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Volume XXVII

COMPOSITAE

Tribes Echinopsidae and Cynareae

FLORA OF THE USSR

Initiated under the supervision and chief editorship
of Academician V.L. Komarov

VOLUME XXVII COMPOSITAE

Tribes Echinopsidae and Cynareae

Volume Editors

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This is the third volume of the series (Vols. 22 and 23) that treat the large family Compositae (Asteraceae). I hope, as a practical matter, to continue my editorial review of this volume on the distribution and the habitat and distribution of the genera of the family. It is my hope that the specific nomenclature of the genera will be improved and that there will be no further changes.

The present volume is devoted to the genera of the subfamily Helianthinae. It is the first volume of the series to be devoted to the subfamily Helianthinae. It is my hope that the present volume will be the first of a series of volumes devoted to the subfamily Helianthinae.

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October 1967

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SCIENTIFIC EDITOR'S PREFACE TO VOLUME XXVII

This is the third volume of the six (Vols. XXV–XXX) that treat the large family Compositae (Asteraceae). I have, as a practical matter, concentrated my editorial review of this volume on the discussions and the habitat and distribution statements. It is in these parts of the text that the specific rendering in English is the most critical. We are confident of the general accuracy of the translation but also recognize that there will be imperfections.

Throughout this volume, as in the other volumes on this family, the translators have used the Latin term “capitulum” (pl., capitula), instead of the more familiar English term “head,” for the Russian term denoting the primary inflorescence of florets. “Head,” if it is used, describes a secondary inflorescence, i.e., an arrangement of capitula.

Galina N. Fet also has reviewed this volume in its entirety, paying particular attention to the geographic and place-name terminology in the distribution statements following the morphological descriptions. Her corrections of the geographical information and other editorial suggestions have added substantially to the accuracy of the translated work.

October 1997

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PREFACE

The twenty-seventh volume contains descriptions of 22 genera comprising 636 species of groups of Compositae according to the accepted classification.

This volume includes results of analysis of materials of the small tribe Echinopsidae and a large part of the tribe Cynareae. The analysis of the latter tribe is concluded in the next volume (Volume XXVIII). A large part of that volume is devoted to the tribe Cynareae.

The present volume provides an analysis of some of the largest Compositae genera of the indigenous flora: *Cousinia*, *Jurinea*, *Saussurea*, and *Echinops*. The analysis of these genera, of course, required much time and effort, and provided new information for a more complete understanding. It suffices to say that this volume lists 272 of the total 350 *Cousinia* species, 146 of 300 *Jurinea* species, 115 of 400 *Saussurea* species, and 58 of 120 *Echinops* species.

Dozens of new taxa were formally described in various local publications during the course of analysis of the material and only about 30 descriptions are included in the Latin appendix to the present volume.

Editors.

*Refers to Russian original page number—General Editor.

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1 **Tribe 11. ECHINOPSIDEAE** Cass. in Bull. Soc. Philom. (1815) 173.—Trib. Echinopseae Cass. in Dict. sc. nat. X (1818) 156; XIV (1819) 200; XX (1821) 362; Opusc. phyt. I (1826) 299; II (1826) 203.—Trib. Echinopodeae Cass. in Dict. sc. nat. XLI (1826) 314; LX (1830) 572.—Trib. Cynareae subtrib. Echinopsidae Less. in Linnaea, VI (1831) 88 and Synops. Comp. (1832) 13; DC. Prodr. VI (1837) 522; Boiss. Fl. or. III (1875) 423.—Trib. Cynaroideae subtrib. Echinopsidae Benth. in Benth. and Hook. f. Gen. Pl. II (1873) 212.—Trib. Carduees Baill. Hist. des Plantes, VIII (1882) 69 p. p.—Trib. Cynareae subtrib. Echinopsidinae O. Hoffm. in Pflanzenfam. IV, 5 (1894) 313.—Capitula one-flowered, aggregated in globose or ovoid heads, with one- or two-rowed involucre. General involucre bracts very small, usually setaceous, recurved and hidden under head, sometimes almost undeveloped, or large, leafy, erect, exceeding and surrounding head. Each capitulum with its own involucre, consisting of outer row of numerous bristles and many-rowed involucre bracts, of which outer bracts shorter than inner. All flowers [florets] tubular, bisexual and fertile, white to blue; their limb pentapartite. Anthers sagittate at base, with ciliate appendages. Style with short and thick branches having crown of pollen-collecting hairs below point of branching. Achenes with appressed hairs. Pappus of short, free or basally fused bristles, forming crown. Phyllotaxy alternate.

Herbs, distributed in southern Europe, Mediterranean, in the steppes and semi-deserts of Asia, including Japan, and North Africa.

KEY TO GENERA OF TRIBE ECHINOPSIDEAE

1. Heads consisting of densely aggregated, one-flowered capitula, globose or ovoid. General involucre bracts very small, usually setaceous, recurved, or hidden under head, sometimes almost undeveloped 1567. **Echinops** L.
- + Heads hemispherical, or later becoming almost globose. General involucre bracts large, outer bracts leafy, exceeding and surrounding capitulum 1568. **Acantholepis** Less.

Echinops L. Sp. pl. (1753) 814; Trautv. Diss. Echin. (1833) 16; Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 390–412; Hoffm. in Pflanzenfam. IV, 5 (1891) 312; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 5–92.—*Echinopus* Adans. Fam. II (1790) 114.—*Echinanthus* Neck. Elem. 1 (1790) 91.—*Echinopsus* St.-Lag. in Ann. Soc. Linn. Lyon, VII (1880) 109.—*Sphaerocephalus* O. Ktze. Rev. gen. I (1891) 366.

Capitula one-flowered, surrounded by numerous bristles; involucre bracts in three to five rows, membranous or coriaceous; outer bracts shorter, linear, broadened in upper part; middle bracts lanceolate, carinate, attenuate into subulate cusp; inner bracts sometimes not longer than middle ones, free, partly fused in lower part, or fused into tube, and free above, pointed or fimbriate-ciliate. Corolla regular, white or pale blue to deep blue, with narrow deeply incised tube protruding from capitulum; stamens five; anthers fused into tube with tuft of hairs below; stigma bifurcate, with ring of hairs in upper part of style. Achene fusiform, slightly ridged, densely covered with long appressed hairs, often covering pappus; pappus of serrate bristles, more or less fused in lower part. Numerous capitula terminal on stem and its branches, aggregated into globose heads with globose or obovoid, glabrous, pitted receptacle; head surrounded by recurved and compressed common involucre below receptacle, consisting of scaly and apically broadened flat bristles like those surrounding individual capitula and forming so-called brushes. Stems erect, usually sparsely branched in upper part, sulcate, arachnoid-hairy tomentose, sometimes glandular, very less often glabrous. Leaves alternate, pinnatifid to bipinnatisect, usually with prickly toothed lobes, reduced from stem base upward; lower leaves petiolate; upper sessile; leaves usually pubescent above, sometimes also glandular, less often almost glabrous; usually almost tomentose beneath. Perennials, less often surviving only for few years and occasionally annual herbs, distributed in steppe and semidesert zones, especially in the zone of mountainous semideserts and steppes.

The genus includes 125–130 species. The distribution area of the genus is in the eastern hemisphere and extends from the Iberian Peninsula to Southern Europe and the steppes and semideserts of Asia as far as Japan; in the south, it occupies the Mediterranean Region and the northeastern part of Africa.

¹Treatment by E.G. Bobrov.

²From the Greek words *echinos*—hedgehog, and *ops(is)*—appearance; named on the basis of spherical and often prickly heads.

Type species: *E. sphaerocephalus* L.

A.A. Bunge published the most complete review of the genus. However, published 100 years ago, it, naturally, is antiquated. Out of the 11 sections included in this review under *Echinops*, 8 were established by Bunge. Subsequent authors, Boissier (*Flora orientalis*) and Hoffmann 3 (*Pflanzenfamilien*), slightly enlarged the sections of the genus, a course that in my opinion is without sufficient basis. Although the number of *Echinops* species has almost doubled since Bunge's publication, we prefer the classification of the genus based on the subdivisions and the system proposed by Bunge, even though it is imperfect. Only a new overall revision of the genus would provide the basis for a total re-examination of the classification of Bunge and the development of a new classification. However, such a work is difficult at present because the collections still have very few plants from Northwest Asia, Iran, Afghanistan, and Northeastern Africa.

It should also be added that the sections of *Echinops* are not very clearly demarcated, which, incidentally, is typical of many genera of Compositae.

As regards the *Echinops* species in the Soviet flora, the present review most probably does not cover them completely. This is because there are few *Echinops* specimens in herbaria, because botanists working in the field often avoid them because of their prickly nature and because their inflorescences crumble on drying.

Further study undoubtedly will increase somewhat the number of Soviet Central Asian species.

Economic importance. The globe-thistle species do not have any significant economic value, but they also are not always referred to entirely in negative terms, as the troublesome, weedy, ruderal plants. They do not pose a big threat as weeds, as they are easily destroyed with the usual control measures, post-harvest soil plowing and inter-row tillage. The spreading of globe-thistles is greatly facilitated by the limited grazing of them because of the prickliness.

Some species of globe-thistles have recently attracted attention as ornamental plants and are fairly widely cultivated for this purpose in western Europe. The list of ornamental globe-thistles may be significantly enlarged because of a few attractive Caucasian species, recommended by Ya.I. Mul'kijanyan (*Bull. Bot. Sada Akad. Nauk ArmSSR*, No. 12, 1951). No less interesting in this respect are a few Soviet Central Asian species. The ornamental value of many globe-thistle species is somewhat reduced because they shed the lower leaves early, which is a typical feature of steppe and semidesert plants.

Some species are valuable as melliferous plants and cultivated for honey production. Very interesting in this respect are many native

species, which deserve to be planted more in open areas, gravelly slopes, along gorges, etc. Some species contain alkaloids.

Mulkijanyan provided brief information on the biology of the globe-thistles (*Bull. Bot. Sada Akad. Nauk ArmSSR*, No. 10, 1951).

1. Plants perennial or surviving few years 2.
- + Plants annual (section *Nanechinops*) 56.
2. Inner involucrel bracts connate for almost half their length 3.
- + Inner involucrel bracts free, sometimes scarcely connate only at base 4.
3. Involucrel bracts 12–15, in three rows; inner involucrel bracts connate, forming pentagonal coriaceous tube (section *Oligolepis*) 8.
- + Involucrel bracts 16–25, in four or five rows; inner involucrel bracts connate in membranous cylindrical tubes (section *Ritrodes*) ... 15.
4. Outer and middle involucrel bracts with straight, usually appressed hairs along margin 5.
- + Outer and middle involucrel bracts with recurved acicular spinules in upper part along margin, appearing almost like branched horn (section *Pleiacme*) 39. **E. tournefortii** Ldb.
5. Pappus cup-shaped, cleft in upper part (section *Therma*) 51. **E. exaltatus** Schrad.
- + Pappus bristles free almost entirely or over large part 6.
6. Pappus bristles connate, linear, obtuse, and densely barbulate ... 7.
- + Pappus bristles subulate, sparsely toothed in upper part, not barbulate; plants of northeastern Soviet Central Asia and Siberian mountains from Tien Shan to Sayans (section *Chamaechinops*) .. 53.
7. Involucrel bracts 16–18; outer bracts usually glandular; leaves thinner; plants of forest edges and shrubby thickets (section *Echinops*) 43.
- + Involucrel bracts 18–25; outer bracts without glandular hairs; leaves coriaceous; plants of plains, mountain steppes, and semideserts (section *Ritro*) 32.
8. Outer involucrel bracts tomentose 1. **E. transcaspicus** Bornm.
- + All involucrel bracts glabrous, smooth, or rough, but not pubescent 9.
9. Stem entirely or at least in upper half white-tomentose; leaves oblong-lanceolate; inner involucrel bracts connate in thin, coriaceous light brown tube 10.
- + Stem glandular, not white-tomentose, sometimes white arachnoid-hairy above; leaves broadly lanceolate; inner involucrel bracts connate in coriaceous dark brown tube 12.

10. Stem white-tomentose only in upper half or one-third; upper surface of leaves green, glandular, glands eventually disappearing but not arachnoid-hairy or sparsely white-tomentose; bristles surrounding mature capitula not shorter but longer than capitula at fruiting...
..... 2. **E. maracandicus** Bge.
- + Stem entirely white-tomentose and sulcate; leaves with glandular hairs on upper surface and arachnoid-hairy or white-tomentose along veins; bristles surrounding capitula not more than half as long as capitulum 11
11. Leaves grayish-green above and white-tomentose along veins; stem striate-sulcate 3. **E. polygraphus** Tschern.
- 5 + Leaves green above, arachnoid-hairy (along veins), with scattered glandular hairs; stems slightly sulcate
..... 4. **E. brevipenicillatus** Tschern.
12. Stem white arachnoid-hairy above; leaves on upper surface with numerous, stalked, glandular hairs, somewhat arachnoid-hairy or white arachnoid-hairy only along veins 13.
- + Stem with short or long-stalked glandular hairs, but not arachnoid-hairy; leaves rough with numerous short-stalked or sessile glandular hairs, but without arachnoid-hairy pubescence 14.
13. Stem deeply sulcate, appearing longitudinally striate; upper surface of leaves with white arachnoid hairy pubescence along veins; outer involucre bracts 12–13 mm long 5. **E. leucographus** Bge.
- + Stem shallow-sulcate; leaves somewhat white arachnoid-hairy on upper surface, without distinctive pubescence along veins; outer involucre bracts about 8 mm long. 6. **E. leiopolyceras** Bornm.
14. Lower cauline leaves up to 25 cm long and 8 cm wide, crenate-lobate; bristles surrounding capitula up to 10 cm long
..... 6. **E. lipskyi** Iljin
- + Lower cauline leaves 10–13 cm long and 4–5 cm wide, widely shallow crenate-toothed; bristles surrounding capitula 12–14 mm long 7. **E. praetermissus** Nevski
15. Involucre bracts arachnoid-hairy pubescent in exposed part
..... 15. **E. pubisquameus** Iljin
- + Involucre bracts glabrous, smooth, or scabrous 16.
16. Stem 1–1.5–2 m high; lower cauline leaves 25–40 cm long; capitula 8–10 cm wide 26. **E. macrophyllus** Boiss. and Hausskn.
- + Stem not more than 1 m high; capitula 2.5–4 or 5–6 cm wide; basal and lower cauline leaves up to 25 cm (occasionally 30 cm) long 17.
17. Stem white-tomentose or sparsely arachnoid-hairy pubescent without glandular hairs 18.

- + Stem glandular, besides white-arachnoid or sparsely white-tomentose in lower part or along ridges 24.
- 18. Receptacular bristles half or almost half as long as capitulum
..... 19.
- + Receptacular bristles one-third–one-fourth–one-fifth as long as capitulum 21.
- 19 Leaves same colored on both surfaces, gray and finely white-tomentose 13. **E. dubjanskyi** Iljin
- + Leaves greenish-gray above from sparse arachnoid-hairy pubescence, almost white-tomentose beneath 20.
- 20. Lamina pinnatifid in upper part, pinnatisect in lower; capitula 12–14 mm long, receptacular bristles about 5 mm long, i.e., less than half as long as capitulum; corolla tube below throat sparsely covered with short bristles (on sands of southern Kazakhstan)
..... 11. **E. albicaulis** Kar. and Kir.
- 6 + Lamina pinnatisect, with 3–4 paired and one terminal lobe; capitula 14–15 mm long, receptacular bristles 8–9 mm long, i.e. exceeding half their length; corolla tube below throat with few glandular hairs (semidesert, southern Kazakhstan).....
..... 12. **E. kafirniganus** Bobr.
- 21. Leaves grayish-green above, sparsely arachnoid-hairy; lower cauline leaves up to 20–25 cm long 22.
- + Leaves green above, rough, without arachnoid-hairy pubescence; lower cauline leaves 30–40 cm long.....
..... 18. **E. chantavicus** Trautv.
- 22. Basal leaves pinnately divided with prickly, crenate, narrow (0.5 cm) rachis and narrow, deltoid, spinescent lobes; corolla tube glandular and spreading hairy above 23.
- + Basal leaves pinnately divided into narrow-lanceolate lobes, densely prickly with fine and short spinules along margin; corolla tube pubescent on outer side of throat (Mountainous Turkmenia) 9. **E. ritrodes** Bge.
- 23. Leaves sparsely arachnoid-hairy above, without glandular hairs; corolla tube densely covered with long and spreading hairs in upper part (northern ranges of Pamiro-Alai, Shakhimardan)
..... 16. **E. dasyanthus** Rgl. and Schm.
- + Leaves sparsely arachnoid-hairy above, together with fine, sessile, glandular hairs, short-stalked on petioles; corolla tube very sparsely pubescent (southern ranges of Tien Shan)
..... 17. **E. tjanschanicus** Bobr.
- 24. Leaves green on both sides, rough above, densely glandular beneath, along petiole and veins (southern Balkhash region, southeastern Aralo-Caspian region). 14. **E. subglaber** Schrenk

- + Leaves grayish-green above, usually with arachnoid-hairy pubescence or glandular, white- or grayish-tomentose beneath 25.
25. Leaves grayish-green above, with arachnoid-hairy pubescence but not glandular, grayish-tomentose beneath, without glandular hairs; stem in lower part white arachnoid-hairy along ridges, yellowish-brown along grooves, with stalked glandular hairs 22. **E. fedtschenkoi** Iljin
- + Leaves always with stalked or sessile glandular hairs above, sometimes scattered; lower surface of leaves usually without glandular hairs or glands present only along veins 26.
26. Stem 40–80 cm high; capitula 3.5–6 cm wide 27.
- + Stem 20–35 cm high; capitula 3–4 cm wide 31.
27. Plants of Soviet Central Asia 28.
- + Plants of Transcaucasia 29.
28. Stem with arachnoid-hairy pubescence and glandular in lower part; leaves with scattered stalked glandular hairs above; capitula 2–2.5 cm long 19. **E. karatavicus** Rgl. and Schm.
- 7 + Stem floccose and loosely tomentose, with short-stalked glandular hairs; leaves with scattered sessile glandular hairs above; capitula 16–18 mm long 20. **E. obliquilobus** Iljin
29. Stem 2–5 mm thick, short-glandular in lower part; leaves finely and very loosely tomentose above 24. **E. opacifolius** Iljin
- + Stem more than 6 mm thick, entirely glandular; leaves without pubescence above, but glandular or somewhat arachnoid-hairy and rough due to stalked glandular hairs 30.
30. Leaves hard and rough above due to dense cover of stalked glandular hairs; glandular hairs on stem numerous, surrounding flat and curly brownish bristles 23. **E. orientalis** Trautv.
- + Leaves not pubescent above, but with thick-stalked glandular hairs; stem with numerous similar glandular hairs 25. **E. connatus** C. Koch
31. Stem with finely tomentose pubescence and glandular hairs; leaves with sessile glandular hairs above; capitula 18–20 mm long 21. **E. babatagensis** Tschern.
- + Stem glandular and white arachnoid-hairy only above; leaves with short-stalked glandular hairs above; capitula 13–15 mm long 10. **E. multicaulis** Nevski
32. Stem with white arachnoid-hairy or white-tomentose pubescence, without glandular hairs 34.
- + Stem glandular entirely or only in lower and middle parts, usually white-tomentose above 33.
33. Stem glandular hairy only in lower or lower and middle parts, white-tomentose only in upper part 39.

- + Stem entirely glandular hairy and without tomentose pubescence 28. **E. meyeri** (DC.) Iljin
- 34. Lobes of leaves lanceolate, more or less flat, in same plane as lamina 35.
- + Lobes of leaves spinulate, divergent in different planes. Capitula 3–3.5 cm wide (Greater Balkhans) 29. **E. spiniger** Iljin
- 35. Leaves green arachnoid-hairy above, grayish-tomentose beneath, with prominent veins; both upper and lower surfaces eglandular 36.
- + Leaves grayish-green, weakly arachnoid-hairy above, with few short-stalked glandular hairs; grayish-tomentose beneath, with prominent veins and scattered glandular hairs 31. **E. polyacanthus** Iljin
- 36. Outer involucre bracts light brown in broader part scarcely brownish, less than half as long as involucre 37.
- 8 + Outer involucre bracts dark brown in broader part, more than half as long as involucre 34. **E. transcaucasicus** Iljin
- 37. Stem up to 60 cm high; lower leaves up to 45 cm long, midrib of lower leaves up to 5 mm wide beneath, yellow (Karabakh) 38. **E. karabachensis** Mulk.
- + Stem 1 m or more high; lower leaves 50–75 cm long and 25–30 cm wide (Lake Sevan basin, Vedinskii Region of Armenia) .. 38.
- 38. Capitula narrow at base, somewhat conical; bristles surrounding capitula as long as outer involucre bracts; basal leaves up to 75 cm long 36. **E. iljinii** Mulk.
- + Capitula broad conical; bristles surrounding capitula shorter than outer involucre bracts; basal leaves up to 50 cm long 37. **E. sevanensis** Mulk.
- 39. Leaves dark green above, glabrous or weakly arachnoid-hairy pubescent; white-tomentose beneath; both surfaces without glandular hairs 27. **E. ritro** L.
- + Leaves arachnoid-hairy pubescent and always glandular above; white-tomentose beneath, occasionally weakly pubescent and without glandular hairs 40.
- 40. Leaves arachnoid-hairy and glandular above, slightly incurved; white-tomentose beneath, without glandular hairs 30. **E. pungens** Trautv.
- + Leaves with stalked glandular hairs beneath all over lamina or only along veins 41.
- 41. Leaves arachnoid-hairy above, rugose and scabrous due to numerous short-stalked glandular hairs; grayish-tomentose beneath, with numerous light brown, stalked-glandular hairs along veins. Capitula 5–7 cm wide. 35. **E. szovitsii** Fisch. and Mey.

