more than 1 mm), lanceolate, and positioned below the hair ring, while the anthers are positioned above the hair ring, nearly reaching the throat of the corolla. Homostylous flowers are similar to these, but their corollas and filaments are much shorter, so that both stigma and anthers are positioned at the same level inside the loose hair ring, approximately in the middle of the corolla tube. On the contrary, long-styled flowers always possess a dense ring of relatively long (to 0.4–0.6 mm), more or less upwards appressed hairs inside the corolla tube. The anthers here are positioned below the hair ring; and the stigma is shorter than in short-styled flowers, with elliptic or roundish lobes, positioned above the hair ring, usually just below the throat of the corolla. As far as it is possible to judge from herbarium specimens, protandry is the common case.

Examination of mature but still unopened flower buds in *O. trichocarpum* and *O. pedunculata* often reveals that anthers open in bud and the stigmas are all covered with pollen. It seems probable that these species are selfers and that loss of heterostyly is connected with their evolutionary transition to selfing.

Distributions of these three species are shown in Figs. 4–6. As one can see, areas of *O. pedunculata* and *O. villosa* are within the range of *O. trichocarpum*. *O. pedunculata* is restricted to E slopes of the range system stretching from N Thailand southward to the Isthmus of Kra. *O. villosa* has a wider distribution from Bangladesh in the W to the NW and W Thailand in the E. Deb & Mondal (1997 publ. 2001) also report it from Andaman Islands, however I have not seen any specimen from there. *O. trichocarpum* has a much wider range compared to the two former species, and demonstrates the most unusual disjunction between the Malay Peninsula and Java. Such a disjunction can hardly be the result of just mis-sampling. Examination of rather rich collections of *Ophiorrhiza* from S Malay Peninsula and Sumatra at L and K, as well as at several Thai herbaria and SING, revealed no specimens that could be assigned to *O. trichocarpum*.

The nomenclature and examined specimens of these three species are given below.

Ophiorrhiza trichocarpum Blume, Bijdr.: 977. 1825. Type: "circa Linga Jaltie (Cheribon) et etiam in umbrosis Insulae Nusae Kambangae" (holotype L!).—*Ophiorrhiza trichocarpa* auct. non Blume, Hook. f., 1882, Fl. Brit. India, 3: 78; Pitard, 1923, Fl. Indo-Chine, 3 (2): 157–158; Deb & Mondal, 1997 (publ. 2001), Bull. Bot. Surv. India, 39 (1–4): 131–133.—*Ophiorrhiza trichocarpos* auct. non Blume, Bakh. f. in Backer & Bakh. f., 1882, Fl. Java, 2: 291.—*Ophiorrhiza hispidula* Wall. ex G. Don, 1834, Gen. Hist., 3: 523; King & Gamble, 1904, J. As. Soc. Bengal., 72 (4): 173–174; Ridl., 1923, Fl. Malay Pen., 2: 40; Craib, 1932, Fl. Siam. Enum., 2 (1): 64–65. Type: "Wall. cat. no. 6234. ... Native of the East Indies, at Tavoi" (holotype K!).

The correct spelling of *O. trichocarpon* has been subject to a long discordance in the literature. In most cases it is misspelled as '*trichocarpa*'. Bakhuizen van den Brink (1965) indicated this spelling as erroneous, but gave another equally erroneous variant '*trichocarpos*' himself. Deb & Mondal (1997 publ. 2001), on the other hand, gave '*trichocarpa*' as the correct spelling, putting '*trichocarpon*' under "sphalmate". I suppose there is no reason to reject the original Blume's epithet, since it seems to be in full concordance with article 23.1. of the ICBN which reads: "The name of a species is a binary combination consisting of the name of the genus followed by a single specific epithet in the form of an adjective, a noun in the genitive, or a word in apposition..." '*Trichocarpon*' as a Greek noun standing in the nominative can certainly be regarded as such "a word in apposition", so I cannot see any reason for changing it to a latinised adjective.

Distribution.— India, Bangladesh, Myanmar, Thailand, Malaysia, Indonesia (Fig. 4).

Habitat.— 5–960 m altitude; along trails, on sandy loam or loamy soil, boulders and rocks, along streams and waterfalls in primary or secondary, disturbed, evergreen, deciduous, or bamboo forests; fl. March–November; fr. June–February.

