

## 2. Tribe ECHINOPEAE

蓝刺头族 lan ci tou zu

Shi Zhu (石铸 Shih Chu); Werner Greuter

Herbs, perennial or rarely annual. Leaves alternate. Synflorescence a compact globose pseudocephalium. Capitula with 1 floret, surrounded by crowded bristles at base. Phyllaries imbricate. Floret bisexual. Corolla actinomorphic. Stamen filaments glabrous; anther sagittate, with short basal appendages; connective with a sterile apical appendage. Style branches divergent, linear. Achene cylindrical, angled, densely hairy, lacking an apical rim surrounding pappus insertion. Pappus of scales, inserted directly on upper edge of achene.

One genus and ca. 120 species: Africa, Asia, Europe; 17 species (five endemic) in China.

## 10. ECHINOPS Linnaeus, Sp. Pl. 2: 814. 1753.

蓝刺头属 lan ci tou shu

*Acantholepis* Lessing.

Herbs, perennial or rarely annual. Stems erect, usually apically branched, mostly cobwebby to lanate or glandular hairy or both. Leaves spiny. Pseudocephalia usually solitary, terminal to stem and branches, rarely clustered, bracteate at base. Capitula deciduous, inserted on a globose secondary receptacle. Basal phyllaries grading into bristles; middle phyllaries keeled and distally with a ciliate margin, apex usually spiny; inner phyllaries often shorter, unarmed, distinct to completely connate. Corolla white, blue, or purple. Anthers bluish gray. Achene covered with long straight appressed hairs. Pappus scales distinct to connate, inserted directly on apical plate.

About 120 species: Africa, Asia, Europe; 17 species (five endemic) in China.

*Echinops albicaulis* Kamelin & Kirilov and *E. chantaviscus* Trautvetter have been reported from Xinjiang (G. M. Shen, Fl. Xinjiang. 5: 238, 241. 1999), but they are not included in the following treatment and key because no material from China has been seen by the present authors.

- 1a. Annuals; middle phyllaries abaxially cobwebby.
  - 2a. Stems and branches yellowish, glabrous or with glandular hairs; leaves green, sparsely cobwebby and glandular hairy ..... 16. *E. gmelinii*
  - 2b. Stems and branches whitish to canescent, densely cobwebby to lanate; leaves grayish white, densely cobwebby to lanate ..... 17. *E. nanus*
- 1b. Perennials; middle phyllaries glabrous or strigose but not abaxially cobwebby.
  - 3a. Margin of pappus scales not strigose.
    - 4a. Leaves linear to linear-lanceolate, undivided and with an entire margin, discolorous, abaxially grayish white, adaxially green and glabrous ..... 14. *E. integrifolius*
    - 4b. Leaves elliptic to oblanceolate, margin dentate to bipinnatifid, concolorous, cobwebby to lanate ..... 15. *E. humilis*
  - 3b. Margin of pappus scales strigose.
    - 5a. Leaves leathery.
      - 6a. Outermost phyllaries 1/3–1/2 as long as involucre.
        - 7a. Lower leaves lanceolate, undivided but toothed, adaxially glabrous and shiny ..... 1. *E. coriophyllus*
        - 7b. Leaves elliptic, elliptic-lanceolate, or oblanceolate, pinnatifid to bipinnatifid, adaxially sparsely cobwebby ..... 2. *E. przewalskyi*
      - 6b. Outermost phyllaries 1/5–1/4 as long as involucre.
        - 8a. Plants to 1.5 m tall; stems sparsely cobwebby, strigose, and with glandular hairs ..... 4. *E. talassicus*
        - 8b. Plants 0.2–0.6 m tall; stems cobwebby to lanate and strigose but lacking glandular hairs.
          - 9a. Corolla lobes outside glabrous ..... 3. *E. ritro*
          - 9b. Corolla lobes outside with a few hairs ..... 5. *E. tjanschanicus*
    - 5b. Leaves ± thickly papery.
      - 10a. Phyllaries abaxially strigose.
        - 11a. Leaves adaxially glabrous or sparsely cobwebby ..... 12. *E. tricholepis*
        - 11b. Leaves adaxially densely strigose ..... 13. *E. sphaerocephalus*
      - 10b. Phyllaries abaxially glabrous.
        - 12a. Stems glabrous to densely cobwebby in lower half but lacking bristles.
          - 13a. Lobes of lower and middle cauline leaves densely spinulose ciliate ..... 6. *E. grijsii*
          - 13b. Lobes of lower and middle cauline leaves entire or with irregular spiny teeth ..... 7. *E. davuricus*
        - 12b. Stems cobwebby and beset with bristles in lower half.
          - 14a. Leaves rough, adaxially sparsely strigose ..... 11. *E. setifer*