- + Leaves arachnoid-hairy and glandular above but not scabrous; white-tomentose beneath, with numerous long-stalked, brown, glandular hairs along veins, or weakly glandular-hairy to white-tomentose, with few stalked glandular hairs 42.
- 42. Leaves arachnoid-hairy above, with scattered short-stalked glandular hairs; white-tomentose beneath, with few long-stalked glandular hairs along veins. Capitula 4–5 cm wide, on lateral branches 3–3.5 cm. 33. **E. foliosus** Somm. and Lev.
- + Leaves arachnoid-hairy and glandular above; weakly glandular-pubescent to gray-tomentose beneath with thick glabrous veins, bearing, few stalked-glandular hairs. Capitula 6–6.5 cm wide 32. **E. conrathi** Freyn
- 43. Stem arachnoid-hairy or loosely tomentose, always with stalked-glandular hairs over entire length, in middle, or only in lower part 44.
- 9 + Stem floccose-white tomentose, glabrescent in parts, without glandular hairs; leaves without glandular hairs above as well as beneath along veins 50. **E. abstersibilis** Iljin
- 44. Leaves very sparsely arachnoid-hairy beneath, slightly lighter in color than grayish-green upper surface 45.
- + Leaves grayish arachnoid-hairy or white-tomentose beneath, different in color from upper surface 46.
- 45. Involucral bracts 15–18; outer bracts glandular dorsally (Yerevan Region) 41. **E. erevanensis** Mulk.
- + Involucral bracts 20–23; outer bracts without glandular hairs dorsally and only very short hairy, other bracts scabrous. 43. **E. viridifolius** Iljin
- 46. Leaves almost glabrous or scarcely arachnoid-hairy above, without glandular hairs, sometimes scabrous due to numerous bristles 47.
- + Leaves scabrous above from stalked glandular hairs or bristles surrounded by glandular hairs 51.
- 47. Leaves scarcely arachnoid-hairy and scabrous above from numerous bristles; capitula 15–18 mm long, receptacular bristles little less than half as long as involucre 46. **E. ossicus** C. Koch
- + Leaves almost glabrous above or scarcely arachnoid-hairy, not scabrous, dark green 48.
- 48. Plants of eastern Kazakhstan or western Transcaucasia 49.
- + Plants of Eastern Siberia and Far East 50.
- 49. Stem 1–1.5 m high; heads 4–6 cm wide; capitula 20–23 mm long; leaves lanceolate, finely tomentose and glandular beneath (eastern Kazakhstan) 49. **E. tricholepis** Schrenk
- + Stem 0.6–1 m high; heads 3–4.5 cm wide; capitula 15–20 mm long; leaves almost lyrate, loosely white-tomentose and without

- glandular hairs beneath (western Transcaucasia).....
- 45. **E. colchicus** Sosn.
50. Stem weakly arachnoid-hairy below, upper surface of leaves weakly arachnoid-hairy (Eastern Siberia)..... 47. **E. latifolius** Tausch.
- + Stem almost glabrous below, with isolated brown hairs; leaves glabrous above, more deeply incised (Far East)
- 48. **E. dissectus** Kitag.
51. Lower leaves lyrate, with small, ovate, remote lower lobes and large elliptical terminal lobe, short prickly-toothed along margin
- 44. **E. galaticus** Freyn.
- + Lower leaves lanceolate, with ovate to deltoid lobes, with short acute teeth on margin and terminating in short spinules
- 52.
52. Stems ribbed, glandular along sides and ribs, appressed-hairy above, appearing white arachnoid-hairy; leaves few, distant
- 40. **E. sphaerocephalus** L.
- 10 + Stem sulcate, with numerous brownish-glandular hairs along sides white arachnoid-hairy along ridges, leafy up to heads (eastern Caucasus)
- 42. **E. dagestanicus** Iljin
53. Leaves undivided, with one or several teeth only at base
- 52. **E. integrifolius** Kar. and Kir.
- + Leaves pinnatilobate or pinnatisect..... 54.
54. Stem white-tomentose, without glandular hairs; leaves pinnatilobate; lower leaves with obtuse lobes
- 53. **E. humilis** MB.
- + Stem covered with stalked glandular hairs, arachnoid-hairy only in upper part..... 55.
55. Stem 10–30 cm high; lobes of leaves and leaf axis very narrow or linear; corolla glandular-hairy on outer side below throat; plants of the Tien Shan
- 54. **E. tschimganicus** B. Fedtsch.
- + Stem 25–45 cm high; lobes of leaves and leaf axis wider; corolla glabrous below throat; plants of southern Altai and Zaisan Basin
- 55. **E. saissanicus** (Keller) Bobr.
56. All leaves arachnoid-hairy-woolly or tomentose on both sides; stem white-tomentose
- 57. **E. nanus** Bge.
- + All leaves, or at least upper, green above due to arachnoid-hairy pubescence or absence of tomentum, with stalked glandular hairs; stem glandular
- 57.
57. Lower leaves scarcely tomentose due to long entangled hairs, undivided or more or less lobed (plants of Central Asia; in Soviet Union found only in southern Altai)..... 56. **E. gmelini** Turcz.
- + All leaves without tomentum or arachnoid-hairy pubescence above, green or yellowish-green, with numerous stalked glandular hairs, undivided or crenate-spiny toothed (Fergana Valley)
- 58. **E. knorringianus** Iljin

Section 1. Oligolepis Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 400, 403; Boiss. Fl. or. III, 424.—Involucral bracts 12–15, in three rows; inner bracts connate, forming pentagonal coriaceous tube.

Lectotype of section: *E. leucographus* Bge.

1. *E. transcaspicus* Bornm. in Beih. bot. Centralbl. XXXVI, 2 (1918) 226.

Perennial. Stem glabrous below and in middle, glandular above. Leaves with sessile glandular hairs above. Outer involucral bracts rather hard, tomentose; inner bracts sometimes attenuate into long spinule in sterile capitula.

11 *Soviet Central Asia*—mountainous Turkmenia (Middle Kopetdag Sulyuklyu-Saratovka near Iran border). Described from indicated place. Type in Weimar.

Note. An enigmatic plant, incompletely described on the basis of immature specimens collected by T. Sintenis (No. 688, 10.VII.1902) in Saratovka. It is necessary to search in this region for a globe-thistle with leaves glandular above and tomentose involucral bracts.

The original diagnosis is insufficient to confirm the placement of this species in the section *Oligolepis*.

Series 1. *Maracandici* Bobr.—Stem white-tomentose entirely or at least in upper half.

2. *E. maracandicus* Bge. Beitr. z. Kenntn. d. Fl. Russl. u. Stepp. Centr. As. (1851) 175; Mém. Sav. Etr. VII (1854) 351; Bge. in Bull. Acad. Sc. Pétersb. 6, 403; O. and B. Fedtsch. Perech. Rast. Turk. IV, 222; Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III, 99.—*E. xanthocanthus* Rgl. and Schm. in Izv. Obshch. Lyubit. Estestv. Antrop. Entnogr. 34, 2 (1882) 46.—O. and B. Fedtsch. op. cit.—*E. argyrocomus* Bornm. in Beih. bot. Centralbl. XXXVI, 2 (1918) 222.

Perennial. Root many-headed. Stem 40–100 cm high, branched above; glabrous in lower half, smooth and yellowish, sometimes with fewer glandular hairs; densely white-tomentose in upper half or one-third, leafy throughout. Leaves green above, with sessile or almost sessile glandular hairs, glabrescent, densely white-tomentose and eglandular beneath; all leaves lanceolate, pinnatifid; lower leaves very short-petiolate; upper leaves pinnatilobate with remote deltoid or ovate toothed lobes terminating in long, yellow, bare spines; sinuses wide, roundish, usually without spines and entire. Heads 5–6 cm wide. Capitula about 3 cm long; bristles surrounding capitulum numerous, silvery, longer than capitulum at fruiting, initially shorter. Involucral bracts 15–17, glabrous; inner bracts connate in larger part into membranous cylindrical tube, brownish in fused part, greenish in free part, broken-toothed along

margin; outer bracts shorter than bristles, rhomboid above, ciliate; middle bracts cuneate, broadened above and terminating into spine; corolla pale yellow; apical appendages of anthers longer and compressed. Achenes with numerous yellowish bristles; pappus of unequal, yellowish bristles, connate up to half length. Flowering VII–VIII.

Shallow and gravelly slopes of middle and lower mountain zone.—*Soviet Central Asia*: Tien Shan, Syr-Darya (Fergana), Pamiro-Alai (from Zeravshan to western Pamir). Endemic. Described from upper Zeravshan. Type in Paris.

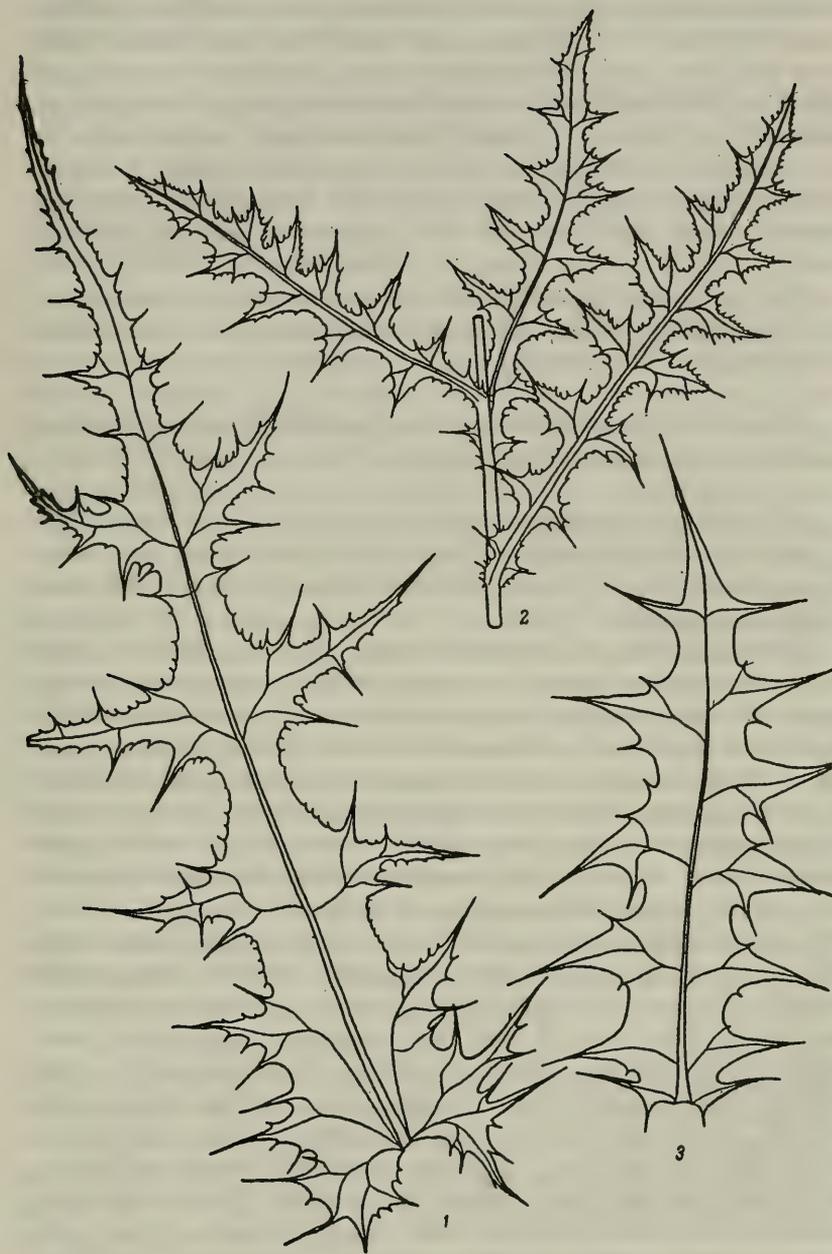
3. **E. polygraphus** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVI (1961) 52.

- 12 Perennial. Stem 40–80 cm high, striate-sulcate, white-tomentose, with few short branches above, leafy. Leaves coriaceous, grayish green and loosely white-tomentose along veins on upper surface, with very prominent veins and grayish-tomentose beneath, lanceolate; basal leaves petiolate; cauline leaves short-petiolate, pinnatipartite, with narrow and entire axial part and narrow-deltoid entire lobes, terminating in spine, with two short basal spinules; upper leaves narrow-lanceolate, large spiny-toothed. Heads 4–4.5 cm wide. Capitula 28–30 mm long, surrounded by numerous, somewhat flat, dirty-white, 15–16 mm long bristles. Involucral bracts 13–14, glabrous, thin; outer bracts linear, 11–12 mm long, deltoidly broadened above, short-toothed, acuminate, scarious; middle bracts lanceolate, 17–20 mm long, carinate, with wide membranous margin, acute; inner bracts connate over three-fourths in membranous tube, free above, creamish, short-ciliate, and pointed. Corolla white, deeply parted, with glandular tube. Achenes densely covered with yellowish hairs; pappus of scabrous bristles fused at base. Flowering VI–VII; fruiting VII–VIII.

Red sandstone foothills.—*Soviet Central Asia*: Pamiro-Alai (extreme west, Yakkabag Region). Described from the vicinity of Kipchak winter camp. Endemic. Type in Tashkent.

4. **E. brevipenicillatus** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVI (1961) 51.

Perennial. Stem erect, 30–60 cm high, weakly sulcate, white-tomentose, leafy, branched above. Leaves coriaceous, green above with scattered glandular hairs and arachnoid-hairy, white-tomentose beneath with prominent veins; basal leaves usually short-petiolate; cauline leaves sessile, auriculate, and spinulate at base, lanceolate, acuminate, pinnatifid or partite, with deltoid entire lobes, terminating into spinule; upper leaves lanceolate, auriculate, crenate-toothed, with prickly pointed teeth. Heads about 5 cm wide; capitula 2.5 cm long, bristles surrounding capitula



Lower cauline leaves of *Echinops* species.

1—*E. macrophyllus* Boiss. and Hausskn.; 2—*E. tjanschanicus* Bobr.; 3—*E. lipskyi* Iljin.

half as long as capitulum at end of flowering, somewhat flat and white. Involucral bracts 16–19, glabrous; outer bracts free, inner bracts connate up to half their length in membranous tube; outer bracts about 8 mm long, linear, broadened above and short-acuminate, narrow-membranous; middle bracts lanceolate, carinate, broadened above and attenuate in cusp; inner bracts lanceolate in upper free part, acute, variable in length, greenish. Corolla whitish, deeply parted with glandular tube. Achenes
14 densely covered with yellowish hairs; pappus of scabrous yellowish bristles, fused at base. Flowering VI; fruiting VII.

Red sandstone foothills.—*Soviet Central Asia*: Pamiro-Alai (southwest Babatag). Endemic. Described from vicinity of Dzhida-Bulak in Babatag. Type in Tashkent.

Series 2. Leucographi Bobr.—Stem glandular, not white-tomentose, sometimes white arachnoid-hairy above.

5. *E. leucographus* Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 406; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 223; Fl. Turkm. VII, 145.—*E. grossheimii* Iljin Fl. Kavk. IV (1934) 160; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 79.

Perennial. Stem 40–60 cm high, branched above, deeply sulcate and hence appearing striated, increasingly densely white arachnoid-hairy above, with scattered glandular hairs, encircling curly brown hairs, weakly arachnoid-hairy below, with numerous curly, stalked-glandular hairs. Leaves coriaceous, green above with numerous stalked-glandular hairs and white arachnoid-hairy veins, lanceolate; basal leaves 20–30 cm long, oblong, narrowed toward base; cauline leaves wider, with slightly decurrent base; all leaves boldly sinuate-toothed, with broad triangular teeth, prickly-toothed along margin and terminating in spinule, sinuses with shorter spinules, teeth reduced toward base of leaves, leaves thus narrowed appearing petiolate; upper leaves small, with broad base, prickly toothed. Heads 3–4.5 cm wide; capitula 2–2.5 cm long, bristles surrounding them about 15 mm long. Involucral bracts 15–16; outer bracts 12–13 mm long, broadened above and terminating in cusp, carinate, scarious along margin, connate at base; middle bracts 18–20 mm long, like outer, but with longer cusp, also connate at base; inner bracts about 20 mm long, fused over two-thirds length into brown pentagonal tube, free above, cristate and cuspidate. Corolla pale blue, deeply parted, with a glandular tube. Achene densely covered with yellowish hairs; pappus of scabrous bristles fused at base. Flowering VI–VII; fruiting VII.

Lower mountain zone.—*Caucasus*: Southern Transcaucasia (Megry), eastern Transcaucasia (Ordubad); *Soviet Central Asia*: mountainous

Turkmenia, Pamiro-Alai. *General distribution*: Iran. Described from northern Iran. Type in Leningrad.

6. ***E. leiopolyceras*** Bormm. in Beih. bot. Centralbl. XXXVI, 2 (1918) 208; Fl. Turkm. VII, 146.—*E. griffithianus* auct. Fl. As. Med. non Boiss.—*E. armenus* Grossh. in Tr. Tifl. Bot. Sada, II, 1 (1920) 36; Iljin in Grossh. Fl. Kavk. IV, 160; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 70.—*E. araxinus* Mulk. op. cit. (1950) 78; Dokl. Akad. Nauk ArmSSR, XII, 1 (1950) 29.

Perennial or biennial. Stem 40–70 cm high, one or two-head, sulcate, branched and more densely arachnoid-hairy above, densely glandular
15 along entire length, glandular hairs on curly, divergent, brownish bristles. Leaves coriaceous, grayish-green, very weakly arachnoid-hairy, and densely glandular above, white-tomentose beneath with prominent veins, covered with stalk glandular hairs, lanceolate; basal leaves 20–25 cm long; cauline leaves broadly amplexicaul; all leaves crenate-toothed, teeth long-spinose along margin and leaves terminating in very long spines; upper leaves small, sessile, auriculate, with spines longer than lamina. Heads 5–6 cm wide, greenish. Mature capitula 2.5–3.5 cm long, surrounded by bristles, up to 16–18 mm long at maturity. Involucral bracts 15, finely scabrous; outer bracts about 8 mm long, carinate, membranous along margin, broadened above and more prickly acuminate; middle bracts narrowed above into long, stiff, grooved, 1.5–3 cm long cusp; five inner bracts connate over two-thirds their length into dark pentangular tube, free part attenuate into grooved acute tip, 3–4 cm long, corniculate in sterile capitula. Corolla whitish-blue, deeply parted, with glandular tube. Achenes yellow-hairy; pappus of sulcate bristles fused at base. Flowering VI–VII; fruiting VII.

Gravelly slopes of lower hills, red sandstones—*Caucasus*: Southern and eastern Transcaucasia; *Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai (in the west—Surkhan Darya and Kashka Darya provinces). *General distribution*: Iran. Described from northern Iran. Type in Weimar.

Note. The formal difference between this species and *E. griffithianus* Boiss., described from the Kabul region, is that the leaves are glandular above, whereas the leaves of the latter species, according to Bornmüller, are not glandular above. If this were to prove wrong and in authentic specimens of *E. griffithianus* Boiss. the leaves were found to be glandular above, then it would follow that the name proposed by Boissier should be considered to have priority

7. ***E. praetermissus*** Nevski in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 4 (1937) 206, Fig. 9; Fl. Turkm. VII, 145.

Perennial. Stem 50–70 cm high, simple, covered almost entirely and especially densely in upper part with rusty long-stalked glandular hairs. Leaves coriaceous, green above, densely glandular and scabrous due to numerous short-stalked glandular hairs; white-tomentose beneath with rather prominent midrib; lower cauline leaves oblong, 10–13 cm long, 4–5 cm wide, terminating in 1–1.5 cm long spine, broadly and shallow crenate-toothed, prickly along teeth, with two spinules near base. Leaves reduced toward upper part, ovate, prickly-toothed, slightly curved in lower part. Heads about 4.5 cm wide. Capitula 2–5 cm long; bristles surrounding capitula 12–14 mm long, white, rusty below, half as long as capitulum. Involucral bracts 14–16; outer bracts 10 mm long, lanceolate, spatulate in upper part and abruptly broad truncate with short acute cusp; middle bracts 11–17 mm long, cuneate, abruptly pointed and prickly in upper part; inner bracts 20 mm long, connate over two-thirds length in brown coriaceous tube, free above, toothed and attenuate into subulate cusp, unequal. Corolla light bluish, with glandular tube; pappus of bristles fused at base. Flowering VI; fruiting VII.