Specimens examined (homostylous plants):

India.— Andaman Is: Little Andaman. Near forest nursery, Hut Bay, 08.05.75, *Bhargava* 2417 (L); Middle Andaman. Vic. of Camp no. 15, 03.11.77, *Bhargava*, *Noteboom et al.* 6319 (L); Middle Andamans. Billy ground, 22.07.74, *Bhargava* 1909 (L); North Andamans. Keralapuram, 21.11.76, *Nair* 4858 (L); S Andamans (Baratang I.). Near Nilambur, 22.07.75, *Bhargava* 2479 (L).

Myanmar.— Eastern Tenasserim, 29.03.32, *Kerr* 21599 (K); Katha district, Suigon, 20.11.08, *Lace* 5213 (K); *Tavoy W. G.* 6234 (holotype: K); Tenasserim and Andamans; distr. at the Royal Gardens, Kew. 1862–3, *Herb. Helfer* 2857 (L).

Indonesia.— Bali: Monkey forest near Ubud 22 km N of Den Pasar, 05.04.75, *Mejer*, *Noerta* 8081 (L); Bawean: Bawean, 17.06.24, *Dorgelo* 57 (L); Tunche Sangkapoera & Telogo, 17.06.24, *Dorgelo* 48 (L); Java: Linga Jattei, Nusa Kumbanga, Blume, holotype (L); Buitenzorg [= Bogor] 16.02.89, *Herb. Boerlage* (L); E Java, res. Besuki, Mt. Raung, S slope above village Gunungsari, 17.05.57, *Jacobs* 4806 (L); anonymous (L); *Korthals* 619 (L); *Herb. Rwdt* (L); Nusabambagan Is., SW part between Soloh Babakan to Karanganjer, 22.11.38, *Kostermans*, v. *Woerden* 130 (L); Puroeroen, Terrei W von Lawang, 06.02.30, *Backer* 37682 (L); Prov. Batavia, in agro Buitenzorgensi, apud Kossa Batu, 07.02.94, *Schiffner* 2687 (L); 2628 (L); Udjung Kulon Reserve, Tjibunar, 11.11.60, *Kostermans* 108 (L); distr. Banten, Bantardjaja rubber estate. 18 km S of Rangkasbetung, 29.04.37, *Buwalda* 2712 (L).

Thailand.— NORTHERN: Chiang Mai [Botanic Garden, Mae Rim, 31.05.94, *BGO staff* 719 (689) (QBG)]; Chiang Rai [Doi Luang National Park, a trail from headquarters to Phu Kaeng Waterfall, 08.12.02, *Schanzer* 02-097 (MHA)]; Phayao [Doi Luang National Park, Cham Pa Thong Waterfall, 09.12.02, *Schanzer* 02-108, (MHA)]; distr. Muang, Doi Luang National Park, east side, Chaha Na Tong Falls, 26.05.97, *Petrair* 24 (BKF)]; Lampang [Mae Ngow, 26.08.20, *Khoon Winit* 748 (BKF, K)]; Tak [20 km E of Mae Sot, 30.05.73, *Geesink*, *Phanichapol*, *Santisuk* 5580