- 14b. Leaves smooth, glabrous or adaxially sparsely cobwebby.  
 15a. Outermost phyllaries ca. 1/4 as long as involucre; plants 1.5–2 m tall ..... 10. *E. sylvicola*  
 15b. Outermost phyllaries 1/3–1/2 as long as involucre; plants 0.3–1 m tall.  
 16a. Leaves pinnatipartite; phyllaries 18–22 ..... 8. *E. pseudosetifer*  
 16b. Leaves bipinnatisect; phyllaries 16–19 ..... 9. *E. dissectus*

**1. *Echinops coriophyllus*** C. Shih, Bull. Bot. Lab. N. E. Forest. Inst., Harbin 5: 63. 1979.

截叶蓝刺头 jie ye lan ci tou

Herbs to 45 cm tall, perennial. Stem solitary, branched below middle, sparsely cobwebby. Leaves leathery, abaxially gray to grayish green and thinly cobwebby, adaxially green, glabrous, and shiny. Lower cauline leaves sessile, lanceolate, ca. 10.5 × 5.5 cm, base truncate, margin with spine-tipped teeth. Middle cauline leaves similar but gradually smaller upward. Uppermost cauline leaves lanceolate to elliptic. Pseudocephalia ca. 4 cm in diam. Capitula ca. 1.3 cm. Phyllaries 20 or 21, abaxially glabrous; outermost phyllaries oblanceolate, ca. 5 mm, unequal in length, 1/3–1/2 as long as involucre, claw margin sparsely long ciliate, distal portion broadly elliptic, cartilaginous, margin ciliate, and apex acuminate; middle and inner phyllaries oblanceolate to narrowly elliptic, 0.8–1.3 cm, distal half of margin sparsely shortly appressed ciliate. Florets ca. 1.3 cm. Corolla blue, glabrous, tube ca. 5 mm. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, to 2 mm, unequal in length, connate for up to proximal half. Fl. and fr. Jul.

- Mountain slopes. Jiangsu (Tongshan).

**2. *Echinops przewalskyi*** Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 108. 1923.

火烙草 huo lao cao

Herbs 15–40 cm tall, perennial. Stems solitary or tufted, unbranched or 1–3-branched, cobwebby to lanate. Leaves leathery, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green to yellowish green and sparsely cobwebby, margin and apex spiny. Basal and lower cauline leaves shortly petiolate; leaf blade elliptic, elliptic-lanceolate, or oblanceolate, 10–20 × 2–8 cm, bipinnatipartite or subbipinnatisect, with 5–8 pairs of segments and a triangular ultimate lobe. Middle and upper cauline leaves sessile, gradually smaller upward, pinnatipartite, semiamplexicaul. Pseudocephalia 1 to few, ± corymbose, 5–5.5 cm in diam. Capitula ca. 1.8 cm. Phyllaries 16–20, abaxially glabrous; outermost phyllaries oblanceolate, to 8 mm, unequal in length, at least 1/2 as long as involucre, claw margin sparsely long ciliate, distal portion broadly elliptic, cartilaginous, margin sparsely shortly ciliate, and apex acuminate; middle phyllaries oblanceolate, ca. 1.5 cm, margin long appressed ciliate, apex narrowed into an awn; inner phyllaries similar but longer. Corolla white or bluish, outside gland-dotted, tube ca. 5 mm. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, mostly ca. 1 mm, connate almost entirely. Fl. and fr. Jun–Aug.

- Sandy mountainous regions, desert steppes; 500–2200 m. C Gansu, Nei Mongol, Ningxia, SE Shandong, Shanxi, N Xinjiang.

Although C. Shih and Y. Ling (FRPS 78(1): 6. 1987) indicated that *Echinops przewalskyi* occurs in Mongolia, the species was not in-

cluded among the *Echinops* in Mongolia by V. I. Grubov (Key Vascular Pl. Mongolia 2: 665–666. 2001).

**3. *Echinops ritro*** Linnaeus, Sp. Pl. 2: 815. 1753.

硬叶蓝刺头 ying ye lan ci tou

*Echinops ritro* var. *tenuifolius* (Fischer ex Schkuhr) Candolle; *E. tenuifolius* Fischer ex Schkuhr.

