

Cardamine occulta (Brassicaceae), a new name for the Flora of Thailand

HANS-JOACHIM ESSER¹

ABSTRACT

The common Thai species of *Cardamine*, treated as *C. hirsuta* in the Flora of Thailand, is discussed. The correct name should be *C. occulta* according to recent publications. New data and collections are added.

KEYWORDS: Cruciferae, neophytes, weeds.

Accepted for publication: 29 August 2020. Published online: 29 September 2020

INTRODUCTION

Brassicaceae (or Cruciferae) are a cosmopolitan family consisting mainly of herbs, and many of them are weedy in temperate regions. They were treated by Hedge (1997) for the Flora of Thailand. In addition to several cultivated taxa, such as cabbage or pak choi in the genus *Brassica* L., Hedge reported only six native or introduced species in two genera in Thailand. One of these genera, *Cardamine* L., has white flowers and narrowly linear, compressed fruits with smooth seeds. The common weed of *Cardamine* present in Thailand was treated as *C. hirsuta* L. by Hedge (1997), recognizable by pinnate leaves (the rare *C. circaeoides* Hook.f. & Thomson has entire leaves).

Several species of this genus are annual widespread weeds that are morphologically similar and at the same time variable in numerous characters. Only in recent years their names have been clarified in several publications (Cheo *et al.*, 2003; Lihová

et al., 2006; Marhold *et al.*, 2016; Šlenker *et al.*, 2018, 2019). In particular, collections of *C. hirsuta* and *C. flexuosa* With. have been confused in China (Cheo *et al.*, 2003).

Cardamine hirsuta is sufficiently distinguished by, e.g., indumentum and stamen number. *Cardamine flexuosa* and *C. occulta* Hornem. are superficially very similar, and were sometimes treated as separate varieties or synonyms of a single species. Cheo *et al.* (2003: 105) stated that “*Cardamine occulta* ... represents only a minor variant of *C. flexuosa*.” Later publications disagreed, based on molecular and more detailed morphological studies. Šlenker *et al.* (2018) published a key to similar species that had been confused before, copied slightly simplified here, and Šlenker *et al.* (2019) added comparative illustrations of *C. flexuosa*, *C. hirsuta* and *C. occulta*. Among these, the first two have a temperate distribution but were erroneously reported for tropical Asia including Thailand before, and only *C. occulta* occurs here.

KEY TO CARDAMINE OCCULTA AND SIMILAR SPECIES

1. Whole plant glabrous, except for few hairs at the base of stem leaves; basal leaf rosette compact; stamens four, the lateral pair often absent, rarely five or six **C. hirsuta**
1. At least some hairs on stem or on stem leaves; basal leaf rosette absent or not compact; stamens six
 2. Middle stem leaflets predominantly glabrous on the upper surface; basal leaves not rosulate; stem hairy or glabrous basally, glabrous or rarely sparsely hairy in the upper part; terminal leaflet of the middle stem leaf (1–)3–5(–7)-lobed with deep and sharp sinuses; petals more than two times wider than sepals **C. occulta**
 2. Middle stem leaflets strikingly hairy on the upper surface; basal leaves rosulate; stem markedly hairy; terminal leaflet of the middle stem leaf 1–7(–9)-lobed with both deep and shallow sinuses; petals less than two times wider than sepals **C. flexuosa**

¹ Botanische Staatssammlung München, Menzinger Strasse 67, 80638 München, Germany; email: esser@snsb.de

TAXONOMY

Cardamine occulta Hornem., Hort. Bot. Hafn. Suppl.: 71. 1819; Marhold *et al.*, Phytokeys 62: 60. 2016; Šlenker *et al.*, Bot. J. Linn. Soc. 187: 468, 473. 2018; Bull. Slov. Bot. Spoločn. 41: 13, fig. 1A.— *Cardamine flexuosa* var. *occulta* (Hornem.) O.E.Schulz, Bot. Jahrb. Syst. 32: 479. 1903. Type: ‘*Cardamine occulta* mihi, sponte provenit in terra e China alata [?], ex h. b. Hafn.’ [spontaneous in the Copenhagen Botanical Garden, in soil from China], 1817, *J.W. Hornemann s.n.* (lectotype C, designated by Marhold *et al.*, 2016: 60, or perhaps holotype); China, Zhejiang Province, Linhai County, Kuocang Mountains, 18 Apr. 2014, *K. Marhold, Y.P. Zhao & M. Jiang CH18/12/20148* (epitype **SAV**, designated by Marhold *et al.*, 2016: 60). Fig. 1.