(L, BKF, AAU); Kamphaeng Phet [Khleng Naum Lai substation, Klong Lan National Park, 03.08.00, *Chamchumroon* vc1019 (BKF)]; NORTH-EASTERN: Loei [along trail from Samhaek (RS-5) to Langpae (RS-7), 29.08.88, *Fukuoka* T-63701 (BKF)]; Phu Kradueng, 30.10.84, *Murata, Phengklai et al.* T-42064 (BKF, L); interior of Nam Thop, on eastern slope of Phu Luang, 07.12.65, *Tagawa, Iwatsuki, Fukuoka* T-1916 (BKF)]; EASTERN: Chaiyaphum [Phu Khiao, Thung Kra Mang trail, 04.08.72, *K. & S. Larsen, Nielsen & Santisuk* 31377 (AAU)]; Nakhon Ratchasima [Muak Lek, Saraburi, 30.08.24, *Kerr* 9077 (K)]; SOUTH-WESTERN: Kanchanaburi [Hin Dat, Kanchanaburi, 29.06.26, *Put* 41 (K); distr. Sangklaburi; Thung Yai Naresuan Wildlife Reserve, 15.06.93, *Maxwell* 93-613 (BKF); Kwae Noi Basin Expedition, Brangkasi, 22.06.46, *den Hoed & Kostermans* 899 (L, K); Kwae Noi Basin Expedition; near Neeckey (n. Wanglea), 24.04.46, *Kasin* 155 (L, K); Pompi village near Khwae Noi river, E of Sangkhla, 25.03.68, *C. van Beusekom, Phengklai* 95 (BKF, L, AAU)]; CENTRAL: Saraburi [Sam Lan, 19.05.74, *Maxwell* 74-519 (AAU)]; SOUTH-EASTERN: Chon Buri [Khao Khiao, Sriracha distr., 22.06.75, *Maxwell* 75-600 (BKF, L)]; Chanthaburi Doi Soi Dao Nue, 13.05.74, *Geesink, Hattink, Phengklai* 6740 (BKF, L, AAU); Pong Namron, 16.10.55, *B. Sangkhachand* 22639 (BKF); Nam Tok Taka Mao, N of Chanthaburi, 25.08.72, *K. & S. Larsen, Nielsen & Santisuk* 32015 (BKF, AAU)]; PENINSULAR: Chumphon [Siepyuan, 07.09.27, *Put* 997 (K)]; Surat Thani [Ban Na, Surat Yuang 19 (K)]; Krabi [distr. Plaipraya, Ban Klong Puan, 30.11.86, *Maxwell* 86-1006 (L); Khao Phanom Bencia, foothill of S range, 11.07.92, *K. Larsen et al.* 43289 (AAU)]; Trang [Lamphura, 10 km N of Trang, 15.11.90, *K. Larsen et al.* 41412, (AAU)]; Yala [Biserat in Jalou (Yala) Bukit Goah, 08.06.94, *Gwynne-Vanghan* 536 (K)].

Specimens examined (longistylous plants):

Thailand.— PENINSULAR: Krabi [distr. Plaipraya, Ban Khleng Puan, Mo 7, 30.11.86, *Supapol* 177 (BKF, L)].

Ophiorrhiza trichocarpa Blume var. **glabra** var. **nov.**

Herba perennis, *Ophiorrhizae trichocarpis* habitu characteribusque valde similis, sed foliis glabris, caulibus glabris, pedunculis sparse pubescentibus, ovariis glabris vel minute sparse papillois, corollis extus glabris, floribus homostylis. Typus: Thailand, Sa Kaeo, SE foot of Khao Takrup, Centennial Bot. Gard., 11.08.99, *Schanzer* 78 (holotypus MHA!).

Plants collected from Khao Takrup seem to be conspecific with *O. trichocarpa* in all characters except pubescence, being nearly glabrous in all parts. Stems, leaves and corollas are completely glabrous, peduncles are usually loosely scattered with short (0.3–0.1 mm long) hairs, which are even shorter (0.1–0.05 mm) on inflorescence branches, and reduced to few papillae on ovaries. This variety seems to be restricted in its distribution to Khao Takrup. Normally pubescent plants do not occur there either.