Herbs 20–60 cm tall, perennial. Stems solitary or tufted, whitish to grayish white, unbranched or apically branched, densely cobwebby to lanate. Leaves leathery, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous or sparsely cobwebby. Basal and lower cauline leaves petiolate; leaf blade elliptic, oblanceolate, or linear-elliptic, 8–20 × 2–8 cm, pinnatipartite or subpinnatisect; proximal segments transformed into spines; distal segments elliptic to lanceolate, 5–8 pairs, with triangular, spiny, and spine-tipped teeth. Middle and upper cauline leaves similar but sessile, sometimes bipinnatisect. Pseudocephalia corymbose, rarely solitary, 3.5–4.5 cm in diam. Capitula 1.2–1.7 cm. Phyllaries 20 or 21, abaxially glabrous; outermost phyllaries oblanceolate, 3–4 mm, 1/5–1/4 as long as involucre, distal portion broadly elliptic, cartilaginous, margin shortly ciliate, and apex acuminate; middle phyllaries elliptic to oblanceolate, 1.3–1.5 cm, margin long patent ciliate in distal half, apex spinulose acuminate; inner phyllaries shorter. Corolla blue, tube gland-dotted outside. Achene ca. 5.5 mm, hairs brown. Pappus scales linear, ca. 1.2 mm, connate in proximal half. Fl. and fr. Jun–Aug.  $2n = 30, 32$ .

Gravelly places on mountain slopes; 400–2400 m. N Xinjiang [Kazakhstan, Mongolia, Russia, Turkmenistan; SW Asia, Europe].

Several subspecies were described from the European part of the species range. The Chinese plants possibly belong to *Echinops ritro* subsp. *ruthenicus* (M. Bieberstein) Nyman (*E. ruthenicus* M. Bieberstein).

**4. *Echinops talassicus*** Goloskokov, Bot. Mater. Gerb. Inst. Bot. Akad. Nauk Kazakhsk. S.S.R. 3: 52. 1965.

大蓝刺头 da lan ci tou

Herbs to 1.5 m tall, perennial. Stem solitary, grayish white, unbranched or branched up to twice, sparsely cobwebby to lanate and strigose, densely so under synflorescences. Leaves leathery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and densely gland-dotted. Lower and middle cauline leaves shortly petiolate; leaf blade oblanceolate, 15–20 × 2–8 cm, pinnatipartite or pinnatifid; segments elliptic, with triangular, spiny, and spine-tipped teeth. Upper cauline leaves similar but sessile, gradually decreasing in size upward, semiamplexicaul. Pseudocephalia 1 to few, 4–5 cm in diam. Capitula 2–2.5 cm. Phyllaries few; outermost phyllaries narrowly oblanceolate, 5–6 mm, unequal, ca. 1/4 as long as involucre, distal portion broadly elliptic and margin long ciliate;

middle phyllaries oblanceolate to narrowly elliptic, 0.8–2.5 cm, distal portion of margin shortly ciliate, apex spinulose acuminate; inner phyllaries narrowly elliptic, ca. 1.2 cm, apex cleft and awned. Corolla blue, tube outside gland-dotted. Achene ca. 5 mm. Pappus scales ca. 1 mm, connate almost entirely. Fl. and fr. Jul–Sep.

Mountain slopes. Xinjiang (Tian Shan) [Kazakhstan].

**5. *Echinops tjanschanicus*** Bobrov, Fl. URSS 27: 714. 1962.

天山蓝刺头 tian shan lan ci tou

Herbs 20–25 cm tall, perennial. Stems branched from base, sparsely to densely cobwebby to lanate. Leaves leathery, abaxially grayish white or white and densely cobwebby to thickly lanate, adaxially green, glabrous, and gland-dotted. Basal and lower cauline leaves shortly petiolate; leaf blade elliptic, 10–20 × 2–3 cm, pinnatifid or subpinnatifid; proximal segments transformed into spines; distal segments triangular-lanceolate to lanceolate, spiny. Middle and upper cauline leaves similar but sessile and gradually smaller upward, semiamplexicaul. Uppermost leaves narrowly elliptic to lanceolate, spiny toothed. Pseudocephalia solitary or paired, 3–4 cm in diam. Capitula 1.4–1.5 cm. Phyllaries 20–28; outermost phyllaries oblanceolate, 3–4 mm, unequal, 1/5–1/4 as long as involucre, distal portion brownish, broadly elliptic, cartilaginous, margin long ciliate, and apex shortly acuminate; middle phyllaries narrowly elliptic to lanceolate, 0.9–1.2 cm, distal half of margin long ciliate, abruptly constricted from middle into a spiny tip; inner phyllaries narrowly elliptic, ca. 1.3 cm, apex dentate. Corolla blue, tube outside gland-dotted, lobes abaxially with a few long hairs. Achene ca. 6.5 mm, hairs yellowish. Pappus scales linear, ca. 1 mm, unequal, connate at base. Fl. and fr. Jul–Sep.

