

Taxonomic Studies in the Compositae of Thailand 13*.
Tribe Lactuceae

Hiroshige Koyama

Department of Botany, National Science Museum, Tokyo
Amakubo 4-1-1, Tsukuba, 305-0005 Japan
E-mail: koyama@kahaku.go.jp

Abstract The tribe Lactuceae in the Compositae of Thailand is taxonomically examined. Eight genera, *Cicerbita*, *Crepis*, *Ixeris*, *Lactuca*, *Launaea*, *Paraixeris*, *Sonchus* and *Youngia*, are enumerated as indigenous. *Cicerbita chiangdaoensis* is newly described and two species of *Lactuca* are newly transferred to *Cicerbita*. These three species are considered to be endemic to Thailand. *Lactuca indica* and *L. sagittarioides* are reported from Thailand for the first time. The occurrence of *Crepis coronopus*, *Lactuca gracilis* and *Launaea asplenifolia* has not been confirmed by us, although they were recorded by Gagnepain from Thailand.

Key words: *Cicerbita chiangdaoensis* sp. nov., *Cicerbita garrettii* and *C. putii* comb. nov., Lactuceae, Thailand.

The tribe Lactuceae (Cichorieae) is widely distributed in the temperate zone of the northern hemisphere and comprises some 70 genera. Historically, generic concepts for some of the Thai taxa have been somewhat confusing. In his enumeration of Thai Compositae, Kerr (1936) recognized 5 genera with 18 species. Of them, *Cichorium intybus* is an introduced weed and *Lactuca sativa* is a cultivated species. The other three species, *Crepis coronopus*, *Lactuca gracilis* and *Launaea asplenifolia*, are cited from the enumeration of Gagnepain (1921).

With new material at hand, Thai Lactuceae is revised taxonomically, with the exception of *Cichorium intybus*, *Lactuca sativa* and three other species which could not be collected in the course of our field survey.

After a careful study of nearly all of the species in SE. Asia, I have come to the conclusion that *Cicerbita*, *Ixeris* and *Paraixeris* are considered to be segregate genera from *Lactuca*. The main characters are the shape of achenes and the presence or absence of an outer pappus. *Youngia* is also segregated from *Crepis* by having truncate achenes with a persistent pappus. They are distinguished as follows:

* Continued from Bull. Natn. Sci. Mus., Tokyo, Ser. B, 24 (3): 109–115 (1998).

Key to the genera

- A. Pappus bristles of two lengths, the outer bristles very short compared with the inner ones. ----- 1. *Cicerbita*
- A. Pappus bristles all one length.
 - B. Achenes strongly flattened, with a prominent beak. ----- 2. *Lactuca*
 - B. Achenes terete or prismatic, not flattened, with or without a prominent beak.
 - C. Achenes narrowly oblong, equally ten-ribbed, with a prominent beak. ----- 3. *Ixeris*
 - C. Achenes lanceolate, ca. 10 to 20-ribbed, with or without a short beak.
 - D. Achenes narrowed at the tip, with an expanded pappus disk.
 - E. Pappus bristles persistent. ----- 4. *Launaea*
 - E. Pappus bristles caducous.
 - F. Pappus bristles dropping off as a unit. ----- 5. *Crepis*
 - F. Pappus bristles dropping off separately. ----- 6. *Paraixeris*
 - D. Achenes truncate at the tip, without an expanded pappus disk.
 - E. Pappus bristles persistent. ----- 7. *Youngia*
 - E. Pappus bristles dropping off as a unit. ----- 8. *Sonchus*

1. *Cicerbita* Wallr.

This genus is characterized in having pappus bristles that are capillary and different in length. The outer bristles are extremely short compared with the inner ones, *i.e.*, the inner bristles are usually more than 6 mm long and the outer ones are less than 0.3 mm long. About ten species are distributed in the Himalayas and northern part of SE. Asia. In Thailand, the following three species are confirmed to occur in the mountains at higher elevations.

Key to the species

- A. Stem erect, 3–5 florets in a head. ----- 1. *C. putii*
- A. Stem procumbent along the lower half; 8–14 florets in a head.
 - B. Leaves ovate or kidney. ----- 2. *C. chiangdaoensis*
 - B. Leaves lyrate-pinnatifid. ----- 3. *C. garrettii*

1. *Cicerbita putii* (Kerr) H. Koyama comb. nov.

Lactuca putii Kerr in Kew Bull., **1935**: 332 (1935), Fl. Siam. Enum., **2** (3): 298 (1936). Type from Doi Chiang Dao, Thailand.

This species is related to *Cicerbita cyanea* (D. Don) Beauv., but differs from it in having a head with 5 florets and a leaf with a long petiole and cordate blade. In the present species, the outer bristles of the pappus are not as prominent as those of the other species of *Cicerbita*. The outer bristles in this species can be observed to be

lacking in some part of the outer series, though Kerr (1935) described them as 'Pappus exterior nullus'.

Erect herbs, 0.5 to 1.4 m tall. Leaves radical and cauline; radical leaves withering after flowering; cauline leaves lyrate, to 12 cm long, 5 cm wide, the terminal segment ovate, to 8 cm long, 5 cm wide, apex acuminate; petioles more or less winged, base auriculate. Heads numerous in a panicle; involucre cylindrical, 15 mm high, 2.5 mm across, phyllaries in 3 series, imbricate, innermost phyllaries 5 in 1 series. Florets 5 per head, corolla white inside and dark purplish brown outside. Pappus bristles of 2 sorts, inner pappus white, ca. 6 mm long, outer one white, ca. 0.25 mm long, partly lacking.