Red sandstone lower hills.—*Soviet Central Asia*: Pamiro-Alai (Kugitang Range near the village of the same name). Endemic. Described from the place indicated. Type in Leningrad.

8. *E. lipskyi* Iljin in Bot. Mat. Gerb. Bot. Sada, IV (1923) 97.

Perennial. Stem 40–70 cm high, with remains of leaves at base, branched, densely glandular with short-stalked hairs. Leaves coriaceous, green on upper surface, scabrous due to short-stalked or almost sessile glandular hairs; white-tomentose with prominent glandular hairs beneath; lower cauline leaves up to 25 cm long and 8 cm wide, narrowed toward base, with obtuse apex, attenuate into stiff spine, crenate-lobed, with broad deltoid entire lobes, with one terminal and two basal spinules; leaves reduced toward stem apex, ovate, prickly-toothed along margin. Heads solitary; fully developed capitula about 2.5 cm long; terminal on branches; bristles surrounding capitula unequal, up to 10 mm long, rusty-white, slightly flat. Involucral bracts 10–20; outer bracts lanceolate, membranous along margin, broadened above and short-acuminate at tip; middle bracts 15–17 mm long, carinate, spatulate above and attenuate into long spine, connate at base; inner bracts up to 25 mm long, connate over larger part in coriaceous, pentagonal, dark tube, terminating in spine. Corolla light bluish, with glandular deeply parted tube. Achene densely covered with short, yellowish hairs; pappus of bristles fused at base, free above. Flowering VI–VII; fruiting VII. (Plate I, Fig. 3).

Gravelly slopes of lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Gissar Range, Denau, Dagana, Boisun, Derbent). Endemic. Described from Dagana. Type in Leningrad.

Section 2. Ritrodes Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 401, 406; Boiss. Fl. or. III, 424; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 169.—Involucral bracts 16–25, in four or five rows; inner involucral bracts connate in cylindrical membranous tube.

Type of section: *E. ritrodes* Bge.

Series 1. Ritrodes.—Basal leaves pinnatifid into narrow-lanceolate lobes, densely covered with thin and short spines along margin.

9. *E. ritrodes* Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 407; Boiss. Fl. or. III, 428.

17 Perennial. Root two or three-headed, forming caudex with floccose-tomentose stem bases surrounded by remains of old leaves. Stem 30–60 cm high, branched above; branches in groups of two or three, entirely white tomentose-arachnoid-hairy, leafy in basal and lower parts. Leaves lanceolate; basal leaves 20–25 cm long, 4–5 cm wide below midpoint in widest part, pinnatifid into lanceolate lobes, with thin and short spines, increasingly reduced upward along stem; upper leaves 1–3 cm long, narrow-lanceolate, prickly-toothed; upper surface of leaves grayish-green, finely sparsely arachnoid, glabrescent; lower surface grayish, densely gray-arachnoid-hairy, like petioles and prominent veins. Heads solitary terminal on branches, one to three on single stem, 3–3.5 cm wide. Capitula 13–15 mm long; bristles surrounding capitula unequal, somewhat flat, yellowish-white, up to 4 mm long. Involucral bracts 20–23; outer bracts rhomboidal at apex, acuminate, short-ciliate; outermost bracts scarcely longer than bristles; middle bracts up to 10 mm long, smooth or very finely scabrous, carinate, acuminate in spine, ciliate along margin; inner bracts even more attenuate, up to 12 mm long, connate at base. Corolla bluish (or pinkish?) deeply parted; tube pubescent on outer side near throat. Pappus of scabrous bristles fused at base. Flowering VII; fruiting VIII.

Gravelly slopes of lower mountain zone in deserts.—*Soviet Central Asia*: mountainous Turkmenia (Firyuza, Desht, Aidere). *General distribution*: Iran. Described from the vicinity of Mashhad. Type in Leningrad.

10. *E. multicaulis* Nevski in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 4 (1937) 286; Fl. Turkm. VII, 144.

Perennial. Plants with three or four-headed root, producing three or four stems, surrounded by numerous remains of old leaves. Stems 20–35 cm high, densely covered with short-stalked glandular hairs, moreover white arachnoid-hairy in upper part, with few branches above. Leaves

coriaceous, oblong-lanceolate, grayish-green above, with short-stalked glandular hairs, scabrous; leaves white-woolly beneath, glandular and greenish along prominent veins; leaves pinnatifid, with linear-lanceolate lobes; basal leaves 15–25 cm long and 3–4 cm wide with lobes; cauline leaves shorter and narrower, leaf axis between lobes 0.5–0.8 cm wide, veins terminating in spinules, hence even linear lobes appear spiny; upper cauline leaves narrow-lanceolate, simple prickly-toothed and not pinnatifid. Heads 3–4 cm wide. Capitula 1.3–1.5 cm long, surrounded by numerous somewhat flat and white 3–4 mm long bristles, one-third to one-fourth as long as capitulum. Involucral bracts glabrous, scabrous, bluish; outer bracts 3–5 mm long, lanceolate, broadened above, long-ciliate; middle bracts carinate, grooved on inner side, long-ciliate and terminating into spine, slightly recurved above; outer and middle bracts free at base; inner bracts connate at base, brownish below on inner side, bluish above on outer side, long-ciliate and attenuate into cusp, longest reaching 15 mm in length. Corolla blue(?), glandular on outer side. Achenes densely hairy; pappus of bristles, light colored. Flowering VII; fruiting VIII.

Middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Kugitang Range). Described from the rise to Kugitang along the western slope, in the middle of the range. Type in Leningrad.

Series 2. Albicaules Bobr.—Stem white-tomentose or more sparsely arachnoid-hairy, without glandular hairs. Plants of foothill semideserts of northern Tien Shan, southern Pamiro-Alai, and Ust-Urt. *E. albicaulis* Kar. and Kir., *E. dubjanskyi* Iljin and *E. kafiriganus* Bobr. belong to this series.

I tentatively include here also the morphologically distinct *E. subglaber* Schrenk and *E. pubisquameus* Iljin, which differ from the above-mentioned species and apparently themselves represent isolated members of other evolutionary series.

11. *E. albicaulis* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 387; Ldb. Fl. Ross. II, 654; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 223.—*E. jaxarticus* Bge. in Beitr. z. Kenntn. d. Fl. Russl. u. Stepp. Centr. As. (1851) 175; Mém. Sav. Etr. VII, 350; Boiss. Fl. or. III, 428.—*E. kasakorum* Pavl. in Vestn. Akad. Nauk KazSSR, 8 (1950) 21, Fig. 16.

Perennial. Stem 40–80 cm high, one or two-branched, sometimes with short branches and densely white arachnoid-hairy, angular under pubescence, without glandular hairs. Leaves greenish-gray above due to sparse arachnoid-hairy pubescence, almost white beneath due to dense arachnoid-hairy, almost tomentose pubescence; basal leaves petiolate,

lanceolate, 20–30 cm long, pinnatifid in upper part, pinnatisect below, hence petiole as if bearing small prickly lobes; lobes in upper part of leaf distant, larger, spinose-spatulate, usually over 3–4 cm appearing decurrent along axes; cauline leaves sessile, smaller. Heads 3–4 cm wide, terminal on main stem and branches. Capitula 12–14 mm long; bristles surrounding capitula white, unequal, less than half as long as capitulum. Involucral bracts glabrous; outer bracts scarcely longer than bristles, cup-shaped, rhomboidal above, ciliate; middle bracts lanceolate, carinate, spinescent, scarcely colored above, ciliate along margin; inner bracts slightly shorter than middle, brownish on inner side, connate. Corolla whitish, deeply parted, tube sparsely covered with short bristles above. Achenes covered with yellowish-brown hairs; pappus of short scabrous bristles fused below. Flowering VI; fruiting VII.

Sandy semidesert.—*Soviet Central Asia*: Aralo-Caspian Region (southeastern), Balkhash Region, Dzhungaria-Tarbagatai, Syr-Darya. Endemic. Described from the Lepsa River. Type in Leningrad.

12. *E. kafirniganus* Bobr. sp. n. in Addenda, XXVI, 714.

- 19 Perennial. Root virgate, three to five-headed. Stems two or three, 60–80 cm high, branched above near tip, indistinctly sulcate, white arachnoid-hairy throughout, without glandular hairs. Lower cauline leaves 15–20 cm long, 6–8 cm wide, with three or four pairs of subopposite and one terminal lobe; upper lobes 3–4 cm long and 2–3 cm wide, prickly-toothed, 2–3 cm apart, short-decurrent, lower lobes spinose, 1–2 cm long, wider apart; basal leaves semiamplexicaul, spinose; upper leaves lanceolate, deeply pinnatifid into prickly-toothed lobes, light grayish-green above, without glandular hairs, arachnoid-hairy, almost white beneath due to dense arachnoid-hairy pubescence, eglandular. Heads two or three on stem, 3.5–4 cm wide, surrounded by common involucre of white membranous bristles, 6–8 mm long, reflexed. Receptacle pyriform or obovoid, 4–6 mm long. Capitula 14–15 mm long, bristles surrounding them numerous, somewhat flat, colorless, 8–9 mm long. Involucral bracts 16–20, in four or five rows, very finely scabrous, pale; outer bracts 9–10 mm long, membranous, almost filiform, cup-shaped above, brownish and toothed, with two or three long cilia on each side along margin; bracts of next two rows 12–14 mm long, carinate, acuminate, with appressed cilia along margin, brownish on inner side; inner bracts connate over more than one-third length, dark brown or even blackish on inner side, free above, acuminate and fimbriate; corolla tube with few glandular hairs below throat. Achene fusiform, densely covered with yellowish appressed hairs enclosing pappus. Flowering VIII–IX.

Pistachio plantations of the semidesert zone of foothills.—*Soviet Central Asia*: Pamiro-Alai (southern Tadzhikistan). Endemic. Described from Kafirnigan, from the slopes between the Aikhatyn well and Chilchik. Type in Leningrad.

13. **E. dubjanskyi** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 176.

Perennial. Stem 25–60 cm high, solitary or two, simple or sparsely branched above, densely white-tomentose throughout, without glandular hairs. Leaves lanceolate, coriaceous, similarly colored on both sides, grayish, finely white-tomentose, without glandular hairs, veins prominent beneath; basal leaves 15–25 cm long, 2–6 cm wide, pinnatipartite, with oblong prickly-toothed lobes, petiole broadened near base; cauline leaves reducing above, distant, sessile, auriculate; upper leaves linear-lanceolate, acuminate, spinescent and prickly-toothed. Heads 2–3.5 cm wide. Capitula 12–14 mm long; bristles surrounding them half as long as capitulum, unequal, scabrous. Involucre of 20–22 free and smooth bracts; outer bracts linear, about 7 mm long, almost as long as bristles, broadened above, setaceous-ciliate, acuminate; middle bracts lanceolate, carinate, 20 widest, membranous and setose along margin, with flexuous cilia, long acuminate; inner bracts lanceolate, dark brown, bluish above, setaceous-ciliate from midpoint, with scabrous cilia, acuminate. Corolla bluish, deeply parted; tube glandular. Achene with dense yellow hairs; pappus of yellowish bristles fused at base. Flowering VI; fruiting VII.

Sandy and gravelly deserts of the Aralo-Caspian region, on consolidated hummocky sands and in lowland basin.—*Soviet Central Asia*: Aralo-Caspian (Ust-Urt), Kyzyl-Kum (Karakalpakia), Kara-Kum (Karabugaz). Described from the Sam sands. Endemic. Type in Leningrad.

14. **E. subglaber** Schrenk in Bull. Acad. Sc. Pétersb. III (1845) 110; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 223.

Perennial. Stems two to four, arising from villous-tomentose caudex at base, with remains of previous year's leaves, weakly white arachnoid-hairy mainly in lower part and with numerous short-stalked glandular hairs throughout. Leaves green on both sides, rough above, densely glandular beneath along petiole and veins, lanceolate, pinnatilobate in upper and pinnatipartite in lower part of lamina, with lobes wide apart, sharply prickly-toothed due to spinules into which prominent veins terminate; lower cauline leaves 20–25 cm long and 3–4 cm wide in upper broadest part, cauline leaves reducing upward; upper leaves linear-lanceolate, prickly-toothed. Heads about 3 cm wide. Capitula 14–16 mm long; bristles surrounding them 4–5 mm long, somewhat flat and white. Involucre of 25 bracts; outer bracts scarious, 6–7 mm long, in upper

part rhomboidal, carinate, ciliate; middle bracts free, 12–13 mm long, bluish and finely scabrous above, appressed ciliate; inner bracts connate at base, brownish below, scarious, longitudinally carinate, ciliate-fimbriate above but not acute, slightly shorter than middle bracts. Corolla whitish(?), deeply parted; tube pubescent on outer side around throat; stamen tube exerted from throat (and involucre bracts) by 7–8 mm, almost equaling corolla lobes.

Sandy-gravelly desert.—*Soviet Central Asia*: Aralo-Caspian (extreme southeast), Balkhash Region (south). Endemic. Described from Balkhash. Type in Leningrad.

15. **E. pubisquameus** Iljin in Bot. Mat. Gerb. Bot. Sada, III (1922) 175.

Perennial. Root two or three-headed. Stems one or two, 25–30 cm high, white-tomentose at base due to pubescence of leaf remains, weakly branched, with glandular hairs on very short stalks, sometimes indistinct due to white arachnoid-hairy pubescence preserved below along edges. Lower cauline leaves 10–15 cm long, 3–4 cm wide, amplexicaul along petiole; cauline leaves shorter and narrower, decurrent, lower pinnatifid, 21 upper pinnatifid into deltoid lobes, sharp prickly toothed; leaves grayish-green above, arachnoid-hairy and scabrous white-tomentose beneath with prominent veins. Heads 2.2–2.5 cm wide. Capitula 12–13 mm long, bristles surrounding them white, somewhat flat, unequal, scarcely reaching 4 mm. Involucre bracts 16–20, arachnoid-hairy on outer side in nonoverlapping part; outer bracts rhomboidal and acuminate, about 5 mm long, spiny-toothed; middle bracts enlarged to 12 mm, spinescent, prickly-ciliate along margin, pale green above, brownish below; inner bracts connate in lower one-third, dark brown, free and prickly-serrate-ciliate above. Corolla bluish, parted over 4 mm, with glabrous tube. Achene densely covered with appressed yellowish bristles; pappus bristles free above. Flowering VII; fruiting VIII.

Gravelly slopes of lower mountain zone.—*Soviet Central Asia*: Tien Shan (foothills of Karatau). Endemic. Described from the Ulkun-Buruk Mountains. Type in Leningrad.

Series 3. Dasyanthi Bobr.—Corolla tube glandular and spreading-hairy above. Plants of mountain ranges bordering the Fergana valley.

16. **E. dasyanthus** Rgl. and Schm. in Izv. Obshch. Lyubit. Estestv. Antrop. Etnogr. 34, 2 (1882) 47; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 225.

Perennial. Root two or three-headed. Stems one to three, 20–40(60) cm high, covered at base with remains of previous year's leaves, white-tomentose, partly glabrescent toward end of vegetative period, with short

branches. Leaves coriaceous, grayish-green, sparsely arachnoid-hairy, without glandular hairs and grayish-tomentose beneath; basal leaves petiolate; pinnatipartite, with prickly, crenate-toothed, narrow (0.5 cm) leaf axis, lanceolate, up to 20 cm long and 3–4 cm wide; cauline leaves sessile, amplexicaul-auriculate; upper leaves 3–5 cm long, 1–1.5 cm wide, with short, deltoidly acuminate, prickly lobes. Heads solitary, terminal on branches, 2.5–3 cm wide, light blue. Capitula about 15 mm long, receptacular bristles numerous, one-third to one-fourth as long as capitulum. Involucral bracts 20, free, bluish; outer bracts scarcely exceeding bristles, broadened above, broadly ciliate; middle bracts lanceolate, carinate, setose-ciliate along margin, acuminate, spinescent; inner bracts long, attenuate-acuminate, almost entire. Corolla light bluish, deeply divided, with glandular tube, upper part of tube densely pubescent with long and spreading white hairs. Achenes with dense yellow hairs above; pappus of scabrous bristles, fused over two-thirds length. Flowering VIII; fruiting IX.

Gravelly slopes of middle mountain zone.—*Soviet Central Asia*: Syr-Darya (northern border of the Pamiro-Alai Region). Endemic. Described from Kokand Region, Shahimardan. Type in Leningrad.

22 17. *E. tjanschanicus* Bobr. sp. n. in Addenda, XXVI, 714.

Perennial. Root two or three-headed. Stems one to three, 25–50 cm high, covered at base with remains of previous year's leaves, entirely densely arachnoid-hairy or loosely white-tomentose with one, less often two, branches in upper one-third. Leaves coriaceous, grayish or grayish-green above, sparsely arachnoid-hairy and glandular; glandular hairs small, sessile, short-stalked on petioles; almost white-tomentose beneath due to light-colored dense arachnoid-hairy pubescence; basal leaves petiolate, lanceolate, up to 20 cm long and 3–4 cm wide in upper one-third part, deeply pinnatipartite, with prickly-toothed lanceolate lobes and narrow crenate rachis, lobes reduced and spiny toward lower part of leaf; cauline leaves sessile, amplexicaul, spinose towards base; upper leaves lanceolate, sharp prickly-toothed. Heads 3–4 cm wide, bluish. Capitula 14–15 mm long, receptacular bristles few, unequal, one-fourth to one-fifth as long as capitulum. Involucral bracts 20–21, free, bluish, scabrous, slightly recurved in upper part; outer bracts smallest, two times as long as bristles, lanceolate, acute, carinate, ciliate, more attenuate and gradually elongating toward inner bracts; innermost bracts long ciliate in upper part, connate and dark brown in lower half. Corolla light bluish, deeply parted, with glandular tube and fewer short hairs. Achene densely appressed hairy; pappus of scabrous unequal bristles, free above. Flowering VII–IX. (Plate I, Fig. 2.)

Mountain-steppes and juniper forest zone.—*Soviet Central Asia*: Tien

Shan (southern range of Kuramin, Uzun-Akhmat, Airtash, Uyunkur, Naryn). Endemic. Described from the Kuramin Range.

Type in Leningrad.

Note. This species is distinguished from *S. dasyanthus* Rgl. and Schm. by the following characters: leaves sparsely arachnoid-hairy above and with fine sessile glandular hairs which are short-stalked on petioles; corolla tube puberulent.

Series 4. Karatavici Bobr.—Leaves grayish-green above, usually with arachnoid-hairy pubescence or glandular, less often scabrous, without arachnoid-hairy pubescence, leaves white- or grayish-tomentose beneath. Plants of Tien Shan and Pamiro-Alai.

18. *E. chantavicus* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 365; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 224.—*E. hypoleucus* Rupr. in Mém. Acad. Pétersb. sér. VII, XIV (1869) 4.

Perennial. Stems 50–80 and up to 100 cm high, simple or with few branches at extreme tip, without glandular hairs, almost glabrous or weakly arachnoid-hairy in lower part, densely arachnoid-hairy to almost white-tomentose above. Leaves green and rough above, white-tomentose 23 beneath, without glandular hairs on both sides; lower leaves 30–40 cm long, reduced above to 10 cm; all leaves deeply pinnatifid, sometimes narrowly decurrent along leaf axes, with large and distant ovate lobes, with unequal teeth terminating in short spinules, spinescent. Heads solitary, 3–4 cm wide, with glabrous receptacle. Capitula 2–2.5 cm long, turbinate in lower part, acutely angled-prismatic in upper part; bristles surrounding them one-fourth to one-fifth as long as capitulum, unequal, slightly broadened above. Involucral bracts almost entirely free, up to 25, imbricate, without glandular hairs, glabrous, smooth, carinate, acuminate-spinescent, short- and hard-prickly from middle, bluish above; outer bracts shortest, spatulately broadened and ciliate above; middle and inner bracts brownish below, bluish above. Corolla blue, exserted from scales. Appendages of anthers acute, short, apical appendages scarcely barbate. Achene densely hairy; pappus setose, bristles free above, ciliate. Flowering V–VI; fruiting VI–VII.

Gravelly semidesert.—*Soviet Central Asia*: Balkhash Region (in the south from Khantau to Chu-Ili mountains and in the Dzsharkent Region in southeast), Tien Shan (central Tien Shan). Endemic. Described from the Khantau Mountains. Type in Leningrad.

19. *E. karatavicus* Rgl. and Schm. in Tr. Peterb. Bot. Sada, V (1877) 256; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 225.—*Exs.*: H.F.A.M. No. 39.