Mountain slopes; ca. 2200 m. Xinjiang (Tian Shan) [Kazakhstan].

**6. *Echinops grijsii*** Hance, Ann. Sci. Nat., Bot., sér. 5, 5: 221. 1866.

华东蓝刺头 hua dong lan ci tou

*Echinops cathayanus* Kitagawa.

Herbs 30–80 cm tall, perennial. Stem solitary, apically usually branched, densely and thickly cobwebby, with fibrous petiole remains at base. Leaves papery, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green, glabrous, and not glandular. Basal and lower cauline leaves long petiolate; leaf blade ± narrowly elliptic, ovate, or ovate-lanceolate, 10–15 × 4–7 cm, pinnatifid; segments 4 or 5(–7) pairs, ovate-triangular to linear-elliptic, margin finely and densely spinulose. Middle cauline leaves similar but shortly petiolate or sessile. Pseudocephalia 1 to several, ca. 4 cm in diam. Capitula 1.5–2 cm. Phyllaries 24–28, glabrous, abaxially not gland-dotted; outermost phyllaries numerous, oblanceolate, 7–8 mm, unequal, ca. 1/2 as long as involucre, claw margin long ciliate in proximal half, distal portion brown, broadly elliptic, and margin shortly ciliate; middle phyllaries narrowly elliptic, ca. 1.3 cm, distal portion gradually constricted from middle into a spiny tip and margin shortly ciliate; inner phyllaries narrowly elliptic, ca. 1.5 cm, apex dentate. Florets ca. 1 cm. Co-

rolla white, tube outside gland-dotted. Achene ca. 1 cm, hairs brownish yellow. Pappus scales linear, ca. 3 mm, connate almost entirely. Fl. and fr. Jul–Oct.  $2n = 32+2B^*$ .

• Grasslands; 100–800 m. Anhui, Fujian, Guangxi, Henan, Hubei, Jiangsu, Jiangxi, S Liaoning, Shandong, Taiwan, Zhejiang.

**7. *Echinops davuricus*** Fischer ex Hornemann, Suppl. Hort. Bot. Hafn. 105. 1819.

驴欺口 lü qi kou

*Echinops davuricus* var. *angustilobus* Candolle; *E. davuricus* var. *latilobus* Candolle; *E. latifolius* Tausch; *E. latifolius* var. *manshuricus* (Kitagawa) C. Y. Li; *E. manshuricus* Kitagawa.

Herbs 30–60 cm tall, perennial. Stems grayish white, unbranched or with 1 or 2 short branches, with fibrous petiole remains at base, sparsely cobwebby to lanate or glabrous in lower part, densely cobwebby to thickly lanate below synflorescences. Leaves papery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous or sparsely cobwebby. Basal and cauline leaves long petiolate; leaf blade ± narrowly elliptic to lanceolate-elliptic, 15–35 × 8–18 cm, bipinnatifid, semiamplexicaul; segments 4–8 pairs; lobes entire or with few triangular spiny teeth, apex long acuminate. Uppermost cauline leaves sessile, pinnately lobed or pinnatifid, semiamplexicaul. Pseudocephalia 1–3, 3–5.5 cm in diam. Capitula ca. 1.9 cm. Phyllaries 14–17, abaxially glabrous; outermost phyllaries scalelike, oblanceolate, ca. 7 mm, ca. 2/5 as long as involucre, distal portion broadly rhombic to elliptic, margin long ciliate, and apex shortly acuminate; middle phyllaries oblanceolate, 1–1.3 cm, margin sparsely shortly ciliate, abruptly constricted from maximum width into a long spiny tip; inner phyllaries narrowly elliptic, ca. 1.5 cm, distal portion of margin shortly ciliate, apex spinulose acuminate. Corolla blue, tube outside gland-dotted. Achene ca. 7 mm. Pappus scales linear, ca. 1.2 mm, proximal half connate. Fl. and fr. Jun–Sep.

