

Taxonomic studies in the Compositae of Thailand 15. *Vernonia* Sect. *Calcarea* comb. nov.

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Abstract Section *Calcarea* is transferred from the genus *Camchaya* to *Vernonia* and a new combination, *Vernonia* sect. *Calcarea* (Kitam.) H. Koyama is made. Four species of section *Calcarea*; *V. birmanica*, *V. pseudo-birmanica*, *V. curtisii* and *V. calcarea*, occur in Thailand, where they are confined to limestone areas. The species are characterized by achenes with a caducous pappus and 18 somatic chromosomes or polyploid derivatives of that number.

Key words : Compositae, taxonomy, Thailand, *Vernonia* sect. *Calcarea*.

Since Kerr's enumeration (1936), there has been no revisional work on *Vernonia* in Thailand. Twenty-eight species with 4 varieties are listed in his enumeration. Of them, I have published on 15 species (7 in sect. *Decaneurum*, 5 in sect. *Strobocalyx*, 2 in *Tephrodes* and 1 in sect. *Cyanopis*) in several papers in this series, but there still remain many unidentified species and species of uncertain placement in the genus *Vernonia*.

Section *Calcarea* was described by Kitamura (1968) with two species as a section of the genus *Camchaya*. As reported in a previous paper (1978), Sect. *Calcarea* differs from *Camchaya* in having herbaceous phyllaries and I-type hairs in addition to having a chromosome number of $2n=54$.

A detailed examination of the flowers in Sect. *Calcarea* reveals that all parts of them are equivalent to those of *Vernonia*. In addition, the chromosome number of two species, *V. birmanica* and *V. pseudo-birmanica*, was observed to be $2n=18$. Sect. *Calcarea* should, therefore, be excluded from *Camchaya* and put into the *Vernonia*. The four species revised here all grow in limestone areas in Thailand.

***Vernonia* Sect. *Calcarea* (Kitam.) H. Koyama comb. nov.**

Camchaya Sect. *Calcarea* Kitam. in Acta Phy-

totax. Geobot. 23: 71 (1983).

Type species: *Camchaya calcarea* Kitam.

Pappus of capillary bristles caducous, short, numerous. Achenes fusiform, 10- or 20-ribbed, ribs obtuse-angle.

Key to species

- A. Annual herbs; pappus in 2 series, inner series 5–7 mm long; outer pappus bristles few ca. 2 mm long.
- B. Heads ca. 3 cm across; involucre subglobose, ca. 7 mm tall; flowers 55 per head. *V. birmanica*
- B. Heads ca. 1 cm across; involucre broadly campanulate, ca. 5 mm tall; flowers 20 per head. *V. pseudo-birmanica*
- A. Perennial herbs; pappus in 1 or 2 (?) series, pappus bristles 0.6–3 mm long.
- B. Heads 1.5–2.5 mm across; achenes ca. 3 mm long, ribs 20; pappus bristles 0.6–1.2 mm long. *V. curtisii*
- B. Heads 3.5–4.5 cm across; achenes 3.5–4.5 mm long, ribs 10; pappus bristles 1–3 mm long. *V. calcarea*

1. **Vernonia birmanica** (Kuntze) Merr. in Brittonia, 2: 200 (1936).—*Cacalia birmanica* Kuntze, Rev. Gen.: 323 (1891). Type from Moulmein, Burma (Kuntze 6271).

Annual herbs from tap roots; *stem* erect, up to 1.7 m tall, finely striate, pubescent, but glabrate in lower part, branched above, branches ending in inflorescences, pubescent upward. *Leaves* petiolate, lanceolate, acuminate, narrowed into petiole, 6–20 cm long, 1.5–4.5 cm wide, sharply and finely serrate, upper surface scaberulous, lower surface pubescent along veins and veinlets; petiole to 2 cm long. Inflorescences loosely corymbose. *Heads* discoid, ca. 3 cm across, few to many, peduncles stout, 2–11 cm long, thickened upward; *involucre* subglobose, ca. 7 mm tall; phyllaries in 4 series, imbricate, with white hairs on dorsal surface and margin, outer phyllaries oblong, apex acute, inner phyllaries broadly oblong, apex concave-obtuse, margins coriaceous. *Flowers* in September to October, ca. 55 per head; *corolla* pale purple outside, white inside, with fine hairs on the lower half; receptacle alveolate, glabrous. *Achenes* fusiform, 3.8–4 mm long, 10-ribbed, ribs obtusely angled, aculeate between ribs; *pappus* white or yellowish white, caducous, in 2 series, inner series ca. 7 mm long, outer pappus bristles few, ca. 2 mm long. Chromosome number $2n=18$. (Fig. 1)

Habitat: on top of or crevices of limestone rocks, or on the ground close to limestone cliffs, under dense canopy, 170–1000 m.