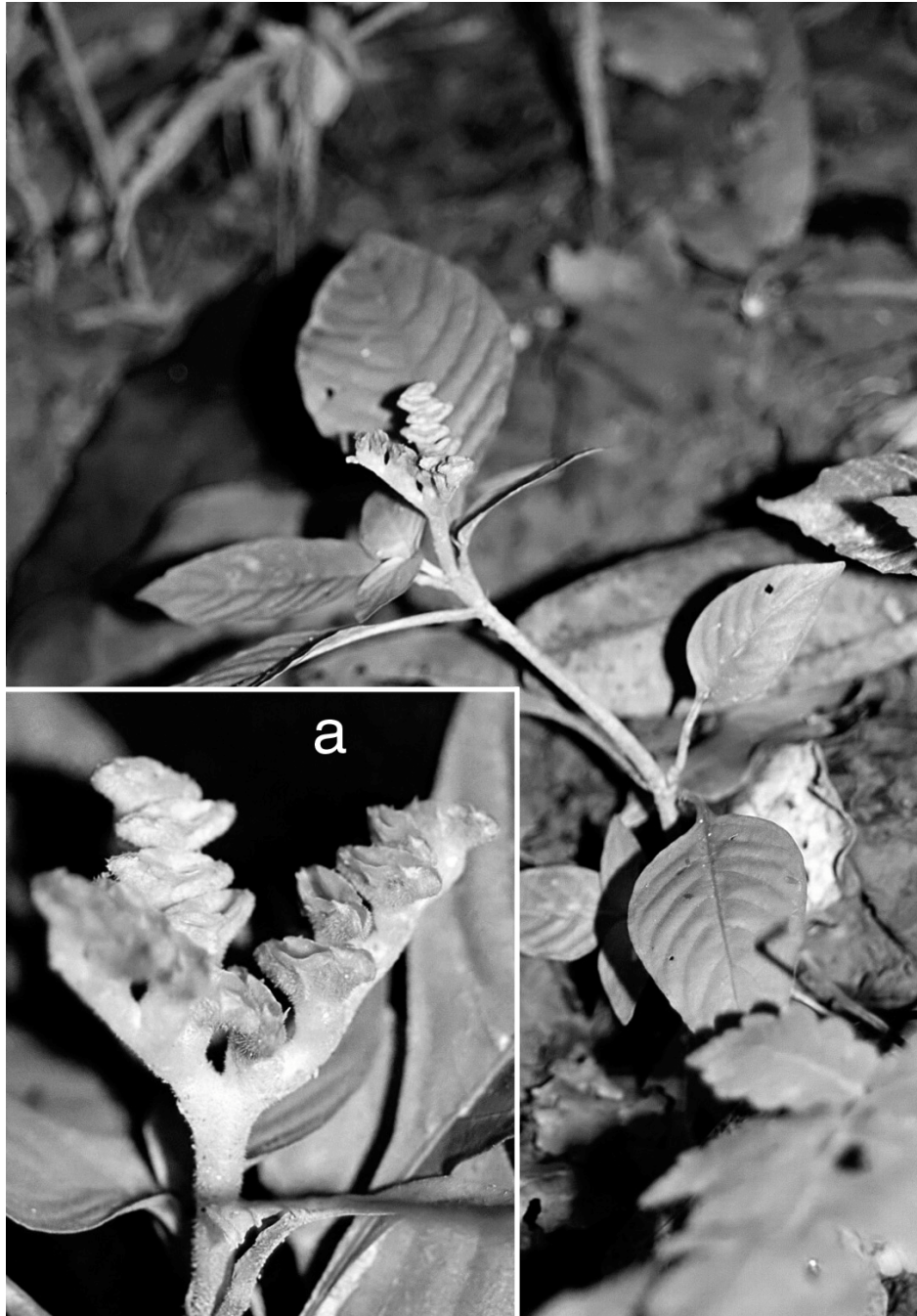


Figure 2. *Ophiorrhiza trichocarpa*. Thailand, Doi Luang Nat. Park, 8.12.2002.: a. inflorescence enlarged: bracts are hardly visible. Photographed by I. Schanzer.



Figure 3. *Ophiorrhiza pedunculata*. Thailand, Doi Luang Nat. Park, 8.12.2002: Arrow points to an elongated bract. Photographed by I. Schanzer.

Specimens examined:

Thailand.— SOUTH-EASTERN: Sa Kaeo [S of Khao Takrup, Centennial Bot. Gard., 10.08.99, *Schanzer* 52 (MHA); SE foot of Khao Takrup, Centennial Bot. Gard., 11.08.99, *Schanzer* 60, 78 (holotype), 68, 82, 88 (MHA)].