Perennial. Stems 60–80 cm or more high, with remains of dead leaves at base, arachnoid-hairy pubescent and glandular below, finely arachnoid-hairy or loosely white-tomentose above, branched from middle. Leaves almost coriaceous; lower leaves lanceolate, 15–25 cm long, short-petiolate, reduced upward, amplexicaul; all leaves pinnatifid, with broad, pinnatilobate, prickly-toothed lobes, green above and sparsely arachnoid-hairy, with scattered stalked glandular hairs, gray-tomentose beneath. Heads solitary, terminal on branches, 5–6 cm wide. Capitula 2–2.5 cm long; bristles surrounding them somewhat flat, 5–6 mm long. Involucre almost as long as florets, free, glabrous, slightly colored; outer bracts spatulate above, with scarious border, toothed; middle bracts lanceolate, deltoidly broadened, ciliate; inner bracts gradually narrowed above, greenish, short-ciliate. Corolla pale blue, about 1.5 cm long, with glandular tube. Achenes densely hispid, narrow, clavate; pappus as crown of scabrous bristles fused over two-thirds their length. Flowering VI–VII; fruiting VII–VIII.

— Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan, Syr-Darya (Fergana Valley), Pamiro-Alai (Alai Range, Lyangar). Endemic. Described from the Chirchik Valley. Type in Leningrad.

20. *E. obliquilobus* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 180.

24 Perennial. Stem 40–60–80 cm high, shallow-sulcate, almost entirely floccose-loosely tomentose, also with short-stalked glandular hairs, branched above, white-tomentose and without glandular hairs below heads. Leaves thin-coriaceous, green, very sparsely white arachnoid-hairy along veins, with scattered glandular hairs and scabrous above, white-tomentose beneath; basal leaves 30–40 cm long, with prickly flattened petioles; cauline leaves sessile, narrowed toward base; upper leaves not narrowed, smallest, very short-decurrent; all leaves pinnatifid, with more or less oblong-deltoid, antrorse lobes, prickly along margin, and scarcely prickly along broad incisions. Heads solitary or a few, 3.5–4 cm wide. Capitula 16–18 mm long; bristles surrounding them few, 4–6 mm long, unevenly scabrous and somewhat flat. Involucre of 25–30 free and smooth bracts; outer bracts linear, spatulately broadened above, setose along margin; middle bracts lanceolate, carinate, cristate-ciliate along margin, acuminate-aristate; inner bracts thin coriaceous, aristate. Anther appendages barbate above. Pappus bristles fused at base. Flowering VII; fruiting VIII–IX.

Limestone outcrops of middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (southwest; Gissar Range and Surkhan-Darya Province). Described from the Khakimi Mountains near Karataga River in the Gissar Range. Type in Leningrad.

21. *E. babatagensis* Tschern. in Fl. Uzb. VI (1962) Addenda.

Perennial. Stem 20–30 cm high, shallow-sulcate, finely tomentose and glandular, with few short branches above. Leaves with sessile glandular hairs above and weakly arachnoid-hairy at isolated points, grayish-tomentose beneath, with prominent midrib, basal leaves petiolate, pinnatifid, with lanceolate prickly-toothed lobes and narrow and flat prickly-small toothed rachis; middle and upper leaves sessile, semiamplexicaul, auriculate; upper leaves pinnatilobate, short-decurrent. Heads terminal on branches, about 3.5 cm wide. Capitula 10–20 mm long; bristles surrounding them few, flat, 4–5 mm long. Involucral bracts 28–30; outer bracts linear, scarcely longer than bristles, broadened above, ciliate; middle bracts 7–15 mm long, lanceolate, carinate, setose-ciliate along margin, acuminate-aristate; inner bracts lanceolate, 18–20 mm long, brownish on inner side over more than half length, ciliate along margin, aristate. Corolla pale blue. Achenes deep yellow; pappus bristles coronate in lower part, fused, split. Flowering VII–VIII; fruiting VIII–IX.

Limestone and gypsum deposits of middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (southwest—northern part of the Babatag Range). Endemic. Described from the place indicated. Type in Tashkent.

25 22. *E. fedtschenkoi* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 177.

Perennial. Stems two or three, 40–50 cm high, covered with remains of previous year's leaves and angular-ribbed below, white pubescent along ribs, yellowish-brown along furrows, with stalked glandular hairs in upper and middle part, stems as well as their branches cylindrical, white-tomentose, without glandular hairs. Lower cauline leaves 25–30 cm long, 4–6 cm wide, with prickly petiole, amplexicaul, lanceolate, deeply pinnatifid into broad deltoid, large prickly-toothed lobes with narrow sinuses much smaller than lobes, spinulose along margin; leaves gradually reduced upward and broad-lanceolate, large prickly-toothed, 4–6 cm long, 1–2 cm wide, densely punctate, grayish-green, arachnoid-hairy, and without glandular hairs above, grayish-tomentose, with prominent veins, less densely pubescent-hairy and without glandular hairs beneath. Heads 4–5 cm wide. Capitula 18–20 mm long; bristles surrounding them about 6 mm long, white, flat, sometimes ciliate-truncate at tip. Involucral bracts 18–20; outer bracts scarcely exceeding bristles, rhomboid above, brownish, carinate, ciliate; middle bracts (9–10) roundish-carinate, finely scabrous on outer side, acuminate, reflexed, ciliate-setose along margin, brownish in lower part, bluish and punctate above; inner bracts free, glabrous, shorter than middle, incised-ciliate-toothed from middle. Corolla deeply divided, bluish, glandular on outer

side. Achenes hispid-strigose; pappus bristles rusty, fused at base. Flowering VII; fruiting VIII.

Middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Darvaz). Endemic. Described from Kamchirak Pass. Type in Leningrad.

Series 5. Orientales Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 70 p. p.—Outer involucre bracts broad-rhomboidal or spatulately broadened above, with short cusp; middle bracts lanceolate, attenuate-acuminate. Plants of Transcaucasia and Dagestan.

23. *E. orientalis* Trautv. Diss. Echin. (1833) 22; DC. Prodr. VI, 526; Iljin in Grossh. Fl. Kavk. IV, 161; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VII, 72.—*E. horridus* acut. non Desf. (1804); Ldb. Fl. Ross. II, 656; Bge. in Bull. Acad. Pétersb. VI, 407; Boiss. Fl. or. III, 438 p. p.; Iljin, op. cit.—*lc.*: Trautv. op. cit., f. 8.

Perennial. Stem about 70 cm high, solitary (?), simple, sulcate, white-pubescent, almost white-tomentose above, also with numerous glandular hairs throughout surrounding brownish, flat, and curly bristles, imparting reddish-brown tinge to stem. Leaves lanceolate; basal leaves 25–35 cm long; cauline leaves shorter, bipinnatifid, with lanceolate lobes, divided into long-deltoid lobes, prickly-toothed, attenuate into 1–1.5 cm long spine; upper cauline leaves simple pinnatifid to long prickly-toothed; leaves scabrous above due to dense cover of stalked glandular hairs, also somewhat arachnoid-hairy, white-tomentose beneath with few, brown, stalked glandular hairs along veins. Heads 4.5–6 cm wide. Capitula 30–35 mm wide, cuneately narrowed toward base; bristles surrounding them about 12 mm long, almost half as long as young capitula, numerous, somewhat flat. Involucre bracts scabrous, 20; outer bracts not longer than bristles, spatulately broadened, mucronate and serrate, brownish on outer side; middle bracts about 25 mm long, broadened in middle, long acuminate, appressed serrate-ciliate along margin; inner bracts connate at base, shorter than middle, acute and fimbriate-incised above. Corolla pale blue, deeply divided. Achenes densely appressed-setose; pappus bristles fused and toothed near base. Flowering VI; fruiting VII.

Foothills of eastern Caucasus in the semidesert zone.—*Caucasus*: Dagestan, eastern Transcaucasia. *General distribution*: Iran (northwest). Described from Derbent. Type in Leningrad.

Note. The classical authors De Candolle, Ledebour and Boissier considered *E. horridus* Desf. as the prior name of this species. However, we are not confident that they were correct. This is because *E. horridus* Desf. was described in a few words and does not characterize the plant at all. The specimens that could be considered as type specimens

apparently belong to different species. We had an opportunity to examine the *E. horridus* specimens from Schrader's herbarium, sent to him by Pearson with a reference to the Paris Garden ("H.P."). These specimens, in our opinion, should be included under *E. orientalis* Trautv. The specimen from the herbarium of Mertens ("11 Nov. 1807, Hort. Paris") is only a portion of the upper part of a stem with terminal leaves. This plant does not resemble *E. orientalis* Trautv.

For a final solution of the problem concerning the name of this species, it is essential to study the specimens of the plant cultivated in Paris in 1804, which are the type specimens of *E. horridus* Desf.

24. ***E. opacifolius*** Iljin ex Grossh. Fl. Kavk. IV (1834) 159; Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 1, 60; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 75.—*E. bipinnatus* auct. non Freyn 1894; Iljin in Grossh. Fl. Kavk. IV, 160; Grossh. Opređ. Rast. Kavk. 471.

Perennial. Stem 30–50 cm high, simple, sulcate, arachnoid-hairy or almost tomentose and also glandular in lower part, leafy in lower one-third part. Leaves oblong, pinnatipartite or pinnatisect, with lanceolate or oblong, prickly-toothed lobes; basal and lower cauline leaves petiolate, with spinule at base, often trifid; upper leaves sessile, semi-amplexicaul; 27 leaves finely and very loosely tomentose above, white-tomentose beneath. Heads 4–5 cm wide. Capitula 20–24 mm long; bristles surrounding them unequal, white, half to one-third as long as capitulum. Involucre of 20–25 glabrous bracts, five or six outer bracts not longer than bristles, spatulately broadened above, short acuminate and ciliate, next five or six bracts with broader cuneate base, long acuminate; middle six or seven bracts linear-lanceolate, dark in lower part, long acuminate and ciliate-toothed above middle; inner bracts lanceolate, connate in lower half, dark, pale green above, acuminate and fimbriate-ciliate. Corolla pale, very deeply divided. Achenes densely appressed-setose; pappus of yellowish bristles, free above. Flowering VII; fruiting VIII.

Foothill zone.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR), Talysh. Endemic. Described from the Nakhichevan ASSR. Type in Baku.

25. ***E. connatus*** C. Koch in Linnaea, XXIV (1851) 381; Iljin in Grossh. Fl. Kavk. IV, 161; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VII, 76.

Perennial. Stem about 1 m high, ribbed, arachnoid-hairy, with numerous thick-stalked glandular hairs, branched above, almost white-tomentose. Leaves lanceolate, 15–25 cm long, bipinnatifid into distant deltoid or lanceolate toothed lobes, spinescent; leaves not coriaceous,

glabrous above, but with thick-stalked glandular hairs, almost white-tomentose beneath, with few stalked glandular hairs along veins. Receptacular bristles half as long as capitulum, somewhat flat, whitish. Involucral bracts glabrous; outer bracts rhomboidal above, with dark brown spot in broader part, toothed, short acuminate; middle bracts lanceolate, ciliate, acuminate-cuspidate; inner bracts shorter than middle, oblong-linear, ciliate, connate in lower half; pappus of reddish barbed bristles.

Caucasus: Southern Transcaucasia (former Olty District of Kars Region). *General distribution*: Asia Minor. Described from the former Olty District. Type specimen lost.

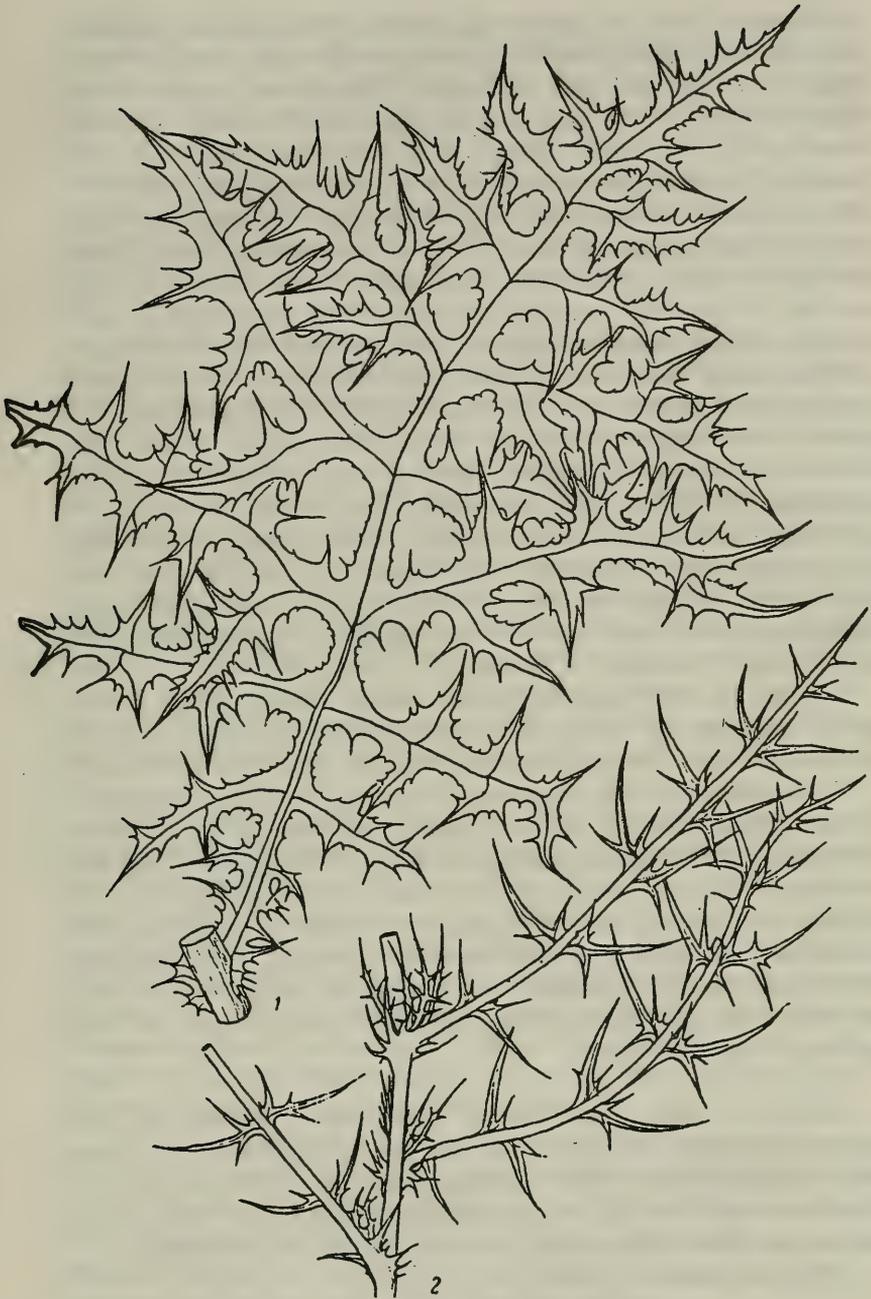
Note. This is a poorly known and extremely problematic species. Boissier included it among the synonyms of the East Mediterranean species *E. viscosus* DC., distributed from Crete to Syria and Kurdistan. Ya.I. Mulkijanyan saw the plants preserved in Tbilisi, collected by D.I. Sosnowsky in the former Olty District, which can be considered as having originated from the classic locality. These specimens are also inadequate and do not permit complete characterization of this plant.

M.M. Iljin (op. cit.) suggested that the species of Koch is "one of the forms of the widespread species *E. pungens* Trautv. in Transcaucasia."

28 Ya.I. Mulkijanyan included *E. macrophyllus* var. *glabricaulis* Bornm. among the synonyms of *E. connatus* C. Koch. The former name was proposed by Bornmüller for the specimens collected by Yu.N. Woronow (VII, 1911) from the vicinity of Artvin. These specimens are in the herbarium of Bornmüller in Weimar. The opinion of I. Bornmüller, the very authoritative botanist who specialized in the study of the Iranian globe-thistles and saw many original specimens, is very important. Nevertheless, I take the liberty to express doubt concerning the identity of the East Anatolian species *E. connatus* C. Koch with the Iranian species *E. macrophyllus* Boiss. and Hausskn., distributed only in the western Kopetdag within the limits of the USSR.

Series 6. Macrophylli Bobr.—Lower cauline leaves undivided and with relatively wide axial part in sinuses between lobes. The only member of this Iranian group of species in our flora is *E. macrophyllus* Boiss. and Hausskn. Apparently, *E. jesdianus* Boiss. and Buhse belongs to this series.

26. *E. macrophyllus* Boiss. and Hausskn. in Boiss. Fl. or. III (1875) 426; Bornm. in Beih. bot. Centralbl. XXXVI, 2, 211; Fl. Turkm. VII, 146.



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Perennial. Stem 1–1.5(2) m high, about 2 cm in diameter, simple at base, branched above, entirely sulcate, sparsely white arachnoid-hairy along ribs, densely glandular with glandular hairs on curly bristles. Lower cauline leaves 25–40 cm long, axial part entire, 1.5–3 cm wide in sinuses, lobes up to 10 cm wide, sessile, semiamplexicaul, lanceolate, with pinnately lanceolate prickly-toothed lobes up to 6 cm long and 1–1.5 cm wide, prickly-toothed with veins terminating in spinules, with broad and deep incisions between teeth, and short spines along margin; leaves gradually reduced upward along stem; upper leaves lanceolate, 10–12 cm long, 2–3 cm wide, not lobed, prickly-toothed; grayish-green above, densely glandular-hairy with papillate stalks, grayish-tomentose beneath, with prominent veins and glandular hairs along veins. Heads solitary terminal on branches, 8–10 cm wide. Capitula 22–24 mm long, with about 32 mm long florets; bristles surrounding them 12–14 mm long. Involucre of 16 glabrous bracts; outermost bracts shorter than bristles, lanceolate, rhomboidal above, brownish, ciliate; middle bracts about 20 mm long, narrowed-subulate from middle, bluish, appressed ciliate along margin, appearing serrated; inner bracts connate in lower one-third, acute, not subulate, colored and ciliate. Corolla tube glandular below throat, deeply parted into linear, about 10 mm long lobes. Pappus bristles fused only at base. Flowering VI; fruiting VII. (Plate I, Fig. 1).

30 Found in shady places in ravines, among shrubs.—*Soviet Central Asia*: mountainous Turkmenia (southwestern Kopetdag). *General distribution*: Iran. Described from southeastern Iran. Type in Weimar.

Note. Bornmüller, in comparing the plants collected by Schintenis in the western Kopetdag with the original specimens in the herbarium of Hausknecht, noted their complete identity. His suggestion (*Beih. bot. Centralbl.*, XXXVI, 2, 1918, 211, 212) that the plant collected by Yu.N. Woronow (VII, 1911, No. 6089) along the Chorokh near Artvin should be included under this species is extremely interesting. These specimens differ, according to Bornmüller, only by glabrous stems, which is why, he named them *E. macrophyllus* var. *glabricaulis* Bornm. See also note to *E. connatus* Koch.

Section 3. Ritro Endl. Gen. pl. (1836) 467 p. p.; Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 401, 408; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 35; Boiss. Fl. or. III (1875) 425 ex. p.—Involucral bracts 18–25; outer bracts without glandular hairs; leaves coriaceous. Plants from plains, mountain steppes, and semideserts.

Type of section: *E. ritro* L.

Series 1. Tenuifolii Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 65.—Receptacular bristles one-third to one-fourth as long as capitulum; outer involucral bracts not longer than adjacent bristles.

27. *E. ritro* L. Sp. pl. (1753) 815, quoad. β .; Trautv. Diss. Echin. 23; Ldb. Fl. alt. IV; Ldb. Fl. Ross. II, 654; Schmalh. Fl. II, 91; Kryl. Fl. Zap. Sib. XI, 2868; Grossh. Fl. Kavk. IV, 158; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 65.—*E. ritro* β . *tenuifolius* DC. Prodr. VI (1837) 524.—*E. tauricus* Willd. ex Ldb. Fl. alt. VI (1831) 44.—*E. tenuifolius* Fisch. ex Schkuhr, Handb. III (1808) 181, nom.—*E. ruthenicus* auct. non MB. (1819); Vozn. Rosl. UkrSSR, 558; Stank. and Tal. Opređ. (1957) 401.—*E. caule* . . . Gmel. Fl. Sib. II (1749) 102.—**lc.**: Gmel. Ibid., tab. XLVI: Trautv. op. cit. Fig. 9: Fl. Yugo-Vost. VI, Fig. 693.—**Exs.**: GRF No. 2028.