Specimens examined. [N] Tak: Khao Phra War, Mae Sot distr. (10-1979, Shimizu *et al.* T-18505, T-18525, T-18526 KYO; 1-1983, Koyama *et al.* T-32833 KYO). [SW] Kanchanaburi: Kao Leam Dam, Thongphaphum distr. (11-1982, Koyama *et al.* T-30444, T-30445, T-30446 KYO), Sai Yok (12-1961, Larsen 8492 C).

Distribution: Burma and Thailand.

This species is characterized by having heads with long peduncles. The peduncles are stout, thickened upward.

2. **Vernonia pseudo-birmanica** H. Koyama sp. nov.

Haec species *Vernonia birmanica* affinis est, sed ab *V. birmanica* capitulis minoribus et ca. 20 flosculis, facile distinguitur.

Annual herbs from tap roots; *stem* erect, 20–40 cm tall, finely striate, pubescent, but glabrate in lower part, branched above, branches ending in inflorescences, pubescent at upper part. *Leaves* petiolate, oblong, acuminate, narrowed into short petiole, 3–11 cm long, 1–3 cm wide, sharply and finely serrate, upper surface glabrate or scaberulous, lower surface glabrate or pubescent; petiole to 1 cm long. Inflorescences loosely corymbose. *Heads* discoid, ca. 1 cm across, few to many, peduncle slender, 0.5–3 cm long, somewhat thickened upward; *involucre* broadly campanulate, ca. 5 mm tall; phyllaries in 4 series, imbricate, nearly glabrous on dorsal surface, margin white hairy, outer phyllaries linear-oblong, apex acute, inner phyllaries broadly oblong, apex concave-obtuse, margins membranaceous. *Flowers* in September to October, ca. 20 per head, corolla pale purple outside, white inside, glabrous; receptacle glabrous. *Achenes* fusiform, ca. 3 mm long, 10-ribbed, ribs obtusely angled, glabrous; *pappus* whitish, caducous, in 2 series, inner series ca. 5 mm long, outer pappus bristles few, ca. 2 mm long. Chromosome number $2n=18$. (Fig. 2)

Habitat: on wet rocks on limestone hills, canopy semi open, 700–900 m.

Type collection. Thailand [N] Tak: Khao Phra War, Maesot distr., 10-1979, Shimizu, Toyokuni, Koyama, Yahara & Santisuk T-18505-bis. Holotype in KYO).

Specimens examined. [N] Tak: Khao Phra War, Maesot distr. (1-1983, Koyama *et al.* T-32834 KYO). [SW] Kanchanaburi: Huai Bankan (11-1971, Beusekom *et al.* 3746 BKF, C, KYO, L, MO).

Distribution: Endemic to Thailand.

This species is similar to *Vernonia birmanica* in general appearance, but differs from it in the smaller size of the heads and glabrous achenes.