Habitat: on open limestone ridges, 1700–1900 m alt.

Specimens examined: [N] Chiang Mai: Doi Chiang Dao (10–1926, Put 367 BK, P-type; 12–1961, Smitinand & Anderson 7250 BKF, US; Koyama *et al.* T-39752, T-48810 KYO, T-39751 BKF, KYO).

Distribution: Endemic to Thailand.

2. *Cicerbita chiangdaoensis* H. Koyama sp. nov.

Haec species *Cicerbitae macrorhizae* et *Lactucae garrettii* affinis est, sed a *Cicerbita macrorhiza* et *Lactuca garrettii* foliis cordatis non pinnatilobatis et capitulis majoribus facile distinguitur.

Rhizomes thick, ca. 1.5 cm across, 5 to 8 cm long. Stems of the lower half procumbent, branched 3 to 5 times; stems of the upper half erect, branched again 3 to 5 times. Leaves radical and cauline; radical leaves caducous withering at flowering time; cauline leaves petiolate, petioles 3 to 7 cm long, sparsely pubescent; blade of cauline leaves cordate to kidney-shaped, 4–5 cm long, 4–6 cm wide, apex obtuse or rounded, base narrowly or broadly cordate, margins entire, mucronate, upper surface nearly glabrous, under surface densely pubescent, especially on the nerves, hairs brownish; upper leaves gradually smaller, blade triangular, petioles shorter. Heads 1–2 in a branch, ca. 3 cm across, peduncle 3–6 cm long; involucre tubular, 13 mm high, phyllaries with white membranous margins, imbricate in 3–4 series, innermost phyllaries 8 in 1 series, lanceolate, 2 mm wide, apex obtuse; outermost phyllary triangular, 2 mm long and wide. Florets 12–14 per head; corolla blue, 20–22 mm long, ligule ca. 4 mm wide, corolla tube ca. 4 mm long, pubescent; anther tube ca. 2.5 mm long, style branches ca. 2.3 mm long. Pappus bristles of 2 sorts, inner pappus white, ca. 6 mm long, outer one brownish, ca. 0.25 mm long. Achenes immature, 6 mm long, beak 1.5 mm long.

This species is similar to *Cicerbita macrorhiza* (Royle) Beauv. and *L. garrettii* Kerr, but differs from it in having cordate or kidney shaped leaves with long petioles.

Habitat: crevices of limestone rock on exposed slopes at the higher elevations in the mountains, 1800–2150 m alt.

Type collection. Thailand [N] Chiang Mai: Doi Chiang Dao (11–1962, Smiti-



Fig. 1. Type specimen of *Cicerbita chiangdaoensis* H. Koyama.

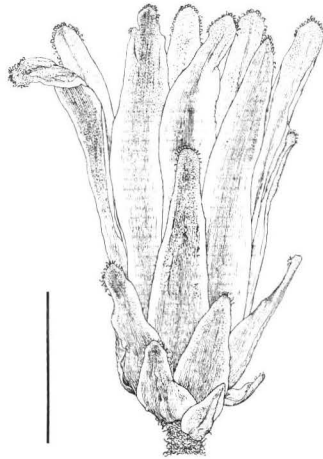


Fig. 2. Involucre of *Cicerbita chiangdaoensis*.

nand, Poore & Robbins 7810 BKF-holotype).

Other specimens examined: [N] Chiang Mai: Doi Chiang Dao (12–1961, Smitinand & Anderson 7294 BKF, US; 10–1979, Shimizu *et al.* T-21201 KYO, TNS).

Distribution: Endemic to Thailand.

3. *Cicerbita garrettii* (Kerr) H. Koyama comb. nov.

Lactuca garrettii Kerr in Kew Bull., 1935: 332 (1935), Fl. Siam. Enum., 2 (3): 297 (1936). Type from Doi Angka, Thailand.

This species is related to *Cicerbita macrantha* (C. B. Clarke) Beauv., but differs from it in having tubular involucre and peduncles with stipitate glandular hairs.

Procumbent herbs with thick roots; roots ca. 1.5 cm across, more than 8 cm long. Cauline leaves sessile, obovate, with a sinus on each side and winged long petiole, to 22 cm long including the petiole, to 6 cm wide, the terminal segment obovate, apex acute or acuminate, to 10 cm long, 6 cm wide. Heads 3 to 6 per raceme, ca. 4 cm across; involucre tubular ca. 15 mm high, phyllaries in 3 series, imbricate, innermost phyllaries 8 in 1 series. Florets 13–18 per head, corolla violet. Pappus bristles of 2 sorts, inner pappus white, ca. 8 mm long, outer one white, ca. 0.25 mm long.

Habitat: on mountain slopes of grassy fields and sometimes grassy banks along roads, 1800–2350 m alt.

Specimens examined: [N] Chiang Mai: Doi Inthanon (10–1979, Shimizu *et al.* T-18894 BKF, KYO; Konta *et al.* T-29779 A, BKF, KYO, TNS; Koyama & Phengklai T-39970 [thick roots], T-39972 KYO, T-39987, T-39991 A, BKF, KYO); Doi Pa Kao (9–1931, H. B. G. Garrett 726 BKF).

Distribution: Endemic to Thailand.

2. *Lactuca* L.

This genus comprises more than 100 species and is distributed in chiefly temperate Eurasia, extending to tropical and South Africa. The following three species are confirmed in Thailand. The lettuce, *Lactuca sativa* L., is cultivated in Lissou opium fields, 1420 m alt. at Doi Chong (Hansen & Smitinand 12696 C) in northern floristic region.