Perennial. Stems solitary or fewer, 20–60 cm high, simple or with few branches above, surrounded at base by remains of previous year's leaves, cylindrical, leafy, white arachnoid hairy-tomentose. Leaves, except basal, sessile, 10–20 cm long, 3–10 cm wide, semiamplexicaul, deeply pinnati- or bipinnatisect into lanceolate prickly-toothed lobes, dark green, glabrous or weakly arachnoid-hairy above, white-tomentose beneath. Heads one to five, solitary terminal on stems and branches, light bluish, 3.5–4.5 cm wide; bristles of common involucre broadened above, 5 mm long. Capitula 12–17 mm long; bristles surrounding them about 4 mm long. Involucre of 20–22 bracts; outer bracts up to 4 mm long, deltoidly broadened above, ciliate; middle bracts spatulate; inner up to 15 mm
31 long, lanceolate, carinate, ciliate along margin, greenish on inner side. Achenes cylindrical, 6 mm long; pappus bowl shaped, of scarious bristles, fused in lower half, free above, ciliolate. Flowering V–VI; fruiting VI–VII.

Predominantly found in steppe zone (less often forest-steppe zone), steppe meadows on rubbly slopes and outcrops, and on chalk.—*European Part*: Upper Volga (south), Volga-Don, Trans-Volga, Volga-Kama (south), middle Dnieper, Bessarabia, Black Sea Region, Lower Don, Lower Volga, Crimea; *Caucasus*: Ciscaucasia; *Western Siberia*: Ob (south), Upper Tobol, Irtysh, Altai; *Soviet Central Asia*: Aralo-Caspian Region, mountainous Turkmenia, Balkhash Region, Dzhungaria-Tarbagatai. *General distribution*: Central Europe (introduced), Iran, western China. The figure cited by me in Gmelin's "Siberian Flora" can be considered as the type of this species.

Note 1. My proposal to consider the plants shown in the figure in Gmelin's Flora as the type of this species is only a preliminary solution of the nomenclatural problem arising in connection with the selection of a type specimen. The matter is as follows. While establishing this species, Linnaeus (op. cit.) cites in the protologue two polynomial names proposed by Gmelin for the West European plants.

The first of them (Gmel. Fl. Sib. II, 100) is *E. latifolius* Tausch, and the second, which Linnaeus denoted with the letter β . (Gmel. op. cit. 102, tab. 46), Russian investigators have always considered to be

true *E. ritro* L. As regards the western European plants, the citations of Bauhin, Lobelius, and Dalechamp probably refer to some other southern European plant, possibly to the one designated by De Candolle as *E. ritro* α . *vulgaris* DC. or to the one for which Bieberstein proposed the name *E. ruthenicus* MB. It is possible, however, that the names proposed by De Candolle and Bieberstein pertain to the same southern European species. To solve the nomenclatural problem it is necessary first to determine the species to which the plant grown by Linnaeus in the Uppsala Garden and cited first, i.e., the formal type specimen of *E. ritro* L., belongs.

The Russian name of this plant is common globe-thistle; the Latin name proposed for it by Linnaeus is "Ritro," taken by him from the article by Matthias Lobelius (1538–1616), in which it was used as a generic epithet. The word "ritro" is the vernacular name of the southern European globe-thistle.

— *Note 2.* The extreme polymorphism of this species was noted already in the first monograph of the genus by Trautvetter (1833). This tendency was mentioned also by De Candolle, Ledebour, Korshinsky and Krylov. Of the forms more or less deserving special study, *E. ritro* δ . *litwinowii* Korsh. (Tent. *Fl. Ross. or.*, 1898, 231), distinguished by extremely narrow lobes of the leaves, should be mentioned, which sometimes is an indicator of the semidesert of western Kazakhstan. In eastern Kazakhstan, var. *latilobus* Kryl. (op. cit.), which is characterized by leaves with broad lobes, shallowly and simply pinnatifid (and not bipinnatisect), the upper 32 cauline ones lanceolate and sharply toothed, is distributed in eastern Kazakhstan. Plants with such leaves are predominant in the southern Altai, the Zaisan Basin, Tarbagatai, and the foothills of the Dzhungarian Alatau. At the same time, typical specimens of *E. ritro* L., with the lobes of the deeply bipinnatisect leaves narrow, are also found there. The wide range of the species, occurring in a diversity of habitats, and its tendency to vary, promote differentiation into races; the latter, however, have not yet been defined sufficiently clearly. After special study, probably the western Kopetdag race of *E. ritro* s.l. will have to be segregated as an independent race.

28. *E. meyeri* (DC.) Iljin in *Fl. Yugo-Vost.* VI (1936) 376 comb.—*E. ritro* γ . *meyeri* DC. *Prodr.* VI (1837) 524; Bge. *Reliq. bot.* 349.—*E. ritro* γ . *glandulosus* Korsh. *Tent. Fl. Ross. or.* (1898) 231.

Perennial. Stem 20–50 cm high, relatively slender, brownish, not tomentose, densely glandular-hairy, slightly branched above. Basal leaves petiolate; cauline leaves sessile, white-tomentose beneath, green above, glabrous or slightly arachnoid-hairy, simple or bipinnatilobate, with oblong, prickly-toothed or aristate lobes. Heads light blue, globose,

solitary, 2.5–3.5 cm wide; bristles surrounding them almost half as long as inner involucre bracts, somewhat flat, toothed. Involucre bracts 14–20, scaly, bluish; outer bracts linear-spatulate; acuminate, ciliate; middle bracts lanceolate, spinescent; inner bracts cuspidate; corolla bluish, tube glandular. Achenes with long hairs; pappus bristles fused over basal half. Flowering V–VI, fruiting VI–VII.

Zone of dry steppes, semidesert and desert; in the steppe zone on projecting rocks and along rubbly slopes.—*European Part*: Trans-Volga Region (south); Volga-Kama (extreme south), Lower Volga; *Western Siberia*: Upper Tobol (south); *Soviet Central Asia*: Aralo-Caspian Region (up to Ust-Urt in the south), Kyzyl-Kum (Karakalpakia). Endemic. The locality was not indicated while establishing *γ. meyeri* DC. It may be assumed that the type material could have originated from southeast of the European part of the USSR. To a certain extent, the plants of Leman, collected at Lake Inderskoe, could be considered as type specimens.

29. **E. spiniger** Iljin ex Bobr. in Tr. Bot. Sada Akad. Nauk SSSR, XLIV (1931) 75, nomen; Fl. Turkm. VII, 147, descr. ross.

Perennial. Stems 30–50 cm high, covered at base with remains of previous year's petioles, strongly branched, densely arachnoid-hairy, without glandular hairs. Leaves hard, bi- or tri-pinnatisect into narrow, hard, spinulate, divergent lobes, greenish above with scattered short-stalked or sessile glandular hairs and white arachnoid-hairy midrib, white-tomentose beneath with narrow border. Basal and lower cauline leaves 33 15–20 cm long, petiolate, broadened and ciliate at base; upper leaves reduced and reaching almost to heads. Heads 3–3.5 cm wide. Capitula at flowering 20–22 mm long; bristles surrounding them 5–6 mm long, broadened and toothed above. Involucre of 18–20 free glabrous bracts; outer bracts not longer than bristles, scarious, spatulate, brownish, acuminate and long-ciliate; middle bracts oblong-lanceolate, with prominent veins on outer surface, acuminate, long-ciliate; inner bracts scarious, free, acuminate above, laterally divided into two or three narrow-lanceolate parts. Corolla deeply incised, narrowed below throat and densely hairy. Achenes densely covered with yellowish bristles; with crown of hairs fused at base. Flowering VI; fruiting VII. Plate II, Fig. 2).

Steppes of middle mountainous zone.—*Soviet Central Asia*: mountainous Turkmenia (The Great Balkhan Range). Endemic. Described from the western slopes near Dzhebel. Type in Leningrad.

Series 2. Pungentes Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 59.—Stems glandular or glabrous below (*E. polyacanthus* Iljin); leaves bipinnatisect, with linear or lanceolate densely spinulose lobes.

30. **E. pungens** Trautv. Diss. Echin. (1833) 18, Fig. 5; Ldb. Fl. Ross. II, 656; Iljin in Grossh. Fl. Kavk. IV, 160; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 60.—*E. persicus* Stev. and Fisch. ex Fisch. Cat. horti Gorenk. II (1812) 37, nomen; DC. Prodr. VI, 525; Boiss. Fl. or. III, 440.—*E. raddeanus* Somm. and Lev. in Nuov. Giorn. bot. Ital. 2 (1895) 90; Tr. Peterb. Bot. Sada, XVI, 247; Iljin, op. cit. 158.

Perennial. Stems 40–60 cm high, less often higher, thick, sulcate, densely arachnoid-hairy, branched above, glandular below, almost white-tomentose above. Leaves coriaceous, elliptical, bipinnatisect into narrow-lanceolate distant lobes, with narrow winged 1–2 cm wide axis, and 2–4 mm long spines along margin; lobes of leaves short, prickly-toothed, teeth terminating in light colored, 6–10 mm long spine; leaves reduced upward; lower leaves up to 25 cm long and 12 cm wide; upper leaves lanceolate, prickly-toothed; leaves arachnoid-hairy and glandular above, with slightly recurved margin, white-tomentose beneath. Heads 3.5–6 cm wide, solitary, terminal on branches, up to six on single plant; common involucre of about 15 mm long scarios bristles lanceolately broadened above. Capitula about 2 cm long, apparently usually sterile; bristles surrounding them unequal, slightly more than one-third as long as involucre, colorless, somewhat flat. Involucre of 15–18 scabrous bracts; outer bracts scarcely exceeding bristles, rhomboidal above, brownish, acuminate, ciliate along margin, with isolated hairs on outer surface; middle bracts carinate, attenuate-acuminate, up to 15 cm long, ciliate; inner bracts not exceeding middle ones, longer and more irregularly ciliate. Corolla light bluish, deeply parted, with isolated hairs on fused part. Achenes with yellowish shiny hairs; pappus of barbed bristles fused up to basal half, unequal. Flowering VII; fruiting VIII. (Plate II, Fig. 1).

Mountain-steppe zone.—*Caucasus*: Southern and eastern Transcaucasia. *General distribution*: Eastern Anatolia, northeastern Iran. Described from the Kirovabad Region. Type in Leningrad.

31. **E. polyacanthus** Iljin in Bot. Mat. Gerb. Bot. Sada, IV (1923) 102; Iljin in Grossh. Fl. Kavk. IV, 158; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 64.

Perennial. Stems 40–60 cm high, ribbed, with two or three branches above, without glandular hairs, glabrous below, white-tomentose above. Lower leaves elliptical, 20–30 cm long, 12–20 cm wide, petiolate, with numerous spines, pinnatipartite into narrow-lanceolate lobes, in turn divided into large prickly-toothed lobules with numerous spines along margin, hence appearing densely prickly; leaves reduced above, sessile, with prickly bases; upper leaves lanceolate, 3–7 cm long, large prickly-toothed; leaves grayish-green above, slightly arachnoid-hairy with few short-stalked glandular hairs, grayish-tomentose beneath, with prominent, sparsely glandular veins. Heads 5–6 cm wide, on 3–4 cm long branches;

common involucre of whitish, flat, 15–20 mm long bristles; bristles surrounding them slightly less than half as long as involucre, comprising white, flat unequal scales. Involucral bracts 17–20, finely scabrous; outer bracts slightly raised above adjoining bristles, i.e., 10–11 mm long, rhomboidal above and brownish on outer surface; increasingly acuminate from middle to inner bracts, appressed-ciliate along margin; innermost bracts sometimes slightly connate at base. Achenes covered with long golden hairs; pappus bristles unequal, about 2 mm long, fused in lower half. Flowering VII–VIII.

Mountain-steppe zone.—*Caucasus*: Southern Transcaucasia (western Armenia). *General distribution*: Eastern Anatolia. Described from the Kagyzman District of the former Kars Province. Type in Leningrad.

32. **E. conrathi** Freyn in Bull. Herb. Boiss. III (1895) 356; Iljin in Grossh. Fl. Kavk. IV, 157; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 59.

Perennial. Stems up to 1 m high and about 1.5 cm thick, angular, branched, white-tomentose, and without glandular hairs above, glandular below, but not tomentose. Lower leaves oblong, up to 35 cm long, pinnatisect into oblong-deltoid lobes, with teeth terminating in spines up to 1 cm long, sinuses between lobes roundish, leaf bases amplexicaul, spiny; leaves reduced upward; cauline leaves about 15 cm long; upper leaves pinnatisect into lanceolate-toothed lobes, arachnoid-hairy and glandular above, weakly pubescent and glandular to grayish-tomentose beneath with thick glabrous veins bearing few stalked glandular hairs.

35 Heads 6–6.5 cm wide. Capitula about 25 mm long; bristles surrounding them scabrous, unequal, almost half as long. Involucre of 16(20) bracts; outer bracts about 13 mm long, spatulately broadened above, toothed-ciliate along margin; middle bracts narrowed and pointed, appressed long-ciliate along margin; inner bracts not strongly acuminate, long-ciliate, longest, brown below on inner side, scarcely connate at base. Corolla light blue. Achenes about 8 mm long, densely pubescent; pappus of short barbed bristles fused at base. Flowering VII–VIII.

Rubby and shrubby slopes of mountain-steppe zone.—*Caucasus*: Southern and eastern Transcaucasia (Somkhetia, northern Armenia, southeastern Georgia). Described from Akhtala in northern Armenia. Type in Brno.

Series 3. Transcaucasici Mulk.—Lower cauline leaves bipinnatisect, more than half or almost as long as stem; outer involucral bracts spatulately broadened above, brown, scarcely longer than adjoining bristles.

33. **E. foliosus** Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900)

248; Iljin in Grossh. Fl. Kavk. IV, 159; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, III, 57.

Perennial. Stem 40–60 cm high, 1.5 cm thick, with few short branches above, white-tomentose, glandular below, sometimes with numerous glandular hairs, on somewhat flat, curly brownish bristles, or glandular hairs fewer and covered with white tomentum. Lower leaves up to 40–50 cm long and 10–18 cm wide, on long amplexicaul petioles prickly along margin, ovate-lanceolate, pinnatipartite with lobes bearing deltoid falcate teeth terminating in spines up to 1.5 cm long, roundish sinuses along axes spiny; cauline leaves almost pinnatifid into large deltoid lobes-teeth, with 1–1.5 cm long spines along margin and at tip; upper leaves undivided, large prickly-toothed, with numerous spines; leaves arachnoid above, with scattered short-stalked glandular hairs, white-tomentose beneath, with numerous long-stalked brownish glandular hairs along veins. Heads 4–5 cm wide, 3–3.5 cm on lateral branches. Capitula 2–2.5 cm long; bristles surrounding them few, unequal, white, about half as long. Involucre of 20, free, thin scabrous bracts. Outer bracts slightly longer than bristles, spatulately broadened above, brown, toothed, and ciliate along margin; middle bracts attenuate-acuminate, with roundish keel bearing long and appressed cilia; inner bracts longest, with very long cilia along margin. Corolla light blue. Pappus of very long bristles, unequal, fused over almost basal half. Flowering VIII–IX.

36 Shubby thickets of mountain-steppe zone.—*Caucasus*: Eastern Transcaucasia (Borzhomi, Abastumani District, Mtskheta, Dilizhan, Bzovdal). Endemic. Described from Borzhomi. Type in Helsinki, cotype in Leningrad.

34. **E. transcaucasicus** Iljin in Bot. Mat. Gerb. Bot. Sada, IV (1923) 104; Iljin in Grossh. Fl. Kavk. IV, 159; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 55, Fig. 10.

Perennial. Stem 60–80 cm high, base covered with fibrous remains of previous year's leaf bases, up to 1.5 cm thick, white-tomentose, without glandular hairs, leafless above. Lower leaves lanceolate, up to 45 cm long and 20 cm wide, pinnatisect into lanceolate lobes, latter in turn divided, prickly-toothed along margin, spines up to 8 mm long, petioles long, amplexicaul; lower leaves often as long as stem; cauline leaves sessile, lanceolate, pinnatifid to undivided, deeply toothed, teeth terminating in spines up to 1.5 cm long, dark green above and grayish due to arachnoid-hairy pubescence, without glandular hairs, grayish beneath due to dense arachnoid-hairy pubescence or loosely tomentose. Heads 5–6 cm wide. Capitula 22–25 mm long, with cuneate base, almost pentagonal; bristles surrounding them numerous, somewhat flat, 12–13 mm long. Involucral bracts 17–18; outer bracts scarcely longer than

adjacent bristles, rhomboidly broadened above, acuminate and spatulate-concave, dark brown in this part, short toothed-ciliate along margin; middle bracts longest, acuminate and attenuate-acuminate, with appressed cilia along margin, finely scabrous on outer side; inner bracts slightly shorter. Corolla pale blue. Achenes ribbed, covered with yellowish hairs; pappus of long unequal bristles, fused at base. Flowering VIII.

Mountain steppes.—*Caucasus*: Eastern Transcaucasia (western Georgia—Bakuryany, Dzhavakhetia). Endemic. Described from the Akhalkalaki Region. Type specimen lost.

Note. The species is very close to *E. foliosus* Somm. and Lev. described from Borzhomi. It differs by the absence of glandular hairs on veins on the dorsal surface of leaves and lower part of stem, and by nonfalcate teeth of the lobes of lower leaves.

Series 4. Iljiniani Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 48.—Stem white-tomentose, without glandular hairs or (*E. szovitsii* F. and M.) glandular, with numerous long-stalked glandular hairs in lower part of stem and along veins on lower leaf surface.

35. *E. szovitsii* Fisch. and Mey. ex DC. Prodr. VI (1837) 524; Ldb. Fl. Ross. II, 656; Bge. in Bull. Acad. Sc. Pétersb. VI, 408; Boiss. Fl. or. III, 426; Iljin in Grossh. Fl. Kavk. IV, 160; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 53.

Perennial. Stem 60–80 cm or higher, thick, branched above, sulcate, finely white-tomentose, also glandular in middle and lower parts, glandular hairs sometimes indistinct because of dense pubescence. Leaves lanceolate, pinnatisect into lanceolate lobes, in turn almost pinnatifid and sinuses between lobes and lobules occupying not more than one-third of leaf area, prickly-toothed, spinescent; lower leaves 30–40 cm long and up to 20–25 cm wide, reduced upward; upper leaves narrow-lanceolate, sharply prickly-toothed, leaves slightly arachnoid-hairy above, rugose and scabrous due to abundance of short-stalked glandular hairs, grayish-tomentose beneath with numerous light brown stalked glandular hairs along veins. Heads 5–7 cm wide. Capitula 22–25 mm long, with cuneate base; bristles surrounding them few, yellowish, not more than half as long as involucre. Involucre of 18–20 scabrous bracts; outer bracts 12–13 mm long, scarcely exceeding adjacent bristles, spatulate, broadened, spreading ciliate, brownish on outer side; middle bracts roundish-carinate, attenuate-acuminate, appressed ciliate, about 2 cm long; inner bracts usually shorter than middle, fimbriate-ciliate above, connate below at isolated points. Corolla pale blue. Achenes covered with yellow

bristles; pappus bristles barbed, unequal, fused below. Flowering VII; fruiting VIII.

Mountain-steppe zone, at 1,500–2,500 m.—*Caucasus*: Southern Transcaucasia (Daralagyo, Zangezur), eastern Transcaucasia (Karabakh). *General distribution*: Northwestern Iran. Described from Karabakh. Type in Leningrad.

36. *E. iljinii* Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 49; Bot. Mat. Gerb. Bot. Inst. Akad. Nauk ArmSSR, XVIII, 291.

Perennial. Stem 1–1.25 m high, usually not solitary, up to 1.5 cm thick below, cylindrical, sulcate, branched above, finely white-tomentose. Leaves lanceolate, pinnatifid into large-toothed lanceolate lobes; lower leaves pinnatifid, sinuses between lobes and lobules occupying at least two-thirds of total leaf area; lower leaves 50–70 cm long and up to 30 cm wide, with lobes up to 13 cm long and 5–7 cm wide, lobes short-prickly-toothed, with teeth terminating in 3–5 cm long spinules, green above, arachnoid-hairy, grayish-tomentose beneath, with prominent veins; apical leaves lanceolate, entire, prickly-toothed. Heads 4–7 cm wide, smaller on lateral branches. Capitula cuneate below, about 3 cm long; bristles surrounding capitulum unequal, white, somewhat flat, half as long as involucre. Involucre of 17–18 glabrous bracts; outer bracts about 13 mm long, carinate and almost bowl-shaped above, irregularly short-ciliate along margin, brownish on outer side; middle bracts attenuate-acuminate, about 2.5 cm long, with thin and long appressed cilia along margin; inner bracts longer, ciliate and entirely free above. Corolla light blue. Achenes up to 15 mm long, with yellowish hairs; pappus of brownish bristles fused in basal half. Flowering VII; fruiting VIII.

38 Zone of mountain meadows and steppes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the Vedi District of Armenian SSR. Type in Erevan; cotype in Leningrad.

37. *E. sevanensis* Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 52; Bot. Mat. Gerb. Bot. Inst. Akad. Nauk ArmSSR, XVIII (1957) 294.—*lc.*: Mulk. op. cit. (1957) figure on page 293.