Grasslands, open forests; 100–2200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Shaanxi, Shandong, Shanxi [Mongolia, Russia].

Fischer's "*Echinops dauricus*" of 1812, a nomen nudum, was published twice independently in the same year, by Hornemann with the spelling "*davuricus*" and by Treviranus (Ind. Sem. Hort. Bot. Wratistlav., App. 1: 2. 1819) as "*dahuricus*." We treat these two names as published simultaneously and give precedence to the former.

**8. *Echinops pseudosetifer*** Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 2: 120. 1935.

羽裂蓝刺头 yu lie lan ci tou

Herbs 50–100 cm tall, perennial. Stems grayish white, unbranched or apically with short branches, with fibrous petiole remains at base, lower half bristly and cobwebby to lanate, below synflorescences densely and thickly cobwebby to lanate. Leaves papery, abaxially whitish to grayish white and thickly cobwebby to densely lanate, adaxially green and usually glabrous. Basal and lower cauline leaves long petiolate; leaf blade elliptic, 25–30 × 8–13 cm, pinnatifid, base enlarged and semiamplexicaul; segments 5–8 pairs, elliptic to narrowly lan-

ceolate, on one side with 1 or more triangular spiny teeth. Middle and upper cauline leaves similar but sessile, pinnately lobed or pinnatifid, semiamplexicaul. Pseudocephalia 1–7, ca. 6 cm in diam. Capitula 1.9–2.1 cm. Phyllaries 18–22, abaxially glabrous; outermost phyllaries oblanceolate, 7–8 mm, 1/3–2/5 as long as involucre, claw margin shortly ciliate, distal portion brown, rhombic to broadly elliptic, and margin shortly ciliate; middle phyllaries oblanceolate to narrowly oblanceolate-elliptic, 1.3–1.8 cm, margin shortly ciliate, abruptly constricted from maximum width into a spiny tip; inner phyllaries linear, ca. 1.5 cm. Corolla blue, outside apically gland-dotted. Achene ca. 6.5 mm, hairs yellowish. Pappus scales linear, ca. 2 mm, connate at base. Fl. and fr. Aug–Sep.

- Mountain slopes; 400–700 m. Hebei, Shanxi.

**9. *Echinops dissectus*** Kitagawa, Rep. Exped. Manchoukuo Sect. IV, 2: 118. 1935.

东北蓝刺头 *dong bei lan ci tou*

Herbs 1.5–2 m tall, perennial. Stem solitary, whitish to grayish white, unbranched or apically sparingly branched, sparsely cobwebby and densely strigose in lower half, densely cobwebby to thickly lanate below synflorescences. Leaves ± thinly papery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous. Middle and upper cauline leaves long petiolate; leaf blade oblanceolate, 16–18 × 4–6 cm, pinnatipartite or pinnatifid; proximal segments transformed into spines; distal segments 3 or 4 pairs, triangular to lanceolate, margin spiny ciliate or with triangular spiny teeth. Uppermost cauline leaves similar but smaller. Pseudocephalia 1–3, 5–6 cm in diam. Capitula 2–2.4 cm. Phyllaries ca. 23, abaxially glabrous; outermost phyllaries oblanceolate, 5–6 mm, unequal, ca. 1/4 as long as involucre, claw margin long ciliate, distal portion brownish, rhombic, margin ciliate, and apex shortly acuminate; middle phyllaries oblanceolate, 1.4–1.6 cm, margin shortly ciliate, constricted from maximum width into a spiny awn; inner phyllaries narrowly elliptic, apex dentate. Corolla blue, tube outside gland-dotted in distal half. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, ca. 1.4 mm, connate at base. Fl. and fr. Jul–Aug.

Forest margins, moist grasslands, stony sunny slopes, river margins; 1300–1800 m. N Hebei, SW Heilongjiang, W Jilin, Liaoning, Nei Mongol, Shandong, Shanxi [Korea, Russia].