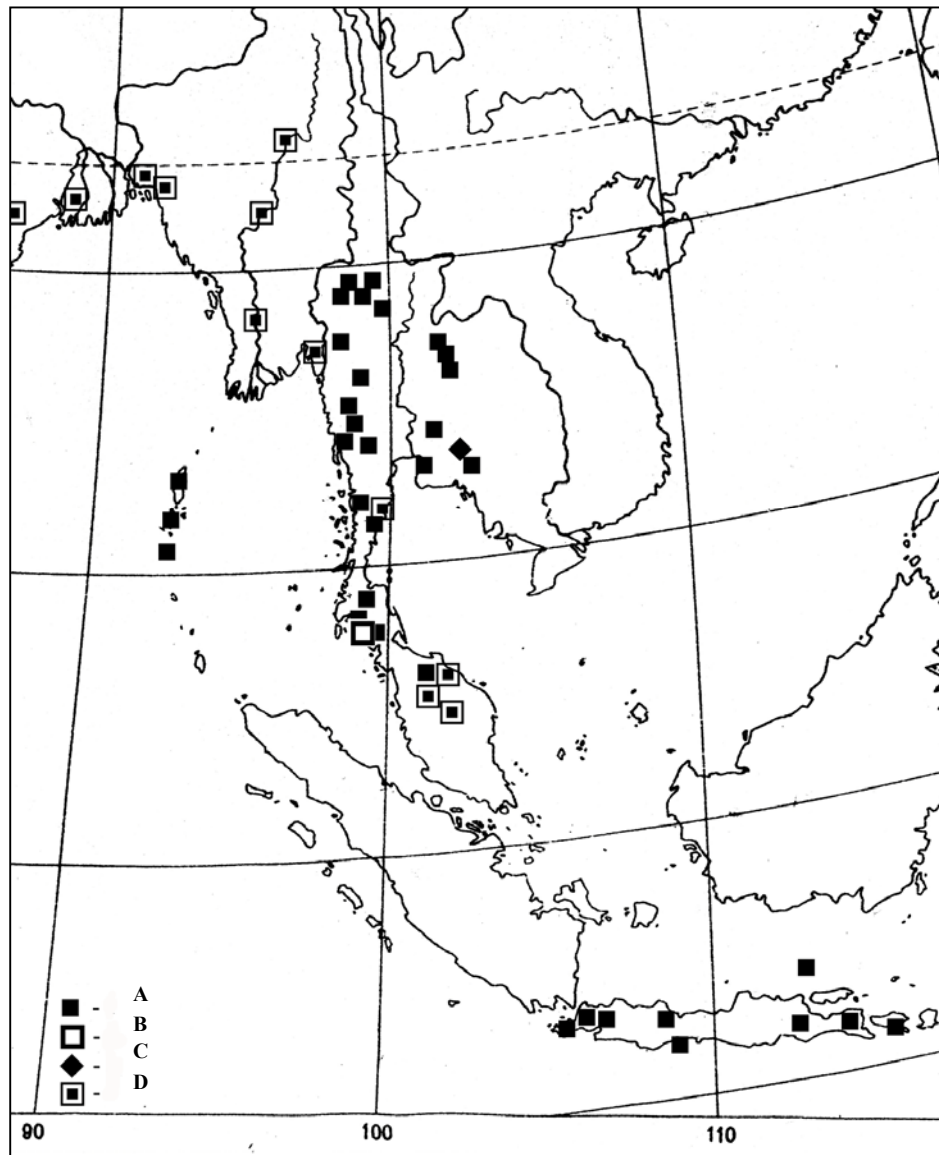


Figure 4. Distribution of *Ophiorrhiza trichocarpa*: A. homostylous plants; B. longistylous plants; C. *O. trichocarpa* var. *glabra*; D. localities cited in literature.

***Ophiorrhiza pedunculata* nom. et stat. nov.**— *O. hispidula* var. *longipedunculata* Craib, 1932, Fl. Siam. Enum., 2 (1): 65, non *O. longipedunculata* Merr., 1937, Mitt. Inst. Allg. Bot. Hamburg, 7 (4): 277. Type: Payap. Me Ping Rapids, Hat Yuak, ca. 200 m, damp rocks by stream, Kerr 4656 (holotype BK!; isotypes K!, BM!).

Distribution.— Myanmar, Thailand (Fig. 5).