Perennial. Stem 1 m or more high, cylindrical, poorly branched above, white-tomentose throughout, without glandular hairs, leafy almost up to tip. Lower leaves lanceolate, up to 50 cm long and 25 cm wide, bipinnatisect into oblong-lanceolate lobes, with small lanceolate teeth in their axils, sinuses between lobes wide, almost rectangular, lobes and teeth terminating in yellowish, up to 8 mm long spines, petioles of lower leaves long, broadened at base, spinulose; middle cauline leaves sessile, oblong-ovate, pinnatifid into lanceolate or deltoid lobes; upper leaves below heads sometimes entire, large prickly-toothed, with teeth

terminating in up to 15 mm long spines; leaves spinulose along margin, slightly arachnoid-hairy above, without glandular hairs, grayish-tomentose beneath, with prominent veins. Heads 5–6 cm wide. Capitula 20–25 mm long, on short peduncles, cuneate below; bristles surrounding capitulum few, unequal, brownish at base, not more than one-third as long as involucre. Involucre of 12–16 free bracts; outer bracts exceeding adjacent bristles, rhomboidal and spatulate-convex above, cristate-ciliate and glabrous; middle bracts lanceolate, attenuate-acuminate, with appressed long cilia along margin, arachnoid-hairy on inner side above; inner bracts shorter, long-ciliate above. Achenes covered with yellowish bristles, turning dark; pappus bristles unequal, fused at base. Flowering VII–VIII.

Steppes of middle mountain zone.—*Caucasus*: Southern Transcaucasia (Sevan Lake Basin). Endemic. Described from the Aregyuni District. Type in Erevan.

38. **E. karabachensis** Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 50; Dokl. Akad. Nauk ArmSSR, XII, 1 (1950) 27.—**lc.**: Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, Figs. 8, 9.

Perennial. Stem up to 60 cm high, cylindrical, branched above, white-tomentose, without glandular hairs. Leaves elliptical, pinnatisect, with yellowish midrib up to 5 mm wide, leaf lobes distant, linear-lanceolate, prickly-toothed, terminating in spine; lower leaves up to 45 cm long and about 20 cm wide, lobes about 10 cm long and 1 cm wide, spinulose along margin, separated by very wide sinuses; middle cauline leaves much smaller, with linear lobes; apical leaves entire, up to 1 cm long, green above, weakly arachnoid-hairy, without glandular hairs, white-tomentose beneath. Heads 4–5 cm wide. Capitula 20–25 mm long, with cuneate base; bristles surrounding them white, numerous, equal to outer involucre bracts. Involucre of 14–16 bracts; outer bracts four, spatulately broadened above, with fewer cilia along margin; bracts of next row rhomboidal above, dome-shaped, cristate-ciliate along margin; middle bracts narrowed from middle, pointed, appressed long-ciliate; inner bracts fimbriate-ciliate above, puberulent on outer surface, connate at isolated points at base; corolla pale. Achenes covered with yellow bristles; pappus bristles unequal, fused over half their length. Flowering VII; fruiting VIII.

Caucasus: Eastern Transcaucasia (Nagorno-Karabakh Autonomous Region). Endemic. Described from the regions between Khanbai and Stepanokert. Type in Erevan.

Section 4. Pleiacme Bornm. in Beih. bot. Centralbl. XXXVI, 2 (1918) 214.—All involucre bracts free; outer and middle bracts acicular along margin in upper pointed part appearing almost like branched horns.

Besides our species, *E. cervicornis* Bornm., described from southern Iran, also belongs to this section, and is the type species of this section.

39. *E. tournefortii* Ldb. ex Trautv. Diss. Echin. (1833) 21; DC. Prodr. VI, 525; Ldb. Fl. Ross. II, 656; Jaub. and Sp. III. pl. or. 427; Boiss. Fl. or. III, 438; Iljin in Grossh. Fl. Kavk. IV, 159; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 67.—**lc.**: Jaub. and Sp. op. cit., tab. 427; Trautv. op. cit., Fig. 7.

Perennial. Stem 40–70 cm high, 5–15 cm thick, sulcate, arachnoid-hairy, glandular below. Lower cauline leaves 30–40 cm long up to 20–25 cm wide, lanceolate, pinnatisect into lanceolate lobes in turn divided into 0.5–1 cm wide lobules, prickly-toothed with teeth terminating in spines up to 1 cm long; teeth and lobules of leaves often curved, giving roundish shape to sinuses, latter occupying about half leaf area, leaf axes narrow, almost winged, with 4–6 mm long spinules along margin, lower lobes near petiole reduced into spines; leaves smaller and less incised upward, up to lanceolate, long prickly-toothed, with spines up to 2 cm long, weakly arachnoid-hairy above, scabrous and short-glandular, scarcely recurved, white-tomentose beneath, with prominent midrib and scattered long-stalked brown glandular hairs along veins. Heads 6–7 cm wide. Capitula 3–3.5 cm long; bristles surrounding them somewhat flat, unequal, yellowish, slightly longer than one-third involucre length. Involucre bracts 15–17, membranous, scabrous and glandular; outer bracts up to 2 cm long, broader in middle, spinescent-acuminate, with divergent spinules along margin; middle and inner bracts up to 3 cm long, attenuate-acuminate, scabrous, with fewer glandular hairs and somewhat divergent spinules along margin. Achenes about 10 cm long, with long yellowish hairs; pappus pentagonal, bristles barbed, fused at base. Flowering VIII–IX.

40 In the upper belt of steppe zone at 2,000–2,500 m.—*Caucasia*: Southern Transcaucasia (Idzhevan and Akhuryan in Armenia). *General distribution*: Eastern Anatolia, Armenia-Kurdistan, western Iran. Described on the basis of cultivated specimens grown from seeds collected in the Ararat. Type in Leningrad.

Section 5. Echinops—*Sphaerocephalus* Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 401, 409; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 35.—*Ritro* Boiss. Fl. or. III (1875) 425 p. p. non Bge.—Involucre bracts 16–18; outer bracts usually glandular; leaves comparatively thin; plants of forest edges and thickets of shrubs.

Type of section: *E. sphaerocephalus* L.

Series 1. Sphaerocephali Mulk. op. cit. 41.—Leaves thicker, densely

glandular above. Outer involucre bracts long-acuminate, with numerous stalked glandular hairs.

40. ***E. sphaerocephalus*** L. Sp. pl. (1753) 814; MB. Fl. taur.-cauc. III, 597; Trautv. Diss. Echin. 16; DC. Prodr. VI, 524; Ldb. Fl. alt. IV, 45; Ej. Fl. Ross. II, 655; Schmalh. Fl. II, 91; Grossh. Fl. Kavk. IV, 157; Kryl. Fl. Zap. Sib. XI, 2867.—*E. maximus* Sievers ex Pall. Neue Nord. Beitr. III (1796) 323.—*E. cirsiifolius* C. Koch in Linnaea, XXIV (1851) 379.—**lc.**: Trautv. op. cit., f. 4; Majeovski, Fl. edition 8, 594; Hegi, III. Fl. VI, 2 tab. 269.—**Exs.**: GRF No. 1479; Fl. Ital. No. 184; Fl. Styr. exs. No. 46, 1272; Fl. exs. reip. Boh.-Slov. No. 960.

Perennial. Stem about 1 m or higher, solitary, branched above, ribbed, dirty brown due to numerous brownish glandular hairs, besides with appressed white hairs above hence appearing white arachnoid-hairy, leafy to tip. Leaves, except lowermost, sessile, amplexicaul, 15–25 cm long and 5–10 cm wide, green and scabrous above due to glandular hairs, grayish-tomentose beneath; lamina deeply incised into acute lobes, ovate to almost deltoid, spiny or prickly-toothed along margin; upper leaves small, usually not spatulate, prickly-toothed. Heads solitary terminal on branches, 4–5.5 cm wide, common involucre of fewer bristles connate at base. Capitula about 2 cm long; bristles surrounding them grayish, much shorter than outer involucre bracts. Outer bracts oblong-rhomboidal, attenuate above into cusp sometimes curved, margin ciliate, glandular on outer side; inner bracts longest, fimbriate-ciliate above, greenish below. Corolla pale blue or white, tube smooth. Anthers blue. Achenes up to 10 mm long, turbinate, truncate above; pappus bristles free in upper one-third. Flowering VI; fruiting VII.

Steppe meadows, shrubby growths, and along forest edges.—*European Part*: Ladoga-Ilmen (vicinity of Leningrad, introduced), Upper Dnieper (south), Upper Volga (south), Middle Dnieper, Volga-Don, Trans-Volga Region, Volga-Kama (south), Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: In all regions except high mountains; *Western Siberia*: Upper Tobol (south), Irtysh (south), Altai; *Eastern Siberia*: Angara-Sayans (only western in the Minusinsk District); *Soviet Central Asia*: Aralo-Caspian (north), Balkhash Region (north), Dzhungaria-Tarbagatai. *General distribution*: Southern and Central Europe, Balkans-Asia Minor. Described from Italy. Type in London.

41. ***E. erevanensis*** Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 43.

Perennial. Stems 1–2 m high, 0.7–2 cm thick at base, usually five or six, highly branched above and therefore single plant with dozens of heads, with numerous, brown glandular hairs along stem, somewhat

grayish-tomentose above. Leaves thin, ovate, glandular pubescent, pale green beneath, mildly grayish arachnoid-hairy, slightly prickly and ciliolate along margin; basal leaves about 40 cm long, long-petiolate, pinnatisect into deltoid-ovate distant lobes; cauline leaves semiamplexicaul, auriculate; upper cauline leaves sessile, lanceolate, undivided, toothed. Heads numerous; bristles surrounding them numerous, somewhat flat, unequal, half as long as involucre. Involucral bracts 15–18; outer bracts weakly acuminate, ciliate, glandular on outer side; middle bracts longer; inner somewhat connate below, obtuse, shorter than adjacent middle bracts. Corolla slightly swollen in throat; stamen tube sometimes rupturing at end of flowering. Achenes densely covered with long hairs; pappus bristles barbed, fused over three-fourths their length. Flowering VII; fruiting IX.

In ruderal habitats.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the vicinity of village of Garni. Type in Erevan.

Note. An enigmatic plant, known from two localities in Armenia, distinguished by vigorous growth (may be due to favorable conditions of the habitats) and shorter pubescence. I am not sure about the racial independence of this globe-thistle from *E. sphaerocephalus* L.

42. ***E. dagestanicus*** Iljin in Grossh. Fl. Kavk. IV (1934) 157; Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 1, 63; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 45.

Perennial. Stem 60–100 cm high, branched above and almost white-tomentose, ribbed almost throughout, white arachnoid-hairy predominantly along ribs, densely glandular-hairy on brownish bristles along furrows, appearing brownish or reddish. Leaves lanceolate, pinnatifid, matte green above, scabrous, setose-glandular, sparsely grayish arachnoid-hairy beneath, besides glandular lamina incised into deltoid lobes, sharply short toothed and terminating in spinule, smaller upward; upper leaves almost undivided below heads, sharply toothed, 3–5 cm long. Heads solitary terminal on branches, four to six on single stem, 4–5 cm wide. Capitula about 20 cm long, bristles surrounding them unequal, yellowish, not more than one-third as long as involucre. Involucral bracts 18–20; outer bracts 7–8 mm long, broadest in upper third, with cuneate brownish base, hairy on outer surface, acuminate, divergent ciliate along margin, middle bracts carinate, up to 15 mm long, attenuate-acuminate, puberulent along outer surface, ciliate; inner bracts shorter than middle, ciliate-fimbriate above, scarcely fused in lower half, greenish brown below on inner side. Corolla pale blue. Achenes with yellowish hairs; pappus bristles fused over basal half. Flowering VI; fruiting VII.

Shrubby thickets and forest edges in middle mountain zone.—

Caucasus: Dagestan, eastern Transcaucasia. Endemic. Described from the Shemakhi District. Type in Leningrad.

43. ***E. viridifolius*** Iljin in Bot. Mat. Gerb. Bot. Sada, IV (1923) 103; Iljin in Grossh. Fl. Kavk. IV, 158; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 47.

Perennial. Stem high, branched above, sulcate, brownish due to numerous stalked glandular hairs, almost white-tomentose above. Upper leaves sessile at base of inflorescence, auriculate, lanceolate, pinnatifid into deltoid prickly-toothed lobes or simply prickly-toothed, 3–8 cm long, 1–3 cm wide, grayish-green above, densely glandular-hairy, slightly lighter colored beneath, sparsely arachnoid-hairy, and glandular along veins. Heads 5–6 cm wide. Capitula 20–23 mm long; bristles surrounding them about 7 mm long, unequal, somewhat flat, white. Involucre of 20–23 thin, scabrous lustrous bracts, only outer ones puberulent but without glandular hairs; outer bracts rhomboidal above, sparsely ciliate; middle bracts lanceolate, acuminate, appressed-ciliate along margin; inner bracts sometimes fused at some points, acuminate and incised above. Corolla light blue. Achenes long-hairy; pappus of yellowish bristles fused up to half their length. Flowering VII.

Steppe slopes.—*Caucasus*: Ciscaucasia (Mt. Mashuk near Pyatigorsk). Endemic. Described from vicinity of Pyatigorsk. Type in Leningrad.

Note. The type specimen of this species is the upper portion of a single plant. It differs from *E. sphaerocephalus* L. in having eglandular outer involucre bracts and leaves less pubescent below (only apical leaves in the authentic specimen). The herbarium of the Academy of Sciences of the USSR has typical specimens of *E. sphaerocephalus* L., collected at Mashuk. I am not sure that *E. viridifolius* Iljin is an independent species, and not just a weakly pubescent form of the Linnaean species. Mulkijanyan saw specimens in the Baku Herbarium collected from Anapa.

Series 2. Galatici Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII (1950) 36.—Leaves comparatively thin, with few glandular hairs. Outer involucre bracts short acuminate, with numerous glandular hairs.

43 44. ***E. galaticus*** Freyn in Bull. Herb. Boiss. III (1895) 355; Iljin in Grossh. Fl. Kavk. IV, 157; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 36.

Perennial. Stem 40–60 cm high, weakly sulcate, branched above, more or less grayish-woolly throughout, with stalked glandular hairs along furrows below. Leaves thin, brownish-green above, densely

glandular-hairy, light gray beneath, almost tomentose; lower leaves 1.5 cm long, petiolate, lyrate, lower lobes small, widely spaced, terminal lobe largest, elliptical, lateral lobes ovate, short prickly-toothed along margin; leaves smaller upward, amplexicaul-auriculate, oblong or pinnatifid above middle into broad deltoid or ovate lobes, sparsely ciliate-prickly along margin. Heads 3–4 cm wide, bluish. Capitula about 20 mm long; bristles surrounding them almost one-third as long as capitulum. Involucral bracts 18–20, free, light green, darker in lower half; outer bracts rhomboidal or spatulate, cristate-fimbriate; middle bracts lanceolate, attenuate-spiescent, carinate, ciliate-fimbriate from middle, finely scabrous, with isolated small glandular hairs; inner bracts slightly shorter, obtuse, slightly incised or almost prickly. Achenes with numerous yellowish hairs; pappus bristles barbed; free in upper half. Flowering VII; fruiting VIII.

Shrubby slopes and forest edges.—*Caucasus*: Ciscaucasia (western part of the main range), western Transcaucasia. *General distribution*: Asia Minor. Described from Amasya in eastern Anatolia. Type in Brno; cotype in Leningrad.

45. *E. colchicus* Sosn. ex Kem.-Nat. in Bull. Mus. Géorgie, IV (1928) 138, nomen; Sosn. in Zhurn. Russk. Bot. Obsch. XIV, 87; Mulk. in Tr. Bot. Inst. Akad. Nauk ArmSSR, VIII, 37.—*E. bannaticus* ssp. *quercifolius* Freyn in Bull. Herb. Boiss. III (1895) 356.

Perennial. Stem 60–100 cm high, relatively slender, angular, loosely white-tomentose and glandular below, slightly branched above; leaves almost lyrate, crenate-pinnatifid, dark green above and glabrous or slightly arachnoid-hairy, loosely white-tomentose beneath; lower leaves 15–20 cm long, with broad deltoid lobes, slightly crenate, short-spiny at tip and along margins, smaller and sparse toward lower part; middle cauline leaves deeply amplexicaul; upper leaves sessile, oblanceolate, toothed. Heads 3–4.5 cm wide, light bluish; capitula 15–20 mm long, bristles surrounding them up to one-third their length, fewer and unequal. Involucral bracts 20–23, free; outer bracts lanceolate, acuminate, carinate, brownish and hairy on outer surface, slightly longer than bristles; middle bracts oblong-lanceolate, attenuate-acuminate, scabrous on outside, long-ciliate along margin; inner bracts slightly shorter, incised-ciliate or fimbriate above, dark colored below on inner side. Corolla pale blue. Achenes pubescent; pappus of brownish, free, scabrous bristles fused only in upper one-fourth. Flowering VII; fruiting VIII.

Edges and swales of mountain-forest zone.—*Caucasus*: Western Transcaucasia. *General distribution*: Eastern Anatolia. Described from Kutaisi District. Type in Tbilisi.

Note. The absence of the original specimens of Freyn and shortage of material from western Transcaucasia with me compels me to doubt

the independent status of this race. The fact that it apparently does not have an independent distribution area and the plants that should have been included under it appear to be simply more mesophilous plants, strengthens my doubt.

46. *E. ossicus* C. Koch in *Linnaea*, XXIV (1851) 380; Boiss. *Fl. or. suppl.* (1888) 304; Iljin in *Grossh. Fl. Kavk.* IV, 159; Mulk. in *Tr. Bot. Inst. Akad. Nauk ArmSSR*, VIII, 39, Fig. 6a.

Perennial. Stem 60–100 cm high, slender, sulcate; loosely white-tomentose, glandular below, slightly branched above. Lower leaves oblanceolate, somewhat lyrate, 12–20 cm long, 4–8 cm wide, deeply crenate-toothed to pinnatilobate with deltoid short-prickly lobes and large terminal lobe; cauline leaves small, less deeply incised, amplexicaul; uppermost leaves lanceolate, toothed, leaves dark green above, slightly arachnoid-hairy, hispid, white-tomentose beneath. Heads 3–4 cm wide. Capitula 15–18 mm long; bristles surrounding them white, somewhat flat, slightly less than half length of involucre. Involucral bracts 18–20, free, scabrous, somewhat pubescent on outer surface; outer bracts spatulate, long-ciliate, up to 7–8 mm long; middle bracts attenuate-acuminate, carinate, appressed ciliate; inner bracts slightly longer, somewhat obtuse, fimbriate-ciliate. Corolla light blue. Pappus bristles fused almost to tip. Flowering VII; fruiting VIII.

Forest edges and grasslands of mountain-forest zone.—*Caucasia*: Western Transcaucasia, eastern Transcaucasia (South Ossetia). Endemic. Described from South Ossetia. Type lost.

Note. Mulkijanyan (op. cit.) traveled in 1948 along the path followed by C. Koch and found a globe-thistle in South Ossetia that in his opinion corresponded to the description of Koch. Taking into account the evidence of Mulkijanyan, who studied the plants in nature, I retain this fairly doubtful species among the globe-thistles of the Caucasus.

Series 3. Latifolii Bobr.—Leaves with wide lobes and small sinuses. Outer involucral bracts without glandular hairs, glabrous in East Siberian species, and pubescent in Mediterranean species. Plants of Eastern Siberia and east of Soviet Central Asia.

47. *E. latifolius* Tausch in *Flora*, XI (1828) 486; Kitag. in *Rep. first Sc. exp. Manch.* IV, 2, 119.—*E. dahuricus* Fisch. *Cat. Hort. Gorenk.* ed. 2 (1812) 37, nom. nud.; DC. *Prodr.* VI, 523; Turcz. *Fl. baic.-dahur.* II, 28; Popov, *Fl. Sredn. Sib.* II, 750.—*E. dahuricus* α . *latilobus* DC. *Prodr.* VI (1837) 523.—*E. gmelini* auct. non Turcz. 1832, Trautv. *Diss. Echin.* 14; Ldb. *Fl. alt.* IV (1833) 45; Ej. *Fl. Ross.* II, 653; Kom. *Fl. Manchzh.* III, 713 p. p.; Kom. and Alis. *Opred. Rast. Dalnevost, Kr. II*, 158.—*Sphaerocephalus dauricus* O. Ktze. ex Kom. *Fl. Mansh.* III (1907)

713.—*E. caule subunifloro*. . Gmel. Fl. Sib. II (1749) 100.—**lc.**: Trautv. op. cit. f. 3.

Perennial. Stems 30–60 cm high, simple or weakly branched, slightly arachnoid-hairy below, almost tomentose above. Leaves bipinnatifid or compound, weakly arachnoid-hairy above, less often subglabrous, almost tomentose below, prickly-toothed or prickly-lobed along margin; basal leaves on thick 10–15 cm long petioles, pinnatifid; lower cauline leaves amplexicaul, pinnatifid, upper ovate, pinnatifid; sometimes leaves with finely divided lobes (var. β . Trautv. l.c.). Heads 4–6 cm wide, bluish; capitula up to 2 cm long, almost ovoid with cuneate base, broadest in middle; bristles surrounding them dense, scabrous, slightly longer than involucre. Involucral bracts glabrous; outer bracts spatulate, acuminate, long-ciliate above; middle bracts oblong, broadest in middle, ciliate above and attenuate into recurved tip. Corolla longer than capitulum. Ovary densely hairy. Pappus setose, bristles linear, fused at base, free and weakly ciliate above. Flowering V; fruiting VI.