Key to the species

- A. Leaves pinnatifid, radical and cauline; erect herbs, more than 1 m tall.
 - B. Flowers yellow. ----- 1. *L. indica*
 - B. Flowers blue. ----- 2. *L. parishii*
- A. Leaves sagittate, all radical. ----- 3. *L. sagittarioides*

1. ***Lactuca indica*** L., Mant., 2: 278 (1771); Kitam. in Acta Phytotax. Geobot. 23: 141 (1969). Type from Java.

Glabrous annual or biennial herbs; roots fusiform; stems erect, usually simple or branched toward the apex, to 250 cm tall. Radical leaves withering before flowering; lower cauline leaves deeply pinnatifid, 13–25 cm long, 20–11 cm wide. Heads ca. 2 cm across, numerous in narrow cylindrical panicles; involucre tubular, 10–13 mm high at flowering, 13–15 mm high after flowering; phyllaries in 3–4 series, imbricate. Flowers throughout the year; florets 20–30 per head, corolla yellowish-violet or pale yellow.

Habitat: on paths and clearings in evergreen forests with bamboo at streams, 1200 m alt.

Specimens examined: [N] Chiang Mai: Khun Klong, 15 km NW of Doi Chiang Dao (7–1968, Larsen *et al.* 2943 AAU, BKF, C, L, P); NW side of Doi Chiang Dao (2–1983, Koyama *et al.* T-33184 KYO).

Distribution: This is the first record from Thailand for *Lactuca indica*, though *L. indica* is widely distributed in E. Asia from Japan to Java through China and SE. Asia.

2. ***Lactuca parishii*** Craib ex Hoss. in Bot. Centralb. Beih. 28, 2: 457 (1911), in Kew Bull., 1911: 403 (1911); Kerr, Fl. Siam. Enum., 2 (3): 297 (1936). Type from Moulmein, Burma.—*Ixeris parishii* (Craib ex Hoss.) Kitam. in Acta Phytotax. Geobot., 23: 140 (1969).

'*Lactuca alatipes* Coll. et Hemsl.': Kerr, Fl. Siam. Enum., 2 (3): 297 (1936).

Erect herbs, to 200 cm tall. Leaves radical and cauline; radical leaves sometimes persistent at flowering, to 50 cm long, to 15 cm wide, oblanceolate, apex acute or acuminate, lyrate-pinnatifid; the terminal segment sagittate, to 20 cm long, margin

sinuate, dentate; lateral segments 2–4, gradually reduced to the long narrow petiole, petiole winged, 7–15 cm long; cauline leaves 3–5, gradually smaller. Heads ca. 2.5 cm across, many per panicle; involucre tubular, ca. 10–11 mm high, phyllaries in 2–3 series, margin purple, innermost phyllaries 8 in 1 series. Florets 11–13 per head, corolla white or pale purple, corolla teeth and stigma purple. Chromosome number $2n=18$ (Shimizu & Koyama, 1984).

Habitat: roadsides in dry dipterocarp forests, bamboo thickets and evergreen forests, 300–1500 m alt.

Specimens examined: [N] Chiang Mai: Doi Suthep (9–1949, Suvarnakoset 53 TNS; Ploenchit 53 BKF; Cockesell s. n. US), 700–900 m (3–1905, Hosseus 454 P), 900–1150 m (Sorensen *et al.* 2850 BKF, C, 6695 BKF, C, 6696 C; 12–1965, Iwatsuki & Fukuoka T-3965 BKF, KYO); Doi Suthep-Pui, 1450–1500 m (Koyama *et al.* T-33613 KYO; Koyama & Nagamasu T-40118 KYO); Hoet That to Muong Khu (2–1958, Ogawa *et al.* OCUBE 216–50 KYO); Mae Pan waterfall, 1110–1400 m, Doi Inthanon (Koyama *et al.* T-32140 KYO; Koyama & Nantasan T-40105 BKF, KYO); Pangboh-Khunkhong, 1200 m (Smitinand 8751 BKF); along route 1019, Chiang Rai to Chiang Mai, 930 m (Koyama *et al.* T-33557 KYO); along route 109, Fang to Chiang Rai, 900–1100 m (Koyama *et al.* T-33468 KYO); Mae Sao Watershed Management Station, 1250–1500 m (Koyama *et al.* T-33394 KYO); Doi Chiang Dao, 500–1510 m (12–1931, Put 4405 BK, P; Koyama *et al.* T-33281 KYO). Chiang Rai: Doi Tung, 1400 m (Koyama *et al.* T-33527 KYO). Lampang: Doi Khun Tan, 1000–1250 m (Koyama & Phengkklai T-39194 A, KYO). Mae Hong Son: near Hmo Paeng waterfall, 850 m (Koyama *et al.* T-32531 KYO); Doi Chong, 1450 m (Hansen & Smitinand 12628 C). Phrae: Mae Kray, 700 m (Beusekom *et al.* 4770 BKF, C, L, MO). Tak: Wang Tao, 600–700 m (Sorensen *et al.* 1037 C). [NE] Khonkaen: Phu Khieo Game Reserve, 850–900 m (Murata *et al.* T-50065 KYO). Loei: Phu Kradung, 300–900 m (Shimizu *et al.* T-22563 KYO; Koyama *et al.* T-31439 KYO). [SW] Kanchanaburi: Khao Kam Phaeng, Tham Than Lod National Park, 1100–1370 m (Shimizu *et al.* T-22065, T-22087, T-22090 KYO; Koyama *et al.* T-30525 KYO; H. Koyama 7986 KYO); Srisawat, 300 m (1–1926, Kerr 10228 BK, P); Tham Nam (Larsen 9325 C).