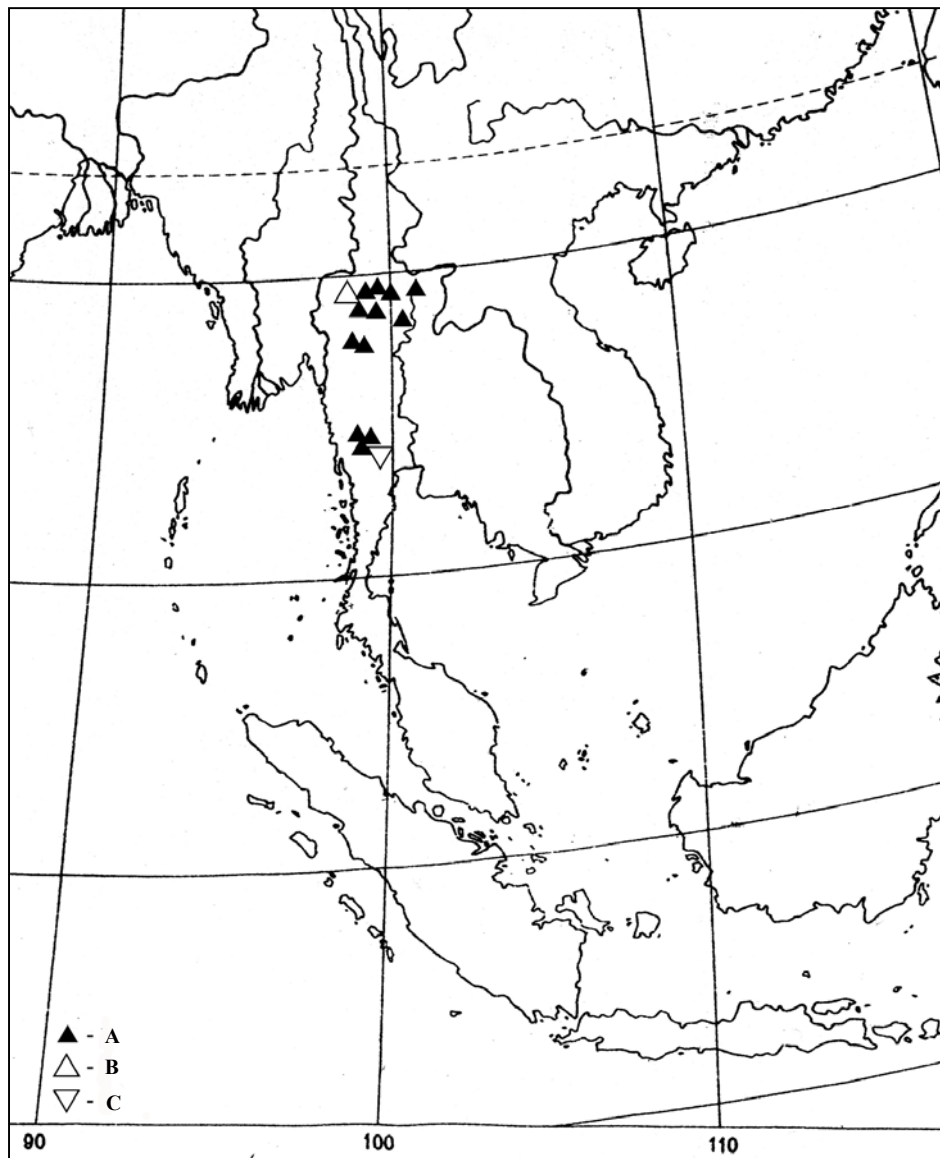


Figure 5. Distribution of *Ophiorrhiza pedunculata*: A. homostylous plants; B. brevistylous plants; C. longistylous plants.

Habitat:— 100–1,125 m altitude; on humus, open soil, wet rocks, along streams and waterfalls in primary or disturbed evergreen, mixed, or disturbed bamboo dominated forests; fl. April–September; fr. June–December.

Specimens examined (homostylous plants):