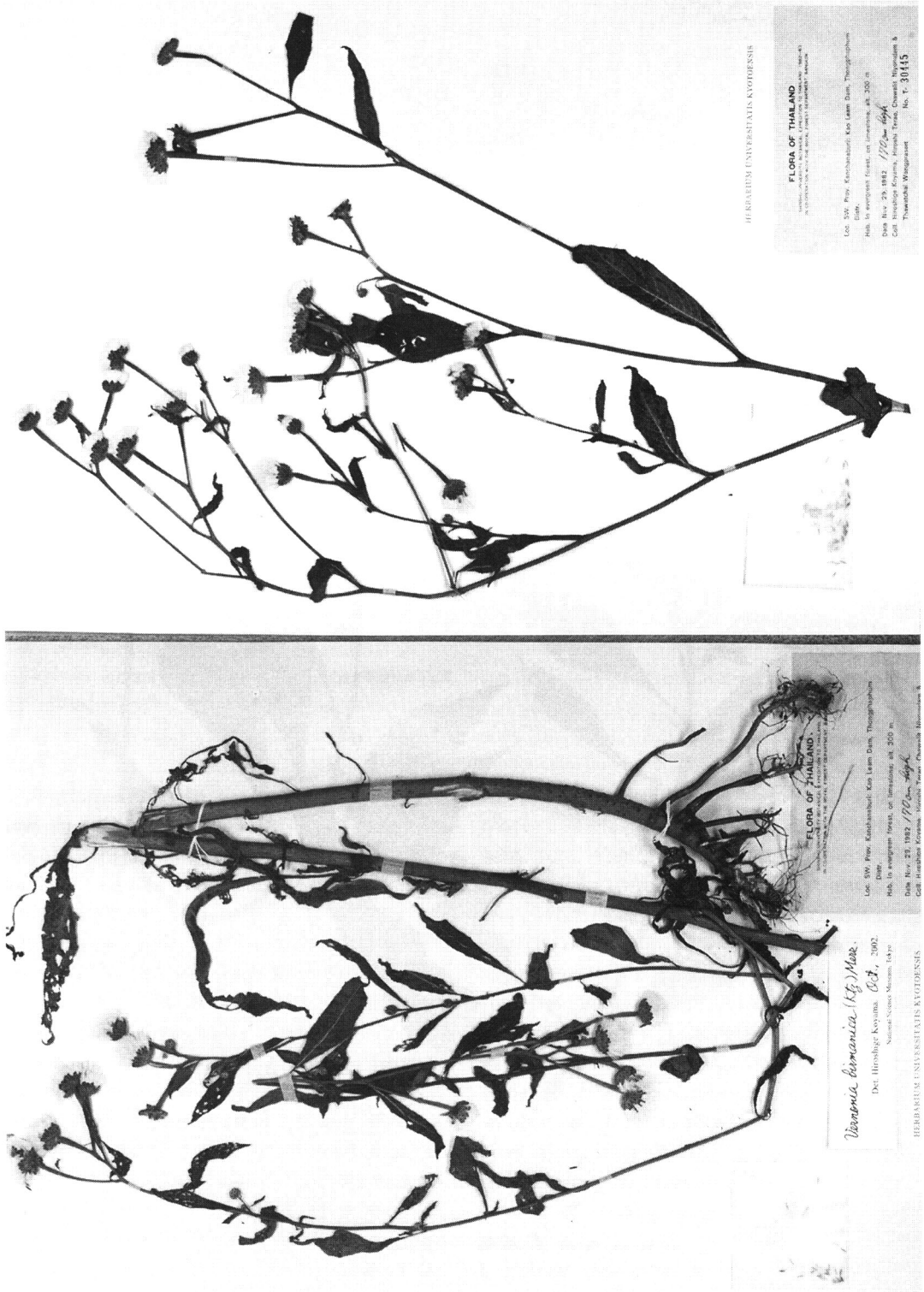


Fig. 1. *Vernonia birmanica* (Kuntze) Merr.

Thailand [SW] Kanchanaburi: Kao Leam Dam, Thongphaphum distr. (11-1982, Koyama, Terao, Niyomdam & Wongprasert T-30445).



Fig. 2. Holotype specimen of *Vernonia pseudo-birmanica* H. Koyama, sp. nov.
Thailand [N] Tak: Khao Phra War, Maesot distr. (10-1979, Shimizu, Toyokuni, Koyama, Yahara & Santisuk T-18505-bis).