Distribution: Burma (Dickason 9110 A) and Thailand.

3. ***Lactuca sagittarioides*** C. B. Clarke, *Comp. Ind.*, 265 (1876). Type from Nepal.—*Ixeris sagittarioides* (C. B. Clarke) Stebbins in *Journ. Bot., Lond.*, **75**: 51 (1937).

Perennial herbs with thick rhizomes; leaves all radical, long-petioled, sagittate, 6–9 cm long and wide, apex acute or obtuse, margin entire or denticulate, petiole 12–30 cm long; flowering stem erect, corymbosely branched above, to 55 cm tall, inflorescence glandular hairy. Involucre tubular ca. 7 mm high, phyllaries in 3–4 series; innermost phyllaries 8 in 1 series, outer longest phyllary half as long as inner ones. Florets ca. 14 per head, corolla yellowish. Achenes dark purple, the body 3.5 mm

long, the beak 0.5 mm long.

Habitat: in pine forests and open evergreen forests, 900–1600 m alt.

Specimens examined: [N] Chiang Mai: Doi Suthep (4–1958, Sorensen *et al.* 2876 C; 3–1965, C. H. & B. S. 302 BKF); Doi Ang Khang (Sadakorn 326 BK); Tin Tok, Chiang Dao (Chermisrivathana 296 BK); along Mae Klang Phat river, 940–1010 m, Doi Inthanon (8–1988, Koyama T-61094 KYO).

Distribution: This is the first record from Thailand for *Lactuca sagittarioides* which is distributed from the Himalayas to Thailand through Upper Burma.

3. *Ixeris* Cass.

Only one species is confirmed in rather high elevations in the mountains, although about fifty species are distributed in E. & SE. Asia to New Guinea.

1. *Ixeris siamensis* (Kerr) Stebbins in Journ. Bot., **75**: 51 (1937).—*Lactuca siamensis* Kerr in Kew Bull., **1935**: 333 (1935). Type from Kao Kradung, Thailand.

Perennial herbs, stem erect, simple, 30 to 55 cm tall. Leaves chiefly radical, 6 to 12, linear spathulate, 9 to 45 cm long including the petiole, apex acute or acuminate, base long attenuate, petioles 4 to 14 cm long; cauline leaves 1 to 3, lanceolate or linear, 4–9 cm long, 1–3 cm wide. Heads 10 to 14, in a corymb; involucre tubular, 7–9 mm high, phyllaries in 2–3 series, innermost phyllaries linear, 8 in 1 series, outer phyllaries triangular, ca. 0.7 mm long, Florets 11–13 per head, corolla yellowish white or yellow. Pappus brownish white, 5–6 mm long.

Habitat: on mossy ground by streams in deciduous forests or in mixed forests with diterocarp and pine, 350–1300 m. alt.

Specimens examined: [N] Chiang Mai: Pine Improvement center, Mae Sa Nam (1–1994, Koyama T-62195 TNS); Mae Sa Nam (1–1983, Koyama *et al.* T-32378 KYO); along 1099, Omkoi Distr. (1–1983, Koyama *et al.* T-32257, KYO, TNS); Om Koi (1–1964, Hansen *et al.* 10823 BKF, C, L, P; 1–1994, Koyama T-62196 TNS); 5 km E of Bo Luang (2–1959, Sorensen *et al.* 7050 C); E of Fang (2–1958, Sorensen *et al.* 1792 C). [NE] Loei: Wang Sapung (Dee 21 BKF); Sra Kaew, Phu Kradung (3–1958, Smitinand 4499 BKF); Kao Kradung (3–1924, Kerr 8714 BK, P-type; Suvatibandhu 138 BK).

Distribution: Endemic to Thailand.

2. *Ixeris gracilis* (DC.) Stebbins in Journ. Bot., **75**: 50 (1937); Kitamura & Gould in Hara *et al.* ed., Enum. Fl. Pl. Nepal., **3**: 31 (1982).—*Lactuca gracilis* DC., Prodr., **7**: 140 (1938); Kerr, Fl. Siam. Enum., **2** (3): 297 (1936). Type from Nepal.

Distribution: Japan, China and Himalayas.

Since Thorel's collection (Kerr, 1936), no specimen has been made. The specimen (in P) which was collected from Tonkin is not *Ixeris gracilis*, but can be identi-

fied as *Ixeris makineana* Kitam.

4. **Launaea** Cass.

About forty species are distributed in the Mediterranean region to E. Asia and tropical and South Africa. Only two species are confirmed in Thailand.

Key to the species

- A. Erect herbs. ----- 1. *L. acaulis*
 A. Procumbent herbs. ----- 2. *L. sarmentosa*

1. ***Launaea acaulis*** (Roxb.) Babcock ex Kerr, Fl. Siam. Enum., **2** (3): 299 (1936).—*Prenanthes acaulis* Roxb., Fl. Ind., **3**: 403 (1832). Type from India.—*Crepis acaulis* (Roxb.) Hook. f., Fl. Brit. Ind., **3**: 396 (1881); Gagnep. in Lecomte, Fl. gen. de l'Indo-Chine, **3**: 644 (1924).

'*Launaea tonkinensis* (Gagnep.) Babcock ex Kerr': Kerr, Fl. Siam. Enum., **2** (3): 300 (1936).

This species is characterized by having long, cylindrical roots, ca. 8 mm across and more than 20 cm long.