Thailand.— NORTHERN: Mae Hong Son [Doi Mae Sakut, Muang, 23.09.95, *BGO staff* 4671 (QBG), 4680 (QBG)]; Chiang Mai [Botanic Garden Mae Rim, 23.06.94, *BGO staff* 974 (QBG); Doi Suthep, N of the temple, 07.08.99, *Schanzer* 10 (MHA), foot of Doi Chiang Dao, 11.09.67, *Tagawa, Shimizu & al.* T-9773 (BKF, AAU, L), middle elevation of Doi Suthep, 20.09.67, *Shimizu, Hutoh* T-10564 (BKF); Doi Suthep, 05.07.14, *Kerr* 3279 (K); Hat Yuak, Mae Ping Rapids, 26.11.20, *Kerr* 4656 holotypes & isotypes (K, BM, BK); Mae Rim-Samoeng Rd, Mae Rim, 20.11.95, *BGO staff* 5264, (QBG); Mok Fa waterfall (just W of Pang Hang) (part of Doi Suthep-Pui National Park), 13.09.99, *Puff* 990913–1/2 (QBG); Khao Chiang Dao, 07.12.61, *Bunchuai* 50, (BKF); Doi Suthep-Pui National Park, Doi Suthep, 02.12.02, *Schanzer* 02-008 (MHA); Doi Chiang Dao, 28.11.62, *Bunchuai* 1233 (BKF); Teen Tok 10 km N of Doi Chiang Dao, 02.08.68, *K. Larsen, Santisuk, Warncke* 3045 (BKF, L, AAU); Botanic Garden, Mae Rim, 12.09.95, *BGO staff* 4195 (QBG); distr. Muang; Doi Suthep, east side, Rue-Si Cave, 15.06.88, *Maxwell* 88-762 (BKF, L); Huai Mae Sanoi, Botanic Garden, Mae Rim, 29.08.94, *BGO staff* 1468 (QBG); Pong Dueat, 04.09.99, *Suksathan* 1754-1 (QBG); Mok Fa Waterfall 40 km NE of Chiang Mai, 24.11.93, *K. Larsen et al.* 44784 (AAU); 44764 (AAU)]; Chiang Rai [Doi Luang National Park, a trail from headquarters to Phu Kaeng Waterfall, 08.12.02, *Schanzer* 02-097 (MHA)]; Lamphun [enroute from Ban Khun Tan to Doi Khun Tan, 04.09.67, *Tagawa et al.* T-9118 (L); Lampang [distr. Wahng Hua, Jae Sawn National Park, 26.10.95, *Maxwell* 95-1020 (BKF)]; Nan [Amphoe Thung Chang, Ban Huai Sataeng, 20.11.93, *K. Larsen et al.* 44667 (AAU)]; Phrae [Huai Rong (= Doi Sawan) Waterfall, NE of Phrae, 09.09.95, *K. Larsen et al.* 46225 (AAU)]; SOUTH-WESTERN: Kanchanaburi [Sai Yok, 02.08.28, *Marcan* 2407 (K); Thong Pha Phum, 03.07.73, *Maxwell* 73-73 (AAU); Kwae Noi River Basin Exp. 1946; near Linthin near Kin Saiyok, 19.07.46, *Kostermans* 1231 (L); Erawan, 01.07.74, *K. & S.S. Larsen* 33965 (BKF, L, AAU, K; SW); between Huai Ban Khao and Kriti, 04.07.73, *Geesink, Phengklai* 6085 (BKF, L, AAU); Erawan National Park, 18.11.71, *van Beusekom, Phengklai et al.* 3826a (BKF, K); Erawan National Park, 20.11.71, *van Beusekom, Phengklai et al.* 3885 (BKF, L, K); Tham Than Lot National Park, Bo Phloi, 07.11.79, *Shimizu et al.* T-21989 (BKF, L); Thung Kang Yang Hills, 07.07.63, *K. Larsen* 10570 (BKF, AAU)].

Specimens examined (longistylous plants):

Thailand.— SOUTH-WESTERN: Kanchanaburi [Muang, 04.07.63, *P. Suvarnakoses* 1895 (BKF, L, K)].

Specimens examined (brevistylous plants):

Thailand.— NORTHERN: Mae Hong Son [Doi Pui, SE of Mae Hong Son, 23.09.95, *K. Larsen et al.* 46836 (AAU)].

Ophiorrhiza villosa Roxb., 1824, Fl. Ind., ed. Carey, 2: 546; Craib, 1932, Fl. Siam. Enum., 2 (1): 71–72; Deb & Mondal, 1997 (pub. 2002), Bull. Bot. Surv. India, 39 (1–4): 133–135. Type: "A native of shaded, moist places amongst the hills of Chittagong", *Wall. Cat.* 6230A (holotype CAL; isotype K!).

Distribution.— India, Bangladesh, Myanmar, Thailand (Fig. 6).

Habitat.— 400–1,800 m altitude; under humid conditions on clayey slopes, by streams and cascades, in crevices of shady limestone in evergreen forests; fl. July–November; fr. July–November.