Steppe and stony slopes.—*Eastern Siberia*: Anagara-Sayans (southeast), Dauria (south). *General distribution*: Mongolia. Described from Baikal. Type lost.

48. **E. dissectus** Kitag. in Rep. first Sc. exp. Manch. IV, 2 (1935) 118.—*E. gmelini* auct. p. p. non Turcz. 1832; Kom. Fl. Manchzh. III, 713 p. p.

Perennial. Root cylindrical, root collar covered with brown of previous year's leaves. Stem solitary, simple, less often with fewer branches above, almost glabrous below, but with isolated brownish bristles, densely white arachnoid-hairy or woolly above. Basal leaves withering before flowering; cauline leaves smaller upward, somewhat amplexicaul, broadly oblong, pinnatifid to deeply pinnatifid, usually glabrous and dark green above, densely, white arachnoid-hairy to woolly beneath but sparsely along veins, up to 20 cm long and 8 cm wide, with lobes deeply pinnatisect, prickly along margin and pointed and prickly at tip. Heads 4–6 cm wide, slightly shorter than outer involucral bracts, somewhat broadened above, ciliate along margin. Outer involucral bracts spatulate, scaly, sparsely ciliate along margin, broadened upward; middle bracts rhomboid to linear-subulate, setose-ciliate along margin, coriaceous and gradually subulately acuminate above, carinate along outer surface; inner bracts almost linear, papery, almost cristate-ciliate above, with longer terminal cilia. Florets pale blue, slightly exerted from involucral bracts; ovary hairy. Pappus bristles 1 mm long, free above middle. Anthers up to 5 mm long, lower appendages scarcely 0.5 mm long, deltoid; style very deeply furcate. Flowering VII; fruiting VIII.

Open mixed forests and grassy southern slopes of hills.—*Far East*:

Zeya-Bureya (south), Ussuri. *General distribution*: Northeastern China. Described from "Manchuria." Type in Tokyo.

49. **E. tricholepis** Schrenk, *Emun. pl.* I (1841) 47; Ldb. *Fl. Ross.* II, 655; Kryl. *Fl. Zap. Sib.* XI, 2868.—*E. exaltatus* auct. non Schrad.; O. and B. Fedtsch. *Perech. Rast. Turkm.* IV, 226.

Perennial. Stem 1–1.5 m high, branched, ribbed, reddish or greenish, with short glandular hairs and arachnoid-hairy at tip below head and white-tomentose along ribs. Lower leaves petiolate, upper sessile, amplexicaul, 10–20 cm long and 5–12 cm wide, spatulate, to deeply pinnatisect; almost glabrous or slightly arachnoid-hairy and green above, finely tomentose, glandular, and grayish beneath; leaf lobes ovate to triangular, with teeth along margins terminating in spinules. Heads 4–6 cm wide, one or two terminal on branches, pale blue. Capitula 2–2.3 cm long; bristles surrounding them not longer than half length of capitulum. Involucral bracts free; outer bracts oblong, rhomboidally broadened from middle, acuminate, glabrous below, finely pubescent above, with scabrous cilia along margin; inner bracts oblong-ovate, fimbriate-ciliate, without terminal spinules. Corolla tube glandular; petals white, 6–8 mm long. Anthers bluish, with ciliate lobes; pappus free almost up to half.

Thickets of shrubs along river valleys.—*Soviet Central Asia*: Balkhash Region (north), Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria. Described from the foothills of the Dzhungarian Alatau. Type in Leningrad.

50. **E. abstersibilis** Iljin in *Bot. Mat. Gerb. Bot. Sada*, III (1922) 179.

Perennial. Stem 50–70 cm high, with two or three branches, sulcate below and white-tomentose in middle floccose, glabrescent at some points, without glandular hairs. Lower cauline leaves 25–30 cm long, 7–8 cm wide with broad prickly base, petiolate, pinnatipartite into wideset oblong-deltoid, prickly lobes, terminating in spinules, separated by broad round sinuses, spinulose along margin; upper leaves pinnately lobed, terminating in spines; cauline leaves sessile, semiamplexicaul, smaller upward and less deeply incised, green, finely arachnoid-hairy, without glandular hairs above; grayish tomentose, with prominent veins beneath. Heads 2.5–3 cm wide. Capitula 16–18 mm long; bristles surrounding them yellowish, somewhat flat, about 6 mm long. Involucral bracts 20, densely puberulent, visible under high magnification; outer bracts (six) membranous, rhomboidal above, about 7 mm long, ciliate; middle bracts (nine) about 15 mm long, subulate, carinate, slightly divergent above, long-ciliate; inner bracts free, slightly fused only at base, ciliate or

fimbriate along margin above. Corolla deeply parted, short-hairy below throat. Achenes covered with yellowish long bristles longer than pappus of fused bristles. Flowering VIII.

Upper mountain zone, at altitude of 2000–3000 m.—*Soviet Central Asia*: Pamiro-Alai (Central and Southern Tadzhikistan). Endemic. Described from the Vakhsh-Kyzylsu interfluvium. Type in Leningrad.

Section 6. Terma Endl. Gen. pl. (1836) 467; Bge. in Bull. Akad. Sc. Pétersb. VI (1863) 400, 410.—Pappus cup-shaped, divided only above. Lectotype of section: *E. exaltatus* Schrad.

51. *E. exaltatus* Schrad, Hort. Goett. (1809) 15, tab. 9; Rchb. Fl. Germ. exc. 292; Trautv. Diss. Echin. 12; DC. Prodr. VI, 523; Rchb. Ic. Fl. Germ. XV, 2, tab. 735.—*E. commutatus* Juratzka in Verh. Zool.-Bot. Ges. Wien, VIII (1858) 17; Hegi, Ill. Fl. VI, 2, 811; Szaf. Kulcz. Pavl. B. Rosl. Polskie, 708; Vozn. Rosl. URSS, 559.—*E. strictus* Fisch. ex Sims. Bot. Mag. (1824) tab. 2457.—*Ic.*: Schrad. *Ic.*: Trautv. op. cit. 2; Bot. Mag. *Ic.*; Rchb. *Ic.* Fl. Germ. XV, tab. 735; Hegi, op. cit., tab. 811.—*Exs.*: Fl. exs. reip. Boh.-Slov. No. 1185; Fl. austro-hung. No. 3437.

Perennial. Stem 50–150 cm high, usually profusely branched above; branches terminating in heads, less often stem simple, sulcate-ribbed, white woolly-tomentose sparsely below and densely above, brownish or pale. Lower leaves petiolate; cauline leaves few, distant, with prickly amplexicaul base, 20–30 cm long and up to 15 cm wide, deeply pinnatifid, with oblong to deltoid lobes and prickly along margin terminating in spine, dark green and sparsely brown-strigose above, white-tomentose beneath, sometimes grayish. Head globose, on long peduncle, 4–6 cm wide. Capitula numerous, up to 2 cm long; bristles surrounding them unequal but one-third to one-fourth as long as capitulum, colorless, somewhat flat above. Involucral bracts gradually enlarged and more acute from outer to inner, with slightly recurved tip, without glandular hairs, margins ciliate; innermost involucral bracts, however, shorter, scarcely one-third as long as middle bracts, and incised at tip; all bracts silvery-gray to greenish. Corolla white; stamen tube grayish. Achene about 7 mm long, densely silky with yellowish hairs; pappus cup-shaped, divided above. Flowering VI; fruiting VII.

Forest edges and scrub, along river and stream banks.—*European Part*: Upper Dniester (Transcarpathian Province). *General distribution*: Southern and Central Europe. Described from cultivated specimens grown in the Göttingen Garden, wrongly attributed to Siberia as the place of origin. Cotype in Leningrad.



Note. Because Siberia was erroneously cited as the native locality in the description of this species, further errors were also committed, although De Candolle expressed doubt about the correctness of this report.

In connection with this report, the plants collected by Carrelin in Ayagy (Enum. 1841, No. 469) were identified as *E. exaltatus* Schrad. On the basis of the specimens of Carrelin, this species was included in our "Flora." This citation was repeated by B.A. Fedtschenko (*Perech. Rast. Turk.* [List of Plants of Turkmenia], IV, 226), while expressing, it is true, some doubt about its correctness. Assuming that *E. exaltatus* Schrad. was described "from Siberia," Juratzka (l.c.) described the European plant on the basis of specimens originating from the environs of Trieste as a closely related plant replacing the European species. The study of the original descriptions and cited figures of *E. exaltatus* Schrad., as well as the plants of Schrader raised by him in the Göttingen Garden (type specimen!), leads to the conclusion that *E. exaltatus* Schrad. is not from Siberia but is a West European plant, and the name proposed by Juratzka—*E. commutatus* Juratzka—is a simple synonym. As regards the plant collected by Carrelin (Enum. 1841, No. 469), it was wrongly identified, and is actually *E. tricholepis* Schrenk. Thus, *E. exaltatus* Schrad. is excluded from the flora of Siberia, more precisely, from the flora of Soviet Central Asia.

Section 7. Chamaechinops Bge. in Bull. Acad. St. Pétersb. VI (1863) 411; Keller in Tr. Obshch. Estestv. Kaz. Univ. XLIV, 5 (1912) 96.—Pappus bristles subulate, spreading above, toothed, not barbed. Plants from the northeast of Soviet Central Asia and mountainous Siberia—from Tien Shan to Sayans.

Type of section: *E. humilis* MB.

52. *E. integrifolius* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 446; Ldb. Fl. Ross. II, 656; Kryl. Fl. Zap. Sib. XI, 2872.

Perennial. Stem 30–80 cm high, usually simple, with numerous remains of previous year's leaves at base, densely leafy to tip, with short-stalked glandular hairs, white-tomentose above. Leaves 5–10 cm long and up to 1.5 cm wide, numerous, oblong or lanceolate, with broad amplexicaul base, smaller upward and less dense, undivided, only lower cauline and basal leaves sometimes with one to three teeth on each side; upper leaves with two or three spines along margin; leaves green above and densely covered with short-glandular hairs, white-tomentose 50 beneath. Heads solitary, whitish, 2–4 cm wide; bristles surrounding capitula not longer than outer involucral bracts; latter linear, rhomboidal above, long-ciliate, glandular above on inner side, acuminate; middle bracts densely pubescent with spinescent tip and long cilia along margin;

inner bracts oblong, spiny, brownish on outer surface. Corolla white, tube glabrous. Pappus bristles unequal, free above over not more than one-third length. Flowering VII; fruiting VIII. (Plate III, Figs. 1, 2).

Sandy and rubbly valleys and slopes of foothills.—*Western Siberia*: Altai (extreme south—Naryim Range, Kurchum Mountains, Saur); *Soviet Central Asia*: Balkhash Region (Zaisan Depression, north). *General distribution*: Dzhungaria-Kashgaria (extreme north of Chinese Dzhungaria), Mongolia (extreme west). Described from the Kurchum Mountains. Type in Leningrad.

53. *E. humilis* MB. Fl. taur.-cauc. III (1819) 598; Trautv. Diss. Echin. 27; Ldb. Fl. alt. IV, 45; DC. Prodr. VI, 523; Ldb. Fl. Ross. II, 653; Kryl. Fl. Zap. Sib. XI, 2871.—*E. davuricus* Trevir. Ind. Sem. h. Wratisl. p. a. 1819 sec. Ldb. Fl. Ross.—*lc.*: Trautv. op. cit., f. 11.

Perennial. Stem 7–15, less often up to 30 cm (var. *elatus* Kryl.) high, covered with remains of numerous leaves in lower part, solitary, usually simple, sometimes branched and then with several heads, densely white-tomentose throughout. Basal leaves numerous, short-petiolate, rosulate, usually lyrate-pinnatifid, sometimes almost undivided, 2–7 cm long and about 1 cm wide, white-tomentose, sparsely above and more densely below, with ovate lobes, obtuse, less often spinescent; cauline leaves pinnatifid, divergent, with oblong lobes, spinescent; upper leaves prickly-toothed, more divergent and even recurved. Heads 3–4 cm wide, solitary, smaller on branched stems. Capitula 1.5–1.7 cm long; bristles surrounding them almost as long as capitulum. Outer involucre bracts lanceolate; inner bracts long-ciliate, exceeding outer bracts. Corolla light blue, with smooth tube and light bluish anthers. Achenes long-hairy; pappus bristles unequal, fused at base. Flowering VII; fruiting VIII. (Plate III, Fig. 3).

Gravelly slopes and valleys, often mildly alkaline.—*Western Siberia*: Altai (eastern Altai); *Eastern Siberia*: Angara-Sayans (Tuva Autonomous Republic). Endemic. Described from Chu Valley. Type in Leningrad.

54. *E. tschimganicus* B. Fedtsch. in O. and B. Fedtsch. Pereh. Rast. Turk. IV (1911) 224.—*Exs.*: H.F.A.M. No. 40.

Perennial. Stems fewer, 10–30 cm high, white-tomentose at base, densely covered with remains of previous year's leaves, densely leafy particularly in lower part, usually simple, with single head, stalked-glandular hairy, finely white-tomentose above. Basal leaves short-petiolate; cauline leaves sessile, all deeply pinnatifid into linear, entire, short-acuminate lobes; leaves oblong, green above, densely stalked-glandular hairy, involute, 3–4 mm wide along midrib. Heads about 3 cm wide, solitary. Capitula about 1.5 cm long; bristles

surrounding them somewhat flat above, almost as long as outer involucre bracts. Outer bracts deltoid above, ciliate, pubescent on outer surface; middle bracts linear-lanceolate, with whitish border, long ciliate above, cuspidate, pubescent on outer surface; inner bracts lanceolate, with wide white border, hairy on outer side, margin ciliate upward. Corolla light blue, glandular-hairy on outer side below throat. Achenes white-pubescent; pappus bristles white, fused at base. Flowering VI; fruiting VIII.

Gravelly slopes of middle mountain zone.—*Soviet Central Asia*: Tien Shan (western Tien Shan—Chimgan, Karatau, Talass Alatau). Endemic. Described from the Kumyshtag Valley. Type in Leningrad.

55. *E. saissanicus* (Keller) Bobr. comb. n.—*E. gordjaginii saissanicus* Keller in Tr. Obshch. Estestv Kaz. Univ. XLIV, 5 (1912) 95.—*E. gordjaginii* Keller ex Kryl. Fl. Zap. Sib. XI (1949) 2870.—*lc.*: Keller, op. cit.

Perennial. Root virgate, two or three-headed, sometimes bearing, besides scape, basal rosettes of leaves of daughter plants. Stem 20–40 cm high, with remains of numerous old leaves, arachnoid-hairy at base, short-glandular hairy above, erect, branched in upper part, sometimes white arachnoid-hairy below solitary terminal heads. Basal leaves numerous, petiolate; middle and upper leaves sessile, with broad spiny base; all leaves lanceolate, convolute, pinnatisect, with narrow (f. *angustisecta* Keller) or wider, deltoid and decurrent (f. *latisecta* Keller) lobes, 5–15 cm long; upper leaves 2–3 cm long; leaves green and densely glandular hairy above, white-tomentose beneath, with prominent midrib, bearing stalked glandular hairs; lobes of leaves distant, entire, lanceolate to linear; terminating in spines. Head globose, 2–4 cm wide; bristles surrounding them as long as outer involucre bracts. Outer bracts linear, ciliate, rhomboidal and short-ciliate above; middle and inner bracts lanceolate, subulate, short-ciliate above, scabrous and slightly pigmented on outer surface. Corolla white, glabrous on outer side below throat. Anther appendages very short, filiform. Pappus bristles subulate, toothed, fused over half their length. Flowering VII.

Stony slopes and in crevices of rocks in semidesert.—*Western Siberia*: Altai (extreme south); *Soviet Central Asia*: Balkhash Region (Zaisan Depression). Endemic. Possibly, of course, also grows in Dzhungaria-Kashgaria. Described from Kaldzhir. Type in Leningrad.

52 *Note.* In establishing *E. gordjaginii* Keller the author, contrary to the rules of nomenclature, included under this name the species *E. tschimganicus* B. Fedtsch., validly described earlier by B.A. Fedtschenko as a subspecies or variety while distinguishing his own Zaisan plants at this rank (β). Given that the description of B.A. Fedtschenko was fully

valid, B.A. Keller should have described the Zaisan plants either as a separate species or under the species established by Fedtschenko. Keller did neither; therefore, the name proposed by him is invalid and should be rejected. I propose to name this Zaisan globe-thistle as *E. saissanicus* (Keller) Bobr.

Section 8. *Nanechinops* Bge. in Bull. Acad. Sc. Pétersb. VI (1863) 401, 411.—Appendages of anthers subulate below, barbed above. Annuals of sandy and halophytic semidesert of Central and Soviet Central Asia.

Type of section: *E. gmelini* Turcz.

56. ***E. gmelini* Turcz.** in Bull. Soc. Nat. Mosc. V (1832) 195; DC. Prodr. VI, 527.—*E. turczaninovii* Ldb. ex Trautv. Diss. Echin. (1833) 28; Ldb. Fl. Ross. II, 657; Iljin in Bot. Mat. Gerb. Bot. Sada, IV, 181; Kryl. Fl. Zap. Sib. XI, 2872.—*Echinops foliis integris* Gmel. Fl. Sib. II (1749) 103.—**lc.**: Gmel. l.c. tab. XIV, fig. 3; Trautv. op. cit. fig. 12.

Annual. Stem 15–30 cm high, simple or divaricately branched from base, with numerous long-stalked glandular hairs. Leaves numerous, undivided or slightly lobed, sessile, oblong, semiamplexicaul, 2–5 cm long, 0.5–2 cm wide, with glabrous, acicular, up to 0.5 cm long spines along margin; usually lower leaves somewhat tomentose above due to long entangled hairs; middle and upper leaves green above and glandular-hairy on both sides. Heads whitish, globose, up to 3 cm wide, solitary terminal on branches; bristles surrounding them almost as long as involucre bracts. Involucre bracts imbricate, oblong-linear; outer bracts aristate; inner fimbriate above; all bracts plumose-ciliate, pubescent on outer surface. Basal appendages of anther subulate, apical barbate. Pappus bristles fused at base, spreading and subulately acuminate. Achenes densely hairy. Flowering VI; fruiting VIII.

Sandy deserts of Central Asia, in Mongolia and China; *Western Siberia*: Altai (Naryim Range, near Altaiskaya sta.). *General distribution*: Mongolia, China. Described from northwestern Mongolia. Type in Leningrad.

57. ***E. nanus* Bge.** in Bull. Acad. Sc. Pétersb. VI (1863) 411; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 226.

Annual, less often biennial. Stem 20–30 (50) cm high, solitary, white-tomentose, often profusely branched; branches divaricate, leafy, with solitary terminal heads. Basal and lower cauline leaves short-petiolate; upper leaves sessile, slightly decurrent; leaves lanceolate, pinnatifid into acuminate lobes, or undivided, toothed; upper leaves crenate-toothed, undivided; leaves densely arachnoid-hairy above, grayish, glandular, grayish-tomentose beneath. Heads 2.5–3 cm wide, pale, somewhat light

bluish. Capitula about 1.5 cm long; bristles surrounding them white scabrous, not more than half as long as capitulum. Involucral bracts 22, free; outer bracts 6–8 mm long, not longer than bristles surrounding capitulum, pubescent on outer side and villous at base, ciliate along margin; middle bracts 12–13 mm long, lanceolate, cuspidate, ciliate along margin, pubescent on outer surface; inner bracts slightly shorter than middle bracts, strigose, hairy below. Corolla light bluish, about 1 cm long, tube glandular below throat. Achenes densely glandular-hairy; pappus bristles short and scabrous, fused at base. Flowering VI; fruiting VII.

Stony-sandy semidesert in plains and on gravelly slopes of foothills.—*Western Siberia*: Irtysh (extreme south—Karkarala Region); *Soviet Central Asia*: Balkhash Region, Dzhungaria-Tarbagatai (foothills of the Dzhungarian Alatau), Tien Shan, Syr-Darya (Fergana), Pamiro-Alai (Zeravshan and western Pamir). *General distribution*: Dzhungaria-Kashgaria. Described from Balkhash. Type in Leningrad.

58. *E. knorringianus* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 173.