— *Cardamine flexuosa* auct. non With.: T.Y.Cheo *et al.*, Fl. China 8: 105. 2003, p.p.

— *Cardamine hirsuta* auct. non L.: Hosseus, Beih. Bot. Centralbl. 28: 390. 1911; Craib, Fl. Siam.: 76. 1931; Hedge, Fl. Thailand 6(3): 180. 1997; Pooma & Suddee, Thai Plant Names rev. ed.: 113. 2014.

Erect to partially decumbent herb, to 25 cm tall, often branched from the base, bright green, stems usually glabrous, rarely few hairs near base. *Leaves* alternate, basal leaf rosette absent; petiole 5–15 mm long, blade thin, 15–30(–50) by 15–30 mm, pinnate with 2–3(–4) pairs of smaller lateral pinnae of irregularly elliptic shape, sometimes lobed, and a larger apical pinna, this 10–15 by 6–10(–15) mm and distinctly (1–)3–5(–7)-lobed with (shallow to) deep sinuses, glabrous at least above. *Flowers* with a pedicel of 1 mm length, sepals ca 2 mm long, petals 2.5–3 by ca 1 mm, white, but further characters not seen (the petals are wider than the sepals but exact measurements difficult, see notes), stamens 6. *Fruits* erect, 15–17 by 0.8–1 mm, dehiscent. *Seeds* ca 1 by 0.7 mm, brown, smooth.

Thailand.— NORTHERN: Chiang Mai [Chiang Dao, Tin Tok, 8 Mar. 1965, *Chermisrivathana 295* (**BK**); Doi Inthanon NP, car park on mountain top, ca 2,500 m, 30 Sep. 2005, *Esser et al. 05-40* (**BKF, M**); Doi Suthep, unterhalb Wat Doi Suthep, 1,050 m, 14 Apr. 1905, *Hosseus 492a* (**M**); Mae On valley, 29 Jan. 1921, *Kerr 4704* (**BK, TCD**); Chiang Dao district, Huai Nam Ru, Doi Sahm Meun, 1,550 m, 01 Feb. 1990, *Maxwell 90-149* (**L**); Samoeng, Pang

Ha Sta., 500 m, 11 Nov. 1980, *Paisooksantavatana 437-80* (**BK**); Chom Thong, Ban Meo Khunglang, 1,200 m, 22 Dec. 1985, *Paisooksantavatana 1671A-85* (**BK**); Fang, 1,500 m, 17 Feb. 1975, *Sadakorn 465* (**BK**); Phu Ping, 05 Jan. 1972, *Umpai 438* (**BK**); Chiang Rai [Ban Phami, Mae Sai, 557 m, 15 Feb. 2012, *Norsaengsri & Tathana 8997* (**BKF**); Mae Chan, Ban Pang Sa, 550 m, 22 Jan. 1980, *Paisooksantavatana 526-81* (**BK**); Phu Chi Fa NP, 22 Sep. 1999, *S.C. 326* (**BKF**); NORTH-EASTERN: Loei [Mueang, Klong river, 217 m, 26 Dec. 2011, *Norsaengsri & Tathana 8528* (**BKF**); SOUTH-WESTERN: Kanchanaburi [Thong Pha Phum, Tha Kha-nun, Suan Ruen Rom view raft resort, 270 m, 03 Aug. 2019, *Esser et al. 19-03* (**BKF, M**)]; CENTRAL: Krung Thep [Bangkok, 19 Aug. 1926, *Kerr 11024* (**BK**)].

Ecology.— Found in open areas of secondary forest and disturbed anthropogenic places, paddy fields, along pavements, in flower pots and nurseries, often in garden earth; sea level to 2,500 m alt. Probably flowering and fruiting throughout the year.

Distribution.— Earliest records from East Asia (type originating from China), from man-made habitats, and from South-East Asia; recently invasive in North America and Europe, the earliest European records known are from 1993 (Marhold *et al.*, 2016).

Conservation status.— Although not often collected, it is a common weed in disturbed places and not threatened.

Vernacular.— Lao ko (เล่ากอ)(Central).

Notes.— Flowers ripen into fruits very soon when pressed, so that no good flowering material was available in the herbaria consulted, but the leaves are sufficient to characterize this species, because they are glabrous above with a larger, lobed apical pinna.

Hedge (1997: 180) used a basal leaf rosette as species character for ‘*C. hirsuta*’ in his key, however, a rosette is absent in all Thai specimens studied. Perhaps he included this character because a leaf rosette would be typical for the true *C. hirsuta*.