**10. *Echinops sylvicola*** C. Shih, Bull. Bot. Lab. N. E. Forest Inst., Harbin 5: 68. 1979.

林生蓝刺头 *lin sheng lan ci tou*

Herbs 1.5–2 m tall, perennial. Stem solitary, whitish to grayish white, unbranched or apically sparingly branched, sparsely cobwebby and densely strigose in lower half, densely cobwebby to thickly lanate below synflorescences. Leaves ± thinly papery, abaxially grayish white and densely cobwebby to thickly lanate, adaxially green and glabrous. Middle and upper cauline leaves long petiolate; leaf blade oblanceolate, 16–18 × 4–6 cm, pinnatipartite or pinnatifid; proximal segments transformed into spines; distal segments 3 or 4 pairs, triangular to lanceolate, margin spiny ciliate or with triangular spiny teeth. Uppermost cauline leaves similar but smaller. Pseudocephalia

1–3, 5–6 cm in diam. Capitula 2–2.4 cm. Phyllaries ca. 23, abaxially glabrous; outermost phyllaries oblanceolate, 5–6 mm, unequal, ca. 1/4 as long as involucre, claw margin long ciliate, distal portion brownish, rhombic, margin ciliate, and apex shortly acuminate; middle phyllaries oblanceolate, 1.4–1.6 cm, margin shortly ciliate, constricted from maximum width into a spiny awn; inner phyllaries narrowly elliptic, apex dentate. Corolla blue, tube outside gland-dotted in distal half. Achene ca. 6 mm, hairs yellowish. Pappus scales linear, ca. 1.4 mm, connate at base. Fl. and fr. Jul–Aug.

- Forests on mountain slopes; 1300–1500 m. Xinjiang (W Tian Shan).

**11. *Echinops setifer*** Iljin, Bot. Mater. Gerb. Glavn. Bot. Sada R.S.F.S.R. 4: 108. 1923.

糙毛蓝刺头 *cao mao lan ci tou*

Herbs 1–2 m tall, perennial. Stem solitary, whitish to grayish white, unbranched or apically shortly branched, base with dense long multicellular hairs and sparsely cobwebby, below synflorescences densely and thickly cobwebby to lanate. Leaves papery, abaxially whitish to grayish white, adaxially green and sparsely strigose but along veins densely cobwebby to thickly lanate and with dense long brown multicellular hairs. Basal and lower cauline leaves shortly petiolate; leaf blade elliptic to oblanceolate-elliptic in outline, 15–25 × 7–14 cm, bipinnatisect; segments 5–7 pairs; lobes narrowly elliptic to oblanceolate-triangular, with spiny and spine-tipped teeth. Middle and upper cauline leaves pinnatipartite. Uppermost cauline leaves narrowly elliptic. Pseudocephalia 1–3, 4–5 cm in diam. Capitula ca. 2 cm. Phyllaries 17–22, abaxially glabrous; outermost phyllaries oblanceolate, 8–9 mm, unequal, ca. 1/2 as long as involucre, claw margin long ciliate above middle, distal portion brown, broadly elliptic, margin sparsely ciliate, and apex spinulose acuminate; middle phyllaries oblanceolate, margin ciliate, abruptly constricted from maximum width into a 1.4–1.6 cm spiny tip; inner phyllaries elliptic, ca. 1.5 cm, apex dentate. Corolla blue, ca. 1.3 cm, tube outside sparsely gland-dotted. Achene ca. 7 mm, hairs yellowish. Pappus scales linear, ca. 2 mm, proximal half connate. Fl. and fr. Aug–Sep.

Mountain slopes. Henan, Shandong [Japan, Korea].

**12. *Echinops tricholepis*** Schrenk ex Fischer & C. A. Meyer, Enum. Pl. Nov. 1: 47. 1841.

薄叶蓝刺头 *bao ye lan ci tou*

Herbs 1–1.5 m tall, perennial. Stem solitary, grayish white, unbranched or apically branched, sparsely cobwebby and strigose, densely cobwebby to lanate below synflorescences. Leaves papery, green to grayish green, concolorous, both surfaces glabrous or sparsely cobwebby. Middle and upper cauline leaves sessile, elliptic, lanceolate, or ovate, 7–16 × 4–9 cm, pinnatipartite; segments elliptic-lanceolate to triangular-lanceolate, with spiny teeth. Uppermost cauline leaves similar but smaller. Pseudocephalia 1 or 2, 3.5–7 cm in diam. Capitula 2–2.3 cm. Phyllaries 15–18; outermost phyllaries oblanceolate to long spatulate, ca. 1 cm, ca. 1/2 as long as involucre, claw margin long ciliate, distal portion elliptic, abaxially sparsely strigose and gland-dotted, margin ciliate, and apex spinulose acu-

minate; middle phyllaries oblanceolate to oblanceolate-elliptic, 1.5–2 cm, abaxially strigose, apex aristate dentate. Corolla blue, tube apically gland-dotted. Achene ca. 7 mm, hairs yellow. Pappus scales linear, connate almost entirely. Fl. and fr. Aug.