Perennial herbs with thick, woody, cylindrical roots, ca. 8 mm across, 20 cm long or more; flowering stems much branched from near the base, erect, 10 to 20 cm tall, the upper part dichotomously branched. Leaves chiefly radical, 5 to 7, obovate-spathulate linear or lanceolate, 5–11 cm long, 6–13 mm wide, margins subentire, mucronate apex of young leaves hooked; cauline leaves few, linear, 3 cm long, 2 mm wide, scalelike. Heads 2 to 4 on dichotomous branches; involucre tubular, ca. 13 cm high; phyllaries in 3 series, innermost phyllaries 8 in 1 series, outer longest phyllary half as long as inner ones. Florets 10–12 per head, corolla yellow or yellowish white.

Habitat: on moist soil of grasslands in open deciduous forests, 200–1100 m alt.

Specimens examined: [N] Chiang Mai: Chiengmai (3–1905, Hosseus 442 P), Doi Suthep (3–1929, Kerr 1727 BO, C*, P); Hod (3–1977, Nimanong & Phusomsaeng 1711 BKF*); 5 km E of Bo Luang (2–1958, Sorensen *et al.* 7045 C**); Bo Luang tableland (2–1979, T. Koyama *et al.* 15501 AAU; Wongprasert 63 KYO); Pangboh (Smitinand 8694 BKF); Doi Chiang Dao (3–1958, Rhantchai 833 BKF). [NE] Loei: Phu Kradung (3–1958, Sorensen *et al.* 2384 C*; 3–1952, Smitinand 1197 BKF, TNS). Nakhon Phanom: Muk Dahan (5–1932, Kerr 21448 BK). Phetchabun: Nam Nao National Park (2–1977, Santisuk 921 BKF*). Sakon Nakhon: Wanawn (2–1924, Kerr 8499 BK, C*, P). [E] Chaiyapum: Pu Kio (2–1931, Kerr 20198 BK); N of Pie Mai (3–1958, Sorensen *et al.* 2153 BKF, C**). [SW] Kanchanaburi: Tham Pha (12–1961, Phengklai 338 BKF, C*, L); Thung Kang Yang (12–1961, Larsen 9020 C**).

Pollen grains of some herbarium specimens were examined microscopically. In the list of specimens examined, specimens marked with two asterisks have abnormal pollen grains, and those with one have normal pollen grains. In the case of Japanese *Taraxacum* (Morita, 1976) and the *Ixeris dentata*-complex (Koyama, 1978), normal pollen grains were observed in the diploids and abnormal ones in the triploids.

Distribution: Nepal, Bhutan, Thailand, Laos (2–1877, Harmand 1141 P) and Hainan.

2. ***Launaea sarmentosa*** (Willd.) Sch.-Bip. ex O. Ktzt., Rev. Gen., 1: 350 (1891); Kerr, Fl. Siam. Enum., 2 (3): 299 (1936); Jeffrey in Kew Bull., 18 (2): 468 (1965); Grierson in Rev. Handb. Fl. Ceylon, 1: 276 (1980).—*Prenanthes sarmentosa* Willd., Phyt., 10, t. 6, fig. 2 (1794). Type from India.

Stem procumbent, long flagelliform rooting and leafing at the nodes. Heads at the nodes solitary or clustered; peduncles 1–3 cm long with 5–13 bracts; involucre tubular, ca. 10 mm high, phyllaries with white membranous margins in 3–4 series, imbricate, innermost phyllaries 8 in 1 series, outermost phyllary nearly equal to the bracts of peduncles in shape and size. Florets 8–10 per head, corolla yellow. Achenes immature, constricted at the upper part. Pappus white, 7–9 mm long.

Habitat: on sandy beaches.

Specimens examined: [SW] Prachuap Khiri Khan: Hua Hin (11–1927, Kerr 13515 BK). [P] Krabi: Lan Ta National Park (1–1992, Niyomdham 2850 TNS). Phangnga: Takuapa (Abbe *et al.* 9682 BKF). Phuket: Khao Pateaw Wildlife Sanctuary (12–1979, Shimizu *et al.* T-27255 KYO), Kamala beach (Niyomdham *et al.* 232 BKF). Ranong: Koh Kho Khao island (7–1972, Larsen *et al.* 31024 AAU, BKF); Bang Ben (1–1929, Kerr 16647 BK; Shimizu *et al.* T-29243 BKF); Kaw Naka (3–1929, Kerr 17373 BK).

Distribution: E. Africa, Mauritius, India (R. F. Hohenacker 193 TNS), Ceylon (Fosberg 53532 KYO), Thailand, Malaysia (ex Grierson, 1980), Hainan (6–1940, M. Mori s.n. TNS) and Hongkong (Tsang 29748 KYO)

3. ***Launaea asplenifolia*** (Willd.) Hook. f., Fl. Brit. Ind., 3: 415 (1881); Gagnep. in Lecomte, Fl. gen. de l'Indo-Chine, 3: 648 (1924); Kerr, Fl. Siam. Enum., 2 (3): 299 (1936).—*Prenanthes asplenifolia* Willd., Sp. Pl., 3: 1540 (1804). Type from India.—*Microrhynchus asplenifolius* (Willd.) DC., Prodr., 7: 181 (1838).

Distribution: India (ex Gagnepain, 1924), Bengal (Jenkins AAU), Burma (ex Gagnep.), Thailand (ex Gagnep.) and Laos (ex Gagnep.).

No specimen has been collected since we began our field survey in Thailand in 1964.

5. *Crepis* L.

More than 200 species are known mostly from the Northern Hemisphere. Only two species are confirmed in Thailand and are distributed from Burma and Yunnan to northern SE. Asia.