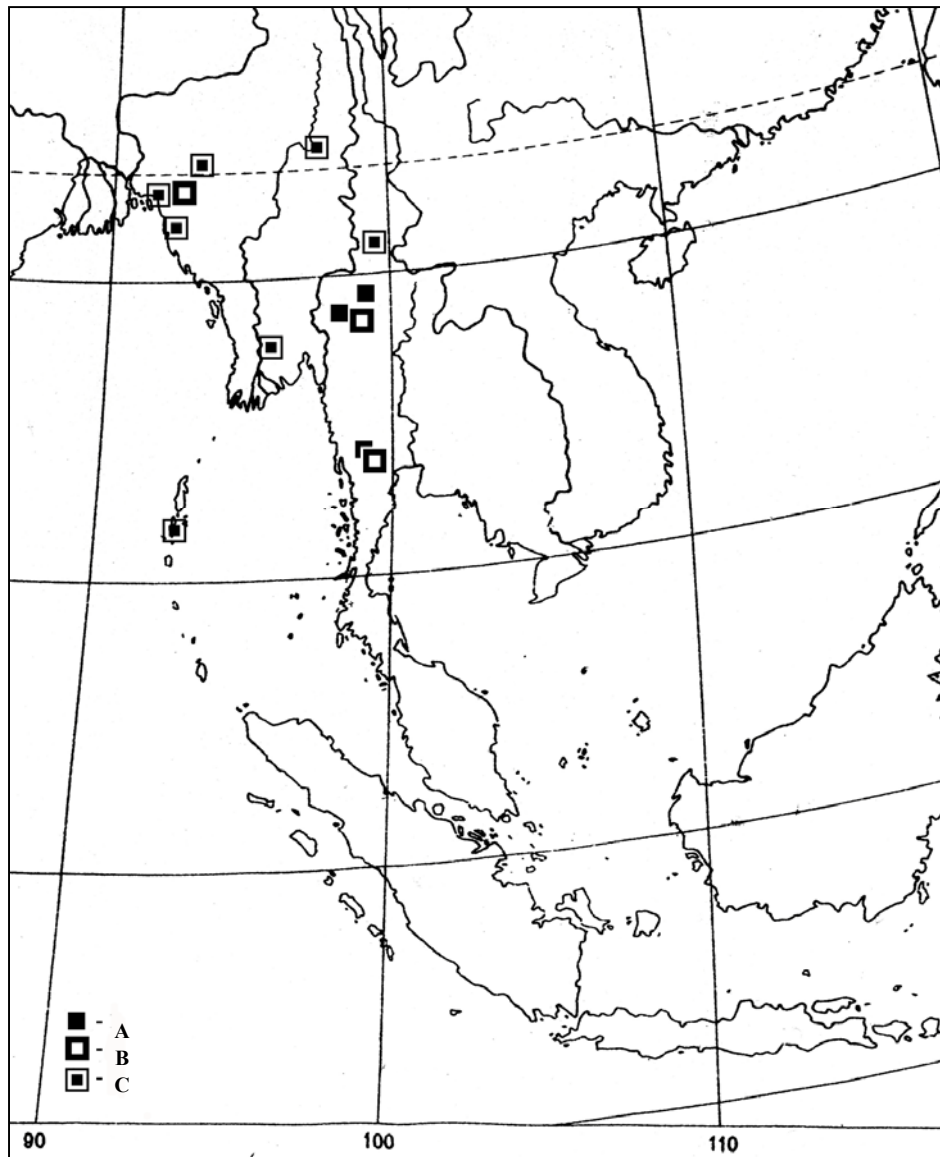


Figure 6. Distribution of *Ophiorrhiza villosa*: A. longistylous plants; B. brevistylous plants; C. localities cited in literature.

Specimens examined (brevistylous plants):

Bangladesh.— Chittagong, 1825 H. B. 6230A (isotype: K!).

Thailand.— NORTHERN: Chiang Mai [Doi Pa Kao, 25.08.31, *Garrett* 704 (L, AAU); SOUTH-WESTERN: Kanchanaburi [Southwestern: Kanchanaburi, Erawan waterfall, 05.07.63, *Suvarnakoses* 36932 (L)].

Specimens examined (longistylous plants):

Thailand.— NORTHERN: Mae Hong Son [Khun Yuam, 05.09.74, *K. & S. Larsen* 34163 (L, AAU), 34163b (L, AAU)]; Chiang Mai [higher elevation of Doi Chiang Dao, 13.09.67, *Tagawa, Shimizu et al.* T-9923 (L, AAU); middle elevation of Doi Chiang Dao, 15.09.67, *Shimizu, Hutoh* T-10159 (L); SOUTH-WESTERN: Kanchanaburi [Erawan National Park, 18.11.71, *van Beusekom, Phengkklai et al.* 3826a (L)].

ACKNOWLEDGEMENTS

I wish to thank the curators of the following Herbaria, L, AAU, K, BM, SING, BK, BKF, QBG, for lending materials and opportunity to study their collections; Drs C. Puff (Botanical Institute, Vienna, Austria), K. Chayamarit (the Forest Herbarium, Bangkok, Thailand), and Mr V. Chamchumroon (the Forest Herbarium, Bangkok, Thailand) for help in conducting field research; the Percy Sladen Memorial Fund for financial support of the field work in 1999; Drs M. Roos (Rijksherbarium, The Netherlands), A. Davis (Royal Botanic Gardens, Kew, UK), and C. Puff for help in obtaining the necessary literature; I also wish to express special thanks to Dr C. Puff for critical reading and correcting of the manuscript.

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