Mountain slopes; 900–1300 m. NW Xinjiang [Kazakhstan].

**13. *Echinops sphaerocephalus*** Linnaeus, Sp. Pl. 2: 814. 1753.

蓝刺头 lan ci tou

*Echinops cirsiifolius* (K. Koch) Grossheim; *E. maximus* Sievers ex Pallas; *E. rochelianus* Grisebach var. *cirsiifolius* K. Koch.

Herbs 0.5–1.5 m tall, perennial. Stem solitary, branched, with dense long multicellular hairs and sparsely cobwebby. Leaves papery, abaxially grayish white, sparsely cobwebby to lanate, and with long multicellular hairs, adaxially green and densely strigose. Basal and lower cauline leaves petiolate; leaf blade broadly lanceolate, 15–24 × 5–10 cm, pinnatifid; segments 3–5 pairs, triangular to lanceolate, with spiny teeth and acuminate spiny apex. Upper cauline leaves sessile, gradually smaller upward. Pseudocephalia 1–3, 4–4.5 cm in diam. Phyllaries 14–18; outermost phyllaries narrowly oblanceolate, ca. 1 cm, ca. 1/2 as long as involucre, claw margin long ciliate, distal portion brown, broadly elliptic, abaxially densely strigose and gland-dotted, margin long ciliate, and apex spinulose acuminate; middle phyllaries oblanceolate to narrowly elliptic, ca. 1.2 cm, abaxially densely strigose, margin long ciliate; inner phyllaries lanceolate, abaxially densely strigose, apex dentate. Corolla blue to white, tube outside not gland-dotted or sparsely gland-dotted. Achene ca. 7 mm, hairs yellowish. Pappus scales ca. 1.2 mm, connate almost entirely. Fl. and fr. Aug–Sep.  $2n = 30, 32$ .

Forest margins, next to water, fields; ca. 2000 m. Xinjiang (Altay Shan, Tian Shan) [Kazakhstan, Russia; SW Asia, Europe].

**14. *Echinops integrifolius*** Karelín & Kirilov, Bull. Soc. Imp. Naturalistes Moscou 14: 446. 1841.

全缘叶蓝刺头 quan yuan ye lan ci tou

Herbs 20–90 cm tall, perennial. Stem solitary, pale gray to grayish white, unbranched, leafy, with dense leaf remains at base, densely gland-dotted in lower and middle part, densely cobwebby to thickly lanate below synflorescences. Leaves sessile, linear to linear-lanceolate, 2–8 × 0.6–0.8 cm, undivided, abaxially whitish to grayish white and densely cobwebby to thickly lanate, adaxially green and densely gland-dotted, margin entire and revolute. Pseudocephalium solitary, 2–4 cm in diam. Capitula ca. 1.6 cm. Phyllaries 16–18; outermost phyllaries oblanceolate to linear, ca. 7 mm, ca. 1/2 as long as involucre, abaxially strigose, claw margin long ciliate, distal portion strigose and apex spinulose acuminate; middle phyllaries oblanceolate, ca. 1.1 cm, abaxially strigose, distal half of margin long ciliate; inner phyllaries narrowly elliptic, abaxially gland-dotted, margin long ciliate. Corolla white, tube outside not gland-dotted. Achene ca. 5 mm, hairs yellowish. Pappus scales subulate, ca. 1.5 mm, connate almost entirely. Fl. and fr. Jul–Sep.

Dry rocky slopes, sandy slopes, open areas in forests, fields; 400–2400 m. Xinjiang (Fuyun) [Kazakhstan, Mongolia, Russia].