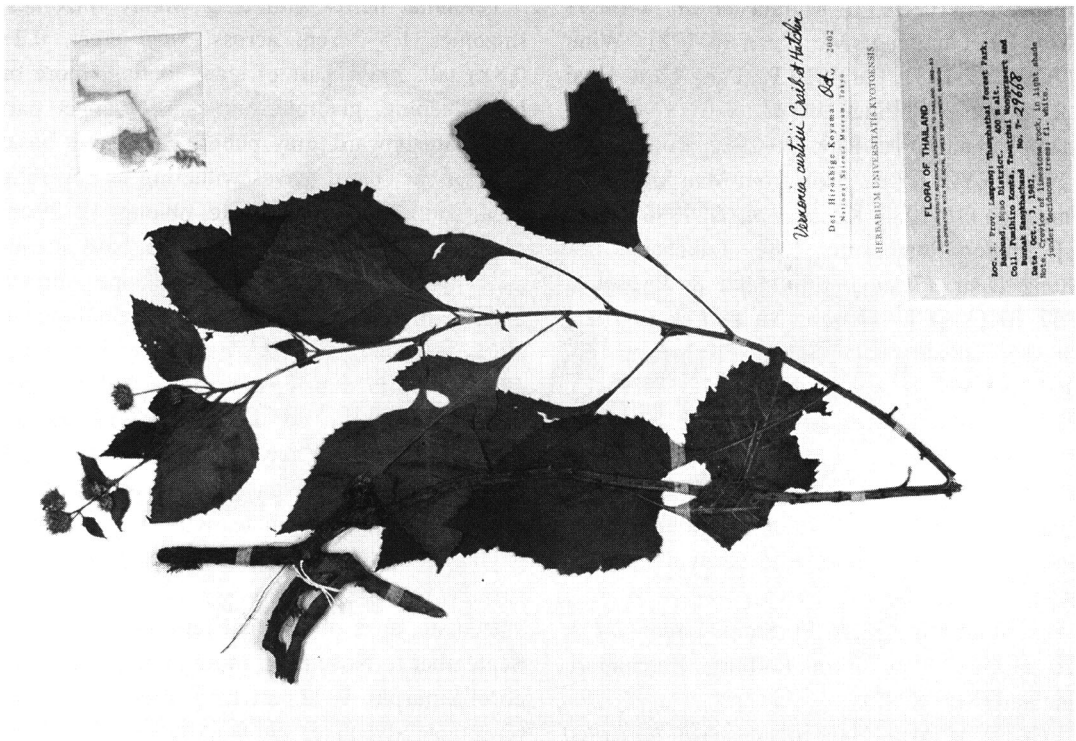


Fig. 3. *Vernonia curtisii* Craib et Hutchinson.

Thailand, [N] Lampang: Thamphathan Forest Park, Ngao distr. (10-1982, Konta, Wongprasert & Sangkhachand T-29668).

3. ***Vernonia curtisii*** Craib et Hutchinson in Kew Bull., 1910: 22 (1910); Kerr, Fl. Siam. Enum., 2 (3): 238 (1936). Type from Kedah Province, Langkawi Island, Malay Peninsula (Curtis 1217, 3690).

Camchaya calcicola Kitam. in Acta Phytotax. Geobot. 23: 72 (1968). Type from Doi Pang La, Lampang Prov., Thailand (9-1967, Shimizu *et al.* T-10808, holotype in KYO).

Succulent herbs with long woody rhizomes, rhizomes 1–2 cm across; *stem* 0.3–1 m tall, lower part of *stem* rooting, shortly creeping, glabrate, upper part branched, spreading, grayish pubescent. *Leaves* basal and cauline; basal leaves withering at flowering time, cauline leaves petiolate, elliptic–lanceolate or oblong, 12–29 cm long, 3–6 cm wide, sharply serrate or laciniate-serrate, base attenuate into petiole, apex acute, upper surface scaberulous, lower surface glabrate or gray-

ish pubescent; petiole to 4 cm long. Inflorescences a single head or loose corymb. *Heads* discoid, 1.5–2.5 cm across, 1–3, peduncle slender, 2–5 cm long; *involucre* subglobose, ca. 1.5 cm tall, phyllaries in 5 or 6 series, glabrous on dorsal surface, oblong-lanceolate, with an herbaceous appendage above, apex long subulate, with long spine, phyllaries of outer 4 or 5 series linear-ob lanceolate, strongly reflexed, phyllaries of innermost series lanceolate, apex acute, short spine, not reflexed. Flowers in September to November, ca. 60 per head, corolla purplish or pale blue; receptacle alveolate. Achenes fusiform, 20-ribbed, glabrous, 3 mm long; pappus caducous, in 1 or 2 (?) series, pappus bristles 0.6–1.2 mm long. (Fig. 3)

Habitat: on limestone boulders and rocks in open forests, 50–1000 m.

Specimens examined. [N] Chiang Mai: Doi

Chiang Dao (9-1971, Murata *et al.* T-14893 KYO, L). Lampang: Me Ngao (8-1921, Winit 757 BKF; 7-1931, Put 4019 P), Pang La to Huai Tak (9-1967, Shimizu *et al.* T-10737 KYO), Thamphathan Forest Park (10-1982, Konta *et al.* T-29668 KYO, L), ca. 3 km from Mae Mo Forest Plantation (10-1982, Konta *et al.* T-29886 KYO). [E] Nakhon Ratchasima: Khao Lukchang, Pak Chong Distr. (7-1965, Smitinand & Phengklai 8857 BKF). [C] Saraburi: Muak Lek (9-1928, Put 1879 BK, P), Khao Sawng Phi Nawng (10-1963, Smitinand & Sleumer 1372 BKF, L). [PEN] Satun: Terutao isl. (Curtis 2127, 3690 SING-type; 11-1921, Haniff & Nur 7496 SING; 4-1969, Chermisirivathana 1477 L; 10-1979, Congdon 44 AAU; 8-1925, Holttum 15092 SING). Trang: Kao Kao, Kao Chawm Lem (8-1929, Rabil 310 BK).

var. **tomentosa** Kerr, Fl. Siam. Enum. 2 (3): 238 (1936). Type from Ratburi, Ratchaburi, Thailand (Kerr 8997).