Key to the species

- A. Stem suberect, the upper half bent; leaves linear-lanceolate, ca. 6 cm long, 5 mm wide. ----- 1. *C. chloroclada*
 A. Stem erect, straight, 20–40 cm tall, leaves linear, scale-like, 5–10 mm long, ca. 0.5 mm wide. ----- 2. *C. lignea*

1. ***Crepis chloroclada*** Coll. et Hemsl. in Journ. Linn. Soc., **28**: 78 (1890); Babcock in Univ. Calif. Publ. Bot., **22**: 647, f. 197 (1947). Type from Burma.

'*Crepis lignea* (Vant.) Babcock': Kitam. in Acta Phytotax. Geobot., **23**: 78 (1968), p. p.

Perennial herbs from a woody tap root, stem suberect, stiff, bending, 25 to 50 cm tall, branched from near the base, dichotomously branched above. Radical and lower cauline leaves scale-like; middle and upper cauline leaves linear-lanceolate, to 11 cm long, to 10 mm wide, margins strongly retrorsely revolute. Heads 2 on the terminal of dichotomous branch, peduncles with short crisped hairs, 0.5–2.5 cm long; involucre tubular, ca. 7 mm high, phyllaries in 2 series, inner phyllaries 8. Florets 8–12 per head.

Habitat: somewhat moist ground in deciduous forests and pine forests, 850–1650 m alt.

Specimens examined: [N] Chiang Mai: 30 km S of Bo Luang, 1100 m (Larsen *et al.* 2039 AAU, BKF); Doi Suthep, 1250–1300 m. (Kerr 1108 BO, C, L, P), 1450 m (Sorensen *et al.* 3629 BKF, C), 1650 m (7–1989, Maxwell 89-852 A); SW-part of Doi Chang, 1300 m (Shimizu *et al.* T-20685 A, KYO); Doi Inthanon, 940–1010 m (Koyama T-61095 A, KYO); Mae Tho, 900–1200 m (Koyama *et al.* T-32320 KYO). Lampang: Doi Khun Tan, 850–1000 m (Smitinand 12082 BKF; Koyama T-9342 KYO; Koyama & Phengklai T-39900 KYO). [NE] Khon Kaen: Nam Nao National Park (Shimizu *et al.* T-18300 KYO).

Distribution: Burma (Dickason 7432 L), Yunnan (4-1895, Soulie 1421 A), Annan (Poilane 3978, 22533 P; Chevalier 40596 P) and Thailand.

2. ***Crepis lignea*** (Vant.) Babcock in Univ. Calif. Publ. Bot., **22**: 644, pl. 14, f. 196 (1947); Kitam. in Acta Phytotax. Geobot., **23**: 78 (1968), p.p.—*Lactuca lignea* Vaniot in Bull. Acad. Geogr. Bot., **12**: 318 (1903). Type from Kweichow, China.

'*Crepis chloroclada* Coll. et Hemsl.': Kerr, Fl. Siam. Enum., **2** (3): 296 (1936).

Perennial herbs from woody roots, stems erect, stiff, 15 to 45 cm tall, remotely branched from near the base upward. Radical and lower leaves withering before flowering; middle cauline leaves linear, 5–10 mm long, ca. 1.0 mm wide. Heads usually 2, on the terminal of dichotomous branch; peduncles 0.5 to 5 cm long, sometimes with glandular hairs; involucre cylindrical campanulate, 7–9 mm high, phyllaries in 2 series, dorsally gland-pubescent, inner phyllaries 8 in 1 series. Florets 8–11 per head.

Habitat: in dry deciduous forests and rather open forests mixed with pine, oak and dipterocarp, 470–1300 m alt.

Specimens examined: [N] Chiang Mai: Doi Chiang Dao, 5000 ft. (3–1937, Deignan 1516 A); Doi Suthep, 1250–1300 m (Sorensen *et al.* 2543, 2874 C); Mae Sa Nam, 1100 m (Koyama *et al.* T-32400 KYO). Lampang: Doi Khun Tan, 900 m (Tagawa *et al.* T-9121 KYO; Koyama & Phengklai T-39013 KYO; H. Koyama 7988 KYO). Tak: Wang Tao, 470 m (Sorensen *et al.* 3246 C). [NE] Loei: Phu Kradung, 1045–1300 m (Floto 7430 C; Dee 250 BKF). Phetchabun: Nam Nao National Park, 850 m (without record of collector 91 BKF).

Distribution: Yunnan (4–1914, Schneider 867 A; 5–1934, Tsai 62038 A; 6–1892, M. Tanant s.n. P; Ducloux 195, 3240 P), Annam (Chevalier 40923 P), Laos (Peltot 2053 A) and Thailand.

3. *Crepis coronopus* Gagnep. in Bull. Soc. Bot. Fr., **68**: 48 (1921); Kerr, Fl. Siam. Enum., **2** (3): 296 (1936).

Distribution: Tonkin (ex Gagnepain, 1924) and Thailand (ex Gagnepain.).

Since Thorel's collection (Gagnepain, 1924), we have not collected any material of this species from Thailand. Further field surveys are necessary to make sure of its presence in Thailand.

6. *Paraixeris* Nakai

This genus is characterized by having capillary bristles of pappus in 1 series which are dropping off separately one by one. Six species are known in Japan, Korea, NE., E. & SW. China and SE. Asia. Only one species is confirmed in Thailand.

1. *Paraixeris sonchifolia* (Bunge) Tzvel., Fl. URSS, **29**: 399 (1964); Kitagawa, Neo-Lineament Fl. Mansh., 664 (1979), non Willdenow. (1804).—*Prenanthes sonchifolia* Bunge in Mem. Sav. Etrang. Sci. St.-Pet., **2**: 114 (1832). Type from NE. China.