Lihová *et al.* (2006) had already reported the species for Thailand, citing two collections from Chiang Mai, *Koch s.n.* (**HEID**) and *Maxwell 90-149* (**MO**), but they discussed it as ‘Asian *C. flexuosa*’, at that time still without a formal name.

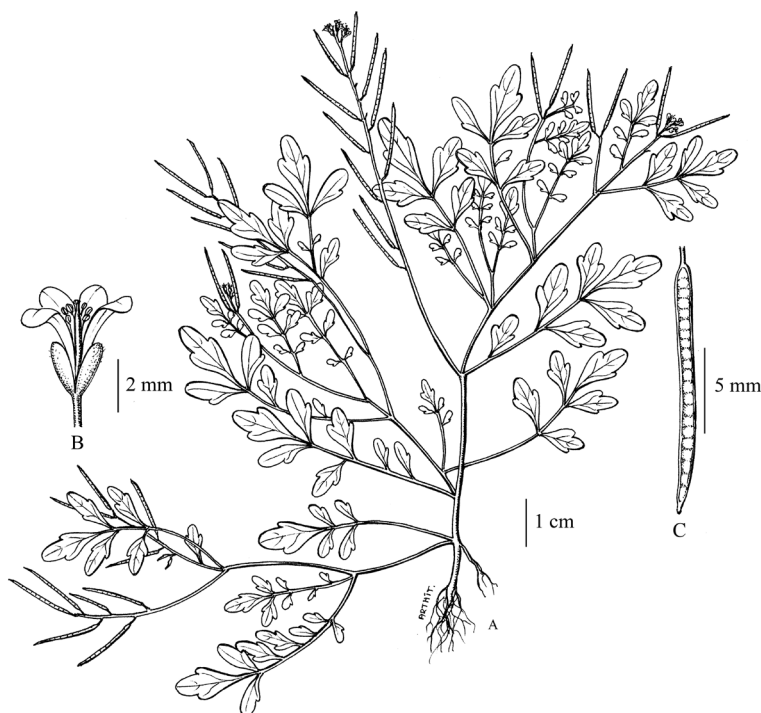


Figure 1. *Cardamine occulta* Hornem. A. habit; B. flower; C. fruit. After S.C. 326 (BKF).

ACKNOWLEDGMENTS

I am indebted to Nannapat Pattharahirantricin and Kanchana Pruesapan for providing information on relevant specimens at BKF and BK, respectively, to Arthit Khamkamnoed for the beautiful drawing, and Peter C. van Welzen for useful discussions.

REFERENCES

- Cheo, T.Y., Lu, L.L., Yang, G., Al-Shehbaz, I.A. & Dorofeev, V.I. (2003). Brassicaceae. In: Z.Y. Wu & P.H. Raven (eds), *Flora of China* 8, pp. 1–193. Science Press, Beijing & Missouri Botanical Garden, St. Louis.
- Hedge, I. (1997). Cruciferae. In: T. Santisuk & K. Larsen (eds), *Flora of Thailand* 6(3), pp. 179–185. The Forest Herbarium, Royal Forest Department, Bangkok.
- Lihová, J., Marhold, K., Kudoh, H. & Koch, M.A. (2006). Worldwide phylogeny and biogeography of *Cardamine flexuosa* (Brassicaceae) and its relatives. *American Journal of Botany* 93: 1206–1221.
- Marhold, K., Šlenker, M., Kudoh, H. & Zozomová-Lihová, J. (2016). *Cardamine occulta*, the correct species name for invasive Asian plants previously classified as *C. flexuosa*, and its occurrence in Europe. *PhytoKeys* 62: 57–72.
- Šlenker, M., Zozomová-Lihová, J., Mandáková, T., Kudoh, H., Zhao, Y.-P., Soejima, A., Yahara, T., Skokanová, K., Španiel, S. & Marhold, K. (2018). Morphology and genome size of the widespread weed *Cardamine occulta*: how it differs from cleistogamic *C. kokaiensis* and other closely related taxa in Europe and Asia. *Botanical Journal of the Linnean Society* 187: 456–482.
- Šlenker, M., Zozomová-Lihová, J. & Marhold, K. (2019). *Cardamine occulta* – nenápadný neofyt Slovenska [*Cardamine occulta* – inconspicuous neophyte in Slovakia]. *Bulletin Slovenskej botanickej spoločnosti* 41: 13–23. Available at http://sbs.sav.sk/SBS1/bulletins/abs/bull41_1.htm#02