Leaves petiolate, lanceolate, base narrowed into long petiole, apex acuminate, 15–22 cm long, 5–9 cm wide, sharply serrate, upper surface scaberulous, lower surface grayish tomentose, petiole to 3 cm long.

Habitat: summits of limestone hills, 200–750 m.

Specimens examined. [NE] Khon Kaen: Pha Nok Khao (7-1973, Smitinand 11813 BKF). [SW] Kanchanaburi: Khaobuing (8-1971, Phengklai *et al.* 2986. C, KYO), Sai Yok (7-1928, Put 1780 A, L, P; Marcan 2348 P). Ratchaburi: Ratburi (7-1924, Kerr 8997 BK, P-type).

Distribution (of species): Thailand (vars. *curtisii* and *tomentosa*) and Malaya (Langkawi: 11-1941, Corner 37834 L, S; 8-1925, Holttum 15092 SING-var. *tomentosa*).

4. **Vernonia calcarea** (Kitam.) H. Koyama comb. nov.

Camchaya calcarea Kitam. in Acta Phytotax. Geobot. 23: 71 (1968). Type from Doi Chiang Dao, Chiang Mai Prov., Thailand (9-1967, Shimizu *et al.* T-10011, holotype in KYO).

Vernonia silhetensis sensu Kerr, Fl. Siam. Enum. 2 (3): 243 (1936), p.p.

Perennial herbs with long woody rhizomes, rhizomes 1.5–2.5 cm across; stem erect, 0.2–0.8 m tall, lower part of stem rooting, more or less creeping, glabrate, branches of upper part spreading upward, gray pubescent. Leaves basal and cauline; basal leaves withering at flowering time, cauline leaves petiolate, oblong, 12–29 cm long, 3–6 cm wide, sharply serrate, base attenuate into petiole, apex acuminate, upper surface glabrate or scaberulous, lower surface pubescent, along veins and veinlets; petiole to 6 cm long. Heads discoid, 2.5–4.5 cm across, solitary, peduncle stout, 3–12 cm long; involucre subglobose, ca. 1.5 cm tall, phyllaries in 6–8 series, oblong-lanceolate, with an herbaceous appendage above, apex long subulate, with a short spine, phyllaries of outer 4 or 5 series linear, upper half strongly reflexed, phyllaries of inner 2 or 3 series lanceolate, apex obtuse, not reflexed. Flowers in September to November, more than 80 per head, corolla purple, 9–11 mm long, lobes glandular; receptacle alveolate, stipitate glands along ridge of alveolus. Achenes fusiform, 3.5–4.5 mm long, 10-ribbed, ribs obtusely angled, glabrous; pappus caducous, in 1 or 2 (?) series, pappus bristles 1–3 mm long. (Fig. 4)

Habitat: on limestone rocks of open ridges, 1300–2150 m.

Specimens examined. [N] Chinag Mai: Doi Chiang Dao (Kerr 6548 BK; Put 373 BK; 12-1959, Smitinand & Abbe 6246 BKF; 11-1962, Smitinand 7752 [cult. at Kew, 12-1963, EN181-63] A, P, US; 9-1967, Tagawa *et al.* T-9927 KYO; 9-1967, Shimizu *et al.* T-10147 KYO; 9-1971, Vidal 5193 AAU; 9-1971, Murata *et al.* T-15039 P; 10-1979, Shimizu *et al.* T-21128 BKF, KYO, L, SHIN; T-21121, T-21181 BKF, KYO, L, SHIN, TNS; 12-1984, Koyama *et al.* T-39755 TNS).

Distribution: Endemic to Thailand.