Lactuca riparia Kerr in Kew Bull., **1935**: 333 (1935). Type from Ubon, Thailand.

Lactuca riparia described as compared with *Lactuca polycephala* Benth. can be identified as having capillary bristles of pappus in 1 series which are dropping off separately one by one in addition to much branched stem with amplexicaular leaves.

Annual herbs from a tap root, stem erect, to 40 cm tall, much branched. Leaves

radical and cauline; radical leaves oblanceolate, 2–7 cm long, 1.5–2.5 cm wide, pinnatifid, withering after flowering; cauline leaves ovate oblong, 1–6 cm, 0.5–2.0 cm wide, apex acuminate, base auriculate, clasping, margin entire, mucronate or irregularly dentate. Heads 7 mm across, in a corymb, peduncles slender, 2 to 14 mm long, involucre tubular, 4–6 mm high, phyllaries in 2 series, inner phyllaries lanceolate with white membranous margins, 8 in 1 series, outer phyllaries ovate with white membranous margins, ca. 1 mm long, ca. 0.5 mm wide. Florets ca. 20 per head. Achenes fusiform, the body black, 2.0–2.5 mm long, the beak brownish black, ca. 0.8 mm long. Pappus bristles snow white in 1 series, dropping off separately.

Habitat: banks of the Mekong river, 200 m alt.

Specimens examined: [NE] Nongkhai: Chaiyaburi (3–1932, Kerr 20707 BK). [E] Ubon Ratchathani: Chanuman (2–1924, Kerr 8386 BK-type of *Lactuca riparia*)

Since Kerr's collection, no specimen has been collected in Thailand.

Distribution: NE. E. SW. China and SE. Asia.

7. *Youngia* Cass.

Only one species is confirmed in Thailand, though *Youngia* contains over 35 species in temperate and tropical Asia.

1. *Youngia japonica* (L.) DC., Prodr., 7: 194 (1838); Kitam. in Acta Phytotax. Geobot., 24: 19 (1969).—*Prenanthes japonica* L., Mant., 1: 107 (1767). Type from Japan.—*Crepis japonica* (L.) Benth., Fl. Hongk., 194 (1861); Kerr, Fl. Siam. Enum., 2 (3): 297 (1936).

Annual herbs from tap roots; stems erect, 8 to 90 cm tall. Leaves mainly or all radical, few cauline; radical leaves mostly lyrate-pinnatifid, the terminal segment larger than lateral ones, elliptical, ovate, obovate or oblong-truncate. Heads cymose-corymbiform; involucre tubular, 3.5–5.0 mm high, phyllaries in 2 series, inner phyllaries ca. 8. Florets 10–20 per head, corolla yellow. Achenes light brown to dark reddish brown, 1.5–2.5 mm long. Pappus bristles capillary, fine, numerous and white.

Habitat: on sunny roadsides in rural places or old clearings, cultivated fields or at the edges of evergreen forests, 200–1600 m alt.

Specimens examined: [N] Chiang Mai: Doi Suthep (Shimizu *et al.* T-18686 BKF, KYO, SHIN); Khunklong (5–1965, Smitinand 8776 BKF, TNS); Doi Chiang Dao (10–1979, Shimizu *et al.* T-20893 BKF, KYO); Maetuen to Nang Kruan waterfall (Shimizu *et al.* T-19247 KYO). Chiang Rai: Doi Tung (Iwatsuki *et al.* T-11085 BKF, KYO, TNS). Phitsanulok: Nakawn Tai (4–1924, Kerr 8887 BK). Tak: Doi Mus-sor (12–1960, Smitinand 7020 BKF, TNS). [NE] Nong Khai: Chaiyaburi (3–1932, Kerr 20708 BK). Phetchabun: Nam Nao National Park (T. Santisuk 923 BKF).

Distribution: Japan, China, Thailand and Ceylon (Walker s.n. AAU).

8. **Sonchus** L.

About fifty species are known from Eurasia and tropical Africa to Atlantic Islands. Only two species are confirmed in Thailand. All species are weedy in habit and grow on roadsides or in rural places.

Key to the species

- A. Perennial herbs with long rhizomes; heads 3–3.5 cm across, ca. 200 florets per head. ----- 1. *S. wightianus*
- A. Annual or biennial herbs without rhizomes; heads ca. 2 cm across, ca. 160 florets per head. ----- 2. *S. oleraceus*

1. **Sonchus wightianus** DC., Prodr., 7: 187 (1838); Gould in Hara *et al.* ed., Enum. Fl. Pl. Nepal., 3: 43 (1982). Type from India.

‘*Sonchus arvensis* L.’: Kerr, Fl. Siam. Enum. 2 (3): 298 (1936); Kitamura in Acta Phytotax. Geobot., 24: 9 (1969).

Slightly glaucous perennial herbs from long creeping rhizomes, stems erect, 70 to 120 cm tall. Leaves radical and cauline, lower surface glaucous; radical leaves oblanceolate, 19–27 cm long, 2–4 cm wide, scarcely lobed; cauline leaves 4 to 9, lanceolate to linear lanceolate, 5–23 cm long, 0.5–2.0 cm wide; base obtusely rounded, auriculate-clasping. Heads 4–5 cm across, 12 to 24 in pseudo-umbel; peduncles to 10 cm long. Florets ca. 200 per head, corolla yellow; corolla tube 6 mm long, pubescent. Pappus white or slightly yellowish, 9–11 mm long.