**15. *Echinops humilis*** M. Bieberstein, Fl. Taur.-Caucas. 3: 598. 1819.

矮蓝刺头 ai lan ci tou

Herbs 7–16 cm tall, perennial. Stems solitary to few, grayish white, usually unbranched, leafy, densely to thickly cobwebby to lanate. Leaves papery, grayish white, concolorous, both surfaces densely cobwebby to thickly lanate. Basal leaves rosulate, shortly petiolate; leaf blade elliptic to oblanceolate, 2–7 × ca. 1 cm, pinnately lobed, lyrate pinnately lobed, or pinnatifid; segments 3–6 pairs, obliquely ovate to obliquely triangular, apex obtuse. Cauline leaves sessile, semiamplexicaul. Pseudocephalium usually solitary, ca. 3 cm in diam. Capitula ca. 1 cm. Outermost phyllaries oblanceolate, ca. 1 cm, ± equaling involucre, proximal half of margin long ciliate; middle phyllaries lanceolate, ca. 1 cm, margin shortly ciliate around middle, apex spinulose acuminate; inner phyllaries linear-lanceolate, margin shortly ciliate, apex long acuminate. Achene ca. 6 mm, hairs yellow. Pappus scales linear, ca. 1.2 mm, connate at base. Fl. and fr. Aug.

Mountain slopes; ca. 3000 m. SW Xinjiang (Taxkorgan) [Kazakhstan, Mongolia, Russia].

**16. *Echinops gmelinii*** Turczaninow, Bull. Soc. Imp. Naturalistes Moscou 5: 195. 1832.

砂蓝刺头 sha lan ci tou

*Echinops turczaninowii* Trautvetter.

Herbs 10–90 cm tall, annual. Stem solitary, yellowish, with patent branches in lower half, rarely unbranched, sparsely glandular hairy to glabrous. Leaves papery, green, concolorous, both surfaces sparsely cobwebby and glandular hairy. Lower cauline leaves sessile, linear to linear-lanceolate, 3–9 × ca. 0.5 cm, semiamplexicaul, margin with spiny teeth and spinulose. Middle and upper cauline leaves similar but gradually smaller upward. Pseudocephalia 1 to several, 2–3 cm in diam. Capitula 1.2–1.4 cm. Phyllaries 16–20; outermost phyllaries oblanceolate, to 1 cm, less than 1/2 as long as involucre, claw abaxially cobwebby at base, margin ciliate with cilia longest around middle, distal portion brown, broadly elliptic, abaxially densely strigose, and apex spinulose acuminate; middle phyllaries oblanceolate, ca. 1.3 cm, abaxially strigose and cobwebby at base, distal half of margin shortly ciliate, constricted from maximum width into a spiny tip; inner phyllaries narrowly elliptic, apex dentate. Corolla blue or white, tube not gland-dotted. Achene ca. 5 mm, hairs dark yellow. Pappus scales linear, ca. 1.2 mm, connate at base. Fl. and fr. Jun–Sep.

Gravelly places on mountain slopes, desert steppes, loess hills, flooded places; 500–3200 m. Gansu, Hebei, Heilongjiang, Henan, Jilin, Liaoning, Nei Mongol, Ningxia, Qinghai, Shaanxi, Shanxi, Xinjiang [Mongolia, Russia (Tyva)].

**17. *Echinops nanus*** Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg 6: 411. 1863.

丝毛蓝刺头 si mao lan ci tou

Herbs 12–16 cm tall, annual. Stem solitary, whitish to grayish white, with ascending robust branches, densely cob-

weby to thickly lanate. Leaves thickly papery, subconcolorous, both surfaces densely cobwebby to thickly lanate. Lower cauline leaves shortly petiolate; leaf blade oblanceolate to linear-ob lanceolate, 4–8 × 1–1.2 cm, pinnately lobed to pinnatifid; segments 2–4(or 5) pairs, narrowly ovate, triangular-lanceolate, or triangular, with sparse spiny teeth. Upper cauline leaves similar but gradually smaller upward. Pseudocephalia several, 2.5–3 cm in diam. Capitula ca. 1.3 cm. Phyllaries 12–14; outermost phyllaries linear, slightly shorter than involucre, abaxially strigose, claw margin long ciliate, distal portion slightly ex-

panded, margin shortly ciliate, and apex spinulose acuminate; middle phyllaries narrowly elliptic, ca. 1 cm, abaxially cobwebby on proximal portion, margin shortly ciliate, apex densely strigose and spinulose acuminate; inner phyllaries narrowly elliptic, abaxially cobwebby, apex bidentate. Corolla blue, tube outside sparsely glandular hairy and gland-dotted. Achene ca. 5 mm. Pappus scales linear, ca. 1.3 mm, proximal half connate. Fl. and fr. Jun–Jul.

Deserts; 1300–1500 m. Xinjiang (Pamir, Tian Shan) [Kazakhstan, Mongolia, Russia, Uzbekistan].