Acknowledgements

Specimens examined are kept in the Harvard University Herbaria (A), Smithsonian Institution (US), U.S.A., Aarhus University (AAU), Den-

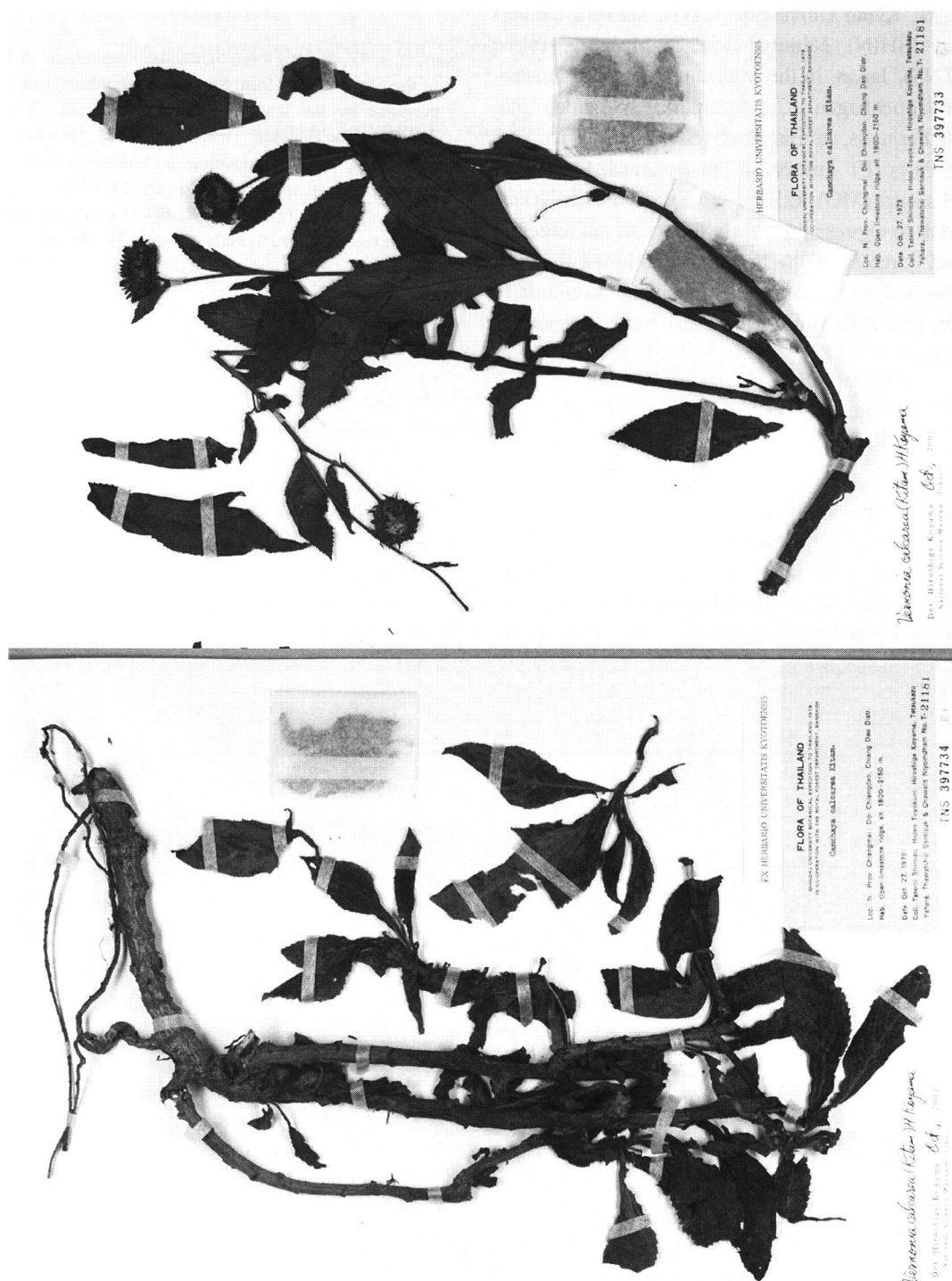


Fig. 4. *Vernonia calcarea* (Kitam.) H. Koyama.

Thailand [N] Chiang Mai: Doi Chiangdao, Chiang Dao distr. (10-1979, Shimizu, Toyokuni, Koyama, Yahara, Santisuk & Niyomdham T-21121).

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References

- Kerr, A. F. G., 1936. *Florae Siamensis Enumeratio*: A list of the plants known from Siam with records of their occurrence by the late Professor W. G. Craib. 2 (3): 235–310. The Bangkok Times Press, LTD., Bangkok.
- Kitamura, S., 1968. Compositae of Southeast Asia and Himalayas II. *Acta Phytotax. Geobot.* **23**: 65–81.
- Koyama, H., 1978. Taxonomic studies in the Compositae of Thailand 3. *Acta Phytotax. Geobot.* **35**: 49–58.