Habitat: on sunny roadsides in rural places or in old clearings, at edges of mossy evergreen forests, usually growing at higher elevation from 1000 m to 2550 m, or at lower elevations of 400–900 m in limestone areas.

Two subspecies occur in our area. The type subspecies is characterized by having peduncles and involucreal phyllaries with stipitate glandular hairs, while the other subspecies lacks hairs on these structures.

subsp. **wightianus**

Sonchus arvensis L. var. *arvensis*

Specimens examined: [N] Chiang Mai: Khun Khon (3–1965, Smitinand 8773 BKF, TNS), Maetuen to Nang Kruan waterfall (Shimizu *et al.* T-19251 KYO); Doi Chiang Dao (11–1922, Kerr 6560 BK; Shimizu *et al.* T-20860 BKF, KYO, T-20892 KYO); Doi Inthanon (Shimizu *et al.* T-18893 BKF, KYO; Konta *et al.* T-29840 BKF, KYO; Koyama *et al.* T-32072 KYO, T-32089-bis BKF; Koyama & Phengklai T-40003 KYO; 8–1988, Koyama & Fukuoka T-62461 TNS; Yahara T-50294 KYO; 2–1998, Konta & Phengklai 3932 TNS); Mae Sao Watershed Management Station (Koyama *et al.* T-33370 KYO). Chiang Rai: Doi Tung (9–1967, Iwatsuki *et al.* T-11062 KYO; Koyama *et al.* T-33528 KYO). Mae Hong Son: Hmo Paeng waterfall (Koyama *et al.*

T-32516 KYO).

subsp. **wallichianus** (DC.) Boulos in B. Not., **125**: 297 (1972); Gould in Hara *et al.* ed., Enum. Fl. Pl. Nepal., **3**: 44 (1982).—*Sonchus wallichianus* DC., Prodr. **7**: 185 (1838). Type from India.

‘var. *laevipes* Koch’; Kitamura in Hara, Fl. East. Himal., **345** (1966).

Peduncles and involucreal phyllaries without glandular hairs.

Specimens examined: [N] Chiang Mai: Doi Chiang Dao (Koyama *et al.* T-39714 KYO); Sam Muen headquarter (Koyama *et al.* T-32742 KYO); Doi Inthanon (Bjornland & Schumacher 595 BKF; Shimizu *et al.* T-18909 BKF, KYO; Koyama *et al.* T-31992 BKF, KYO, T-32071, T-32089 BKF, KYO; Koyama & Phengkklai T-40003-bis KYO); Maetuen to Nang Kruan waterfall (Shimizu *et al.* T-19191 BKF, KYO); Huay Maelid bridge (Koyama *et al.* T-32446-bis BKF, KYO). Tak: Doi Mussor (Smitinand 7021 BKF); Ban Mussor (Floto 7655 KYO); Khao Phra War (Koyama *et al.* T-32844 BKF, KYO).

Distribution (of species): This species occurs only in the northern floristic region of Thailand, though it has been reported to be a widespread weed.

2. **Sonchus oleraceus** L., Sp. Pl., 794 (1753); Gould in Hara *et al.* ed., Enum. Pl. Nepal., **3**: 43 (1982). Type from Europe.

‘*Sonchus asper* Hill.’; Kerr, Fl. Siam. Enum., **2** (3): 299 (1936).

Nearly glabrous annual or biennial herbs; stem erect, 50 to 110 cm long, often branched, hollow; lower leaves oblong, 8–17 cm long, 4–8 cm wide, pinnately parted to runcinate-pinnatifid, base auriculate clasping. Heads ca. 2 cm across, 10 to 20 in pseudo-umbel; peduncles to 4.0 cm long, stipitate glandular hairy. Florets ca. 160 per head, corolla pale-yellow, corolla tube ca. 4 mm long, densely white pubescent. Pappus white, 7–9 mm long.

Habitat: on roadsides in cultivated fields, 1500–1800 m alt.

Specimens examined: [N] Chiang Mai: Doi Chiang Dao (Shimizu *et al.* T-20941 BKF, KYO; 11–1984, Koyama *et al.* T-39734 A, BKF, KYO). Chiang Rai: Doi Tung (Anderson 5389 A).

Distribution: a widespread weed of European origin, not frequent in Thailand.

Acknowledgment

Specimens examined are kept in the Harvard University Herbaria (A), U.S.A., Aarhus University (AAU), Denmark, Kyoto University (KYO), Japan, in the Museum of Natural History at Copenhagen (C), Denmark, at Leiden (L), Netherlands, at Paris (P), France, at Stockholm (S), Sweden, at Bangkok (BK, BKF), Thailand, in the Botanical Garden of Bogor (BO), Indonesia, Missouri (MO) and New York (NY), U.S.A. and Singapore (SING). Several type specimens in addition to general collections from Southeast Asia were very helpful in obtain the delimitation of each

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References

- Koyama, H., 1978. Distribution of diploids, triploids and tetraploids identified by pollen grains in *Ixeris dentata* (Thunb.) Nakai *sens. lat.* in Japan. *Proc. Japan Soc. Pl. Taxon.*, **4** (1): 1–3.
- Morita, T., 1976. Geographical distribution of diploid and polyploid *Taraxacum* in Japan. *Bull. Natn. Sci. Mus., Ser. B*, **2** (1): 23–38.
- Shimizu, M. & H. Koyama, 1984. On the chromosome number of *Lactuca parishii* and *L. sororia*. *Acta Phytotax. Geobot.*, **35**: 58.
- The other references in the text are cited in the list of synonymy.