Annual. Stem 10–40 cm high, solitary, erect, sometimes with one or two divergent but not divaricate branches, densely covered with long, yellowish, stalked glandular hairs, sometimes sparsely tomentose-arachnoid-hairy above. Leaves green or yellowish green above with numerous stalked glandular hairs, white-tomentose beneath, with very sparse yellowish glandular hairs along midrib; basal leaves petiolate, largest leaves 4–10 cm long, lanceolate to ovate, crenate to prickly-toothed along margin, less often pinnatilobate; cauline leaves smaller upward, lanceolate, crenate-toothed, terminating in spines. Heads usually solitary terminal, sometimes two or three on branches, 2–3 cm wide. Capitula about 1.5 cm long; bristles surrounding them about 1 cm long, white, scabrous. Involucral bracts 20, free; outer bracts not longer than bristles, long-hairy on inner side, scabrous on outer side, strigose above; middle bracts about 1.5 cm long, cuspidate, divergent hairy on outer surface, coarsely ciliate along margin; inner bracts 12–13 mm long, lanceolate, obtuse, short-strigose along margin, long-hairy on outer side. Corolla whitish, about 1 cm long, with hairy limb. Achenes densely hispid; pappus bristles yellowish, scabrous, fused below. Flowering VI; fruiting VII.

Wormwood-saltwort semidesert, on gravelly and rubbly slopes of foothills.—*Soviet Central Asia*: Syr-Darya (Fergana Valley); Pamiro-Alai (Upper Zeravshan, Madm). Described from Shaidan in the vicinity of Namangan. Endemic. Type in Leningrad.

GENUS 1568. *Acantholepis* Less.^{1, 2}

Less. in *Linnaea*, VI (1831) 88; Mulk. in *Izv. Akad. Nauk ArmSSR*, III, 9 (1950) 839.

Capitula single-flowered, numerous, aggregated into dense hemispherical or subsequently almost globose heads, surrounded by well developed many-rowed involucre of usually large bracts, inner bracts smaller and compressed, outer bracts squarrose, leafy, much longer than head. Individual involucre (i.e. involucre of individual single-flowered capitulum) many-rowed, imbricate, oblong; involucre bracts free; outer bracts forming so-called brush, setaceous, inner bracts longer, aristate, long ciliate. Common receptacle very small, spherical-conical, irregularly tuberculate, glabrous, smooth. Flowers uniform: all bisexual, tubular, regular; corolla tube short and cylindrical with 5-lobed limb, lobes linear. Anthers sagittate at base, with short ciliate-fimbriate appendages. Style with rather thick, short, subsequently divergent branches, surrounded by ring of hairs at base. Achene oblong-obovoid, irregularly globose-4-angled, densely pubescent. Pappus one-rowed, coronate, very short, finely dentate.

Annual. Usually small, white-pubescent plant with alternate, entire, and linear-lanceolate leaves.

A monotypic genus.

1. **A. orientalis** Less. in *Linnaea*, VI (1831) 88; DC. *Prodr.* VI, 527; Ldb. *Fl. Ross.* II, 2, 657; Boiss. *Fl. or.* III, 442; O. and B. Fedtsch. *Perech. Rast. Turkm.* IV, 226; Grossh. *Fl. Kavk.* IV, 161; Mulk. *op. cit.* 839; Nikitin in *Fl. Turkm.* VII, 148; Gadzhiev in *Fl. Azerb.* VIII, 354.—*A. orientalis* var. *songorica* (Trautv.) O. and B. Fedtsch. in *Perech. Rast. Turkm.* IV (1911) 226.—*Echinops acantholepis* Jaub. and sp. III. *pl. or.* III (1847–1850) 99; Bge. in *Bull. Acad. Pétersb.* VI, 412.—*E. acantholepis* var. *songorica* Trautv. in *Bull. Soc. Nat. Mosc.* XXXIX (1866) 368.—*E. olivieri* Jaub. and Sp. *op. cit.* 101.—**lc.**: Jaub. and Sp. *op. cit.* tab. 273 and 274; Nikitin, *op. cit.* *Plat* XXIII, Fig. 1.—**Exs.**: *Pl. or. exs.* No. 72; Aucher, *Herb. or.* No. 4812; Sintenis, *It. transcasp.* pers. 1900–1901, No. 1886; Bornm. *It. pers. alt.* 1902, No. 7295.

Annual. Plants 5–25(40) cm high; stem white-tomentose and finely glandular hairy, erect, simple or cymosely branched above (less often almost from base). Leaves white arachnoid-hairy tomentose, linear-lanceolate, involute, up to 5–6(8) cm long and 1–1.5 cm wide, acuminate, terminating in stiff bristles, narrowed toward base, sessile and more or less amplexicaul, usually with sparse irregularly spaced, stiff, whitish,

¹Treatment by I.A. Linczevsky.

²From the Greek words *acantha*—spine, and *lepis*—scale.

2–4 mm long bristles above and along margin. Heads up to 20–25 mm wide and about 15 mm long, comprising 10–25 one-flowered capitula; common involucre two or three-rowed, comprising 12–20 bracts; outer bracts squarrose, almost leafy, linear-lanceolate, up to 20–30 mm long, much longer than head, stiff and somewhat sparsely ciliate-setose along margin, white arachnoid-hairy tomentose on outer side, densely pubescent on inner side less and often glabrous and glossy at base; inner bracts appressed, much shorter, 5–10 mm long and 1–1.5(2) mm wide, stiff and rather densely ciliate-setose along margin, acuminate with up to 2–3 mm long awn, densely arachnoid-hairy tomentose on outer side, glabrous and glaucous on inner side. Capitula 10–12 mm long and about 5 mm wide, sessile often two or three capitula fused together at base; individual involucre dense, many-rowed, outer rows (brush) of white, split, flexuous above and slightly plumose, 5–7 mm long bristles; middle and inner involucral bracts stiff-leafy, densely covered with long curly hairs on outer side, glabrous on inner side, glossy and green; innermost bracts black-brown; middle bracts shorter, 5–7 mm long, linear-spatulate, long plumose-ciliate in upper half; inner bracts longer, up to 10–12 mm, lanceolate, long plumose-ciliate above, with long, weakly recurved, often reddish-reddish brown, up to 4–6 mm long setaceous awn. Corolla reddish-violet (when dry) or light blue (according to Mulkijanyan, op. cit., p. 841), about 5 mm long, limb about 3 mm and tube about 2 mm long. Achenes 4–5 mm long and about 1.5–2 mm wide, densely pubescent with appressed, upward directed, very short-plumose, long hairs covering pappus; pappus comprising short, up to 0.5–0.7 mm long, unequal, flat bristles irregularly connate at base in ring. Flowering IV–VII; fruiting VI–VII. (Plate IV, Fig. 1).

Desert plains, foothills, and lower mountains; fixed hummocky sands and sandy takyr, in clayey and stony submountainous plains, dry clayey and stony slopes. *Caucasus*: Eastern and southern Transcaucasia; *Soviet Central Asia*: Aralo-Caspian Region (south), Balkhash Region (south), Dzhungaria, Tarbagatai (south), Kyzyl-Kum, Kara-Kum, mountainous Turkmenia, Amu-Darya, Syr-Darya, Pamiro-Alai (southern Tadzhikistan). *General distribution*: Eastern Mediterranean (Syria), Armenia-Kurdistan, Iran (in the southeast up to Baluchistan). Described from Syria or Iraq (from the collections of Olivier and Brugier between Baghdad and Haleb [Aleppo]). The type specimen was in Berlin (in Kunth Herbarium); possibly, duplicates [isotypes] are available in Paris, where the main collection of Olivier and Brugier is preserved.

Note. Soon after the establishment of *Acantholepis* Less., Jauber and Spach (op. cit.) reduced it to a subgenus under *Echinops* L., and included the two above-mentioned species in this subgenus. A little later, Bunge (op. cit.), having seen *Acantholepis* Less. as only a monotypic section of *Echinops* L. in Boissier (op. cit.), recognized

Acantholepis Less., however, as a separate monotypic genus without accepting its other species described by Jauber and Spach; the probable baselessness of the second species was quite convincing from the excellent plates of the authors mentioned, which, it seems, very distinctly demonstrate the absence of significant differences between the two
56 species depicted. Subsequent authors shared the opinion of Boissier, indicating close affinity of *Echinops* L. and *Acantholepis* Less. Mulkijanyan (op. cit., p. 840), who studied this question in great detail recently, hypothesized that the "genus *Acantholepis* Less. is derived from the genus *Echinops* L. and, probably originated from an ancestor of the *E. integrifolius* Kar. and Kir. or *E. humilis* type."

Tribe 12. CYNAREAE Less. in *Linnaea*, V (1830) 128 p. p. and *Synops. Comp.* (1832) 4 p. p.; DC. *Prodr.* VI (1837) 499 p. p.; Boiss. *Fl. or.* III (1875) 422 p. p.; O. Hoffm. in *Pflanzenfam.* IV, 5 (1894) 312 p. p.—*Cinarocephalae* Juss. *Gen. pl.* (1789) 171.—*Acarnaceae* Link, *Handb.* I (1829) 684.—*Fam. Cynaraceae* Lindl. *Nat. Syst. ed.* 2 (1836) 151.—*Trib. Cynaroideae* Benth. in Benth. and Hook. f. *Gen. pl.* II (1873) 211 p. p.—*Trib. Carduées* Baill. *Hist. des Plantes*, VIII (1882) 69 p. p.—*Fam. Carduaceae* Bessey in *Ann. Miss. Bot. Gard.* II, 2 (1915) 164.—*Capitula* homogamous or heterogamous, usually many-flowered, homochromous or heterochromous. Involucres many-rowed; involucre bracts imbricate, usually coriaceous or leafy, cuspidate, with diverse type of spinules or scales, less often without appendages. All florets tubular, bisexual (unisexual, in some *Cirsium* species, and then plants dioecious), sometimes outer florets sterile, enlarged or not, funnel-shaped, less often pistillate (their corolla bilobed). Receptacle covered with scales or bristles, less often glabrous. Anthers sagittate at base, with diverse (cuspidate, strigose, ciliate, fimbriate, split or entire) tips (anthers without basal appendages only in *Anura* (Juz.) Tschern). Style usually with crown (collar) of pollen collecting hairs below branching or thickened; its branches free or fused, partly or up to tip. Corolla variously colored. Leaves alternate.

Herbs and semishrubs, distributed throughout Europe, northern Africa, and a large part of Asia; the largest number of genera of this tribe are found in the Mediterranean Region, Northwest and Soviet Central Asia and only a few genera are represented in America, Australia, and Tropical Africa.

KEY TO SUBTRIBES OF CYNAREAE

1. Achenes with straight (occasionally slightly oblique) areole 2.
- + Achenes with oblique or lateral areole
..... Subtribe 3. *Centaureinae* O. Hoffm.

2. Achenes appressed-hairy or villous, without distinct margin at apex
 Subtribe 1. **Carlininae** O. Hoffm.
 + Achenes glabrous with scattered divergent hairs (only in *Polytaxis*
Bge.); apex mostly with dentate margin
 Subtribe 2. **Carduinae** O. Hoffm.

57 Subtribe 1. **CARLININAE** O. Hoffm. in Pflanzenfam. IV, 5 (1894) 314.—Trib. Carlineae Cass. in Bull. Soc. Philom. (1815) 173 p. p.; Ej. in Dict. Sc. nat. VII (1817) 109 p. p.; X (1818) 156 p. p.; XX (1821) 357 p. p.; XLVII (1827) 497 p. p.; LX (1830) 569 p. p.; Opusc. phyt. 1 (1826) 292 p. p.; II (1826) 202 p. p.—Subtrib. Carduinae Less. in Linnaea, VI (1831) 86 p. p. and Synops.-Comp. (1832) 8 p. p.—Subtrib. Cardopateae DC. Prodr. VI (1837) 527.—Subtrib. Xeranthemeae DC. Ibid. 528.—Subtrib. Carilineae DC. Ibid. 531 p. p.; Benth. in Benth. and Hook. f. Gen. pl. II (1873) 212; Boiss. Fl. or. III (1875) 442.—Achenes with straight areole, without distinct margin at apex, villous. Pappus with one or two rows of scales, less often of bristles (*Atractylodes* DC., *Carlina* L.).

KEY TO GENERA OF SUBTRIBE CARLININAE¹

1. Pappus of more or less narrow aristate scales, usually very short-barbate, but not plumose 2.
 + Pappus of thin plumose bristles or narrow scales, free almost to base in plumose setaceous lobes 6.
 2. All florets similar, bisexual, fertile
 1569. **Cousiniopsis** Nevski
 + Ray florets pistillate, sterile or fertile; disk florets bisexual, fertile
 3.
 3. Corolla of ray (pistillate) florets bilabiate 4.
 + Corolla of all florets regular 5.
 4. Corolla of bisexual florets very shallow 5-fid. Involucral bracts not prickly. Capitula on peduncles 1570. **Xeranthemum** L.
 + Corolla of bisexual florets deeply 5-fid. Involucral bracts prickly. Capitula sessile 1571. **Siebera** J. Gay
 5. Filaments united. Annuals 1572. **Chardinia** Desf.
 + Filaments free. Perennials 1573. **Amphoricarpus** Vis.
 6. Innermost involucral bracts long, much longer than florets, radially divergent or recurved 1574. **Carlina** L.

¹By I.A. Linczevsky.

- + Innermost involucre bracts shorter, not longer than florets, erect
 1575. *Atractylodes* DC.

GENUS 1569. *Cousiniopsis* Nevski^{2, 3}

Nevski in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 4 (1937) 288.

Capitula many-flowered, small (about 10 mm wide), spherical-ovoid,
 58 solitary. Involucre many-rowed, imbricate; involucre bracts stiff-leafy,
 prickly; outer bracts with recurved, stiff, whitish appendage with three
 to seven spinules; inner bracts with thick, less recurved cusp. Receptacle
 slightly convex, punctate, densely covered with large almost transparent
 scales closely enclosing florets; scales shallow split at apex into thin
 bristles. Florets similar: all bisexual, tubular, regular; corolla with short
 tube and deeply 5-partite limb having linear lobes. Anthers with long,
 fimbriate-hairy, tail-like basal appendages; filaments glabrous. Style
 gradually thickened in upper part, with very short, flat, cylindrical
 branches and with ring of short hairs at their base. Achenes obovoid,
 sericeous-villous, obtuse, with straight areole. Pappus in two rows: outer
 row of (8)10 lanceolate or narrow-lanceolate scales, approximate at base,
 finely divided at apex, with short spinose continuation of midrib; inner
 row as five-toothed crown, one-fourth to one-third as long as outer scales,
 teeth split at tip into bristles; middle bristle aristate, long, almost equal
 or as long as scales of outer row.

A short annual; leaves alternate, pinnatisect or toothed with prickly
 lobes or teeth.

A monotypic genus.

1. *C. atractyloides* (Winkl.) Nevski in Tr. Bot. Inst. Akad. Nauk
 SSSR, Ser. 1, 4 (1937) 288; Nikitin in Fl. Turkm. VII, 156.—*Cardopatum*
atractyloide Winkl. in Tr. Peterb. Bot. Sada, IX (1886) 517; O. and B.
 Fedtsch. Perech. Rast. Turkm. IV, 227; Popov in Tr. Turk. Nauchn.
 Obshch. I, 33; Vved. in Tr. Sredneaz. Gos. Univ., Ser. VIIIb, 102.—*lc.*:
 Nikitin, op. cit., Plate XXIII, Fig. 2.—*Exs.*: H.F.A.M. No. 477; Sintenis,
 It. transcasp.-pers. 1900–1901, No. 250.

Annual. Plants 5–15(25) cm high, sparsely white arachnoid-hairy;
 stem branched from base, usually with fewer slender, whitish branches,
 simple or slightly branched. Leaves 3–7 cm long, lower (basal) leaves

²Treatment by I.A. Linczevsky.

³From the word *Cousinia*—name of a genus of plants of the Compositae, and the
 Greek word *opsis*—external appearance; based on the similarity with some species of this
 genus.

linear-lanceolate, prickly-toothed or pinnatisect, with spinescent lobes, middle (very sparse on branches) and upper (usually crowded forming rosettes below capitula) leaves similar to basal, but often pinnatisect, with five to seven (nine) distant, prickly-toothed lobes. Capitula 8–10 mm wide, fewer, (3)5–10(15) on plant, borne singly in stem forks (beginning right from base, almost at soil surface) and at apices of branches. Involucral bracts more densely pubescent than other parts; outer bracts four or five-rowed, gradually reduced towards outer side, narrow-ovate to narrow-lanceolate, 5–3.5 mm long and 2–1.5 mm wide, with up to 3–4 mm long process, and spinules about 2 mm long; inner
59 bracts one or two-rowed, longer than outer, oblong-ovate, 6–7 mm long and 2.5–3 mm wide, dark purple above, with about 1–2 mm long cusp; receptacular scales 5–6 mm long and 2.5–3 mm wide, split at apex up to 0.5–1 mm. Corolla centaury or lilac-blue, about 8 mm long, with about 4 mm long limb and about 4 mm long tube. Achenes 1.5–2 mm long and about 1 mm wide; pappus 3.5–4 mm long, light straw-yellow, inner row (crown) about 1 mm long, aristate tips of pappus scales and teeth of crown barbellate. Flowering IV–V; fruiting VI–VIII. (Plate IV, Fig. 2).

Submountainous plains, foothills and lower mountains on loamy and loamy-stony soils, usually in regions of variegated gypsum rocks.—*Soviet Central Asia*: Kyzyl-Kum (extreme south: Kenimekh Region), Kara-Kum (along Middle Murgab), mountainous Turkmenia (Ashkhabad and Dushak regions), Amu-Darya, Syr-Darya (Fergana Valley, Namangan Region), Pamiro-Alai (southwest and western lower mountains). *General distribution*: Possibly occurs in northern Iran and northern Afghanistan. Described from the foothills of the interfluve of the Kafirnigan-Vakhsh rivers between Kabadian and Dzhilikul. Type in Leningrad.

Note. In describing this species, Winkler (op. cit.) indicated its intermediate position between *Cardopatum* Juss. and *Atractylis* L., but still included it under the former genus, placing it under the monotypic subgenus *Distemma* Spach [Monographia generis *Cardopatum*, Ann. Sc. Nat. sér. 3, V (1846) 233–247], which until then included the only species, *C. boryi* Spach from Laconia, which differs from other species of the genus by its two-rowed pappus, the second row being coronate, five-toothed, and very short. Boissier (Boiss. *Fl. or.* III. 1875, 444) in the note to *C. boryi* Spach, noted that the flowers in the herbarium specimens of this species preserved in Paris are damaged by insects, and, therefore, the description of the pappus is given only from Spach. Popov (op. cit.) doubted the correctness of including this species in *Cardopatum*, and Vvedenskii (op. cit.) pointed out that it should be considered as a separate genus. Nevski (op. cit.), in describing the genus *Cousiniopsis*, writes that *Cardopatum* Juss. differs from *Cousiniopsis*

by having a one-rowed pappus, and the two-rowed pappus in *Cardopatum boryi* Spach is doubtful ("pappus biseriatus in *C. boryi* Spach dubius est!").

It can be seen from what is stated above that the taxonomic position of *Cousiniopsis* is not yet entirely clear; to resolve this, probably first of all a critical revision of the genus *Cardopatum* Juss., apparently not entirely homogeneous, will be necessary.

GENUS 1570. *Xeranthemum* L.^{1, 2}

L. Sp. pl. (1753) 857; DC. Prodr. VI (1837) 528; Benth. and Hook. f. Gen. pl. VII (1873) 463; O. Hoffm. in Pflanzenfam. IV, 5 (1892) 315.—*Harrisonia* Neck. Elem. I (1790) 84.—*Xeroloma* Cass. in Dict. sc. nat. LIX (1829) 120.

60 Capitula many-flowered, small (up to 15–20 mm wide), campanulately or hemispherically ovoid or oblong-cylindrical, solitary, terminal on long leafless branches. Involucre many-rowed; imbricate; involucre bracts scarious, not prickly; outer bracts appressed, gradually reduced towards outer side; innermost bracts oblong, colored (pink, brown to purple or violet) or white, erect or reflexed. Receptacle flat, densely covered with stiff, narrow, concave, undivided or divided scales. Florets variable; ray florets pistillate, very few, sterile, with a short bilabiate corolla; lips small, erect, outer lip entire or three-toothed, inner smaller and bifid; disk florets bisexual, fertile, with regular tubular corolla, and very short five-fid limb. Anthers sagittate at base, with short, fimbriate or cuspidate appendages or obtuse; filaments free, glabrous. Style of bisexual florets with very short erect or subsequently recurved branches. Achenes of pistillate florets thin, empty, with or without pappus of fine scales; achenes of bisexual florets oblong-cuneate, narrow-obdeltoid or almost turbinate, with short appressed pubescence, cylindrical or angular on inner side, truncate at apex and with one-rowed pappus or with more or less numerous (5–15) aristate-acuminate scales.

Annuals. Nonprickly, white pubescent-hairy plants with alternate, narrow, entire leaves.

The genus includes five or six species growing in the Mediterranean Region.

Type species: *Xeranthemum annuum* L.

Economic Importance: The species of this genus, in particular *X. annuum* L. and *X. squarrosum* Boiss., have long been used in the southern

¹Treatment by I.A. Linczevsky.

²From the Greek words *Xeros*—dry, and *antheon*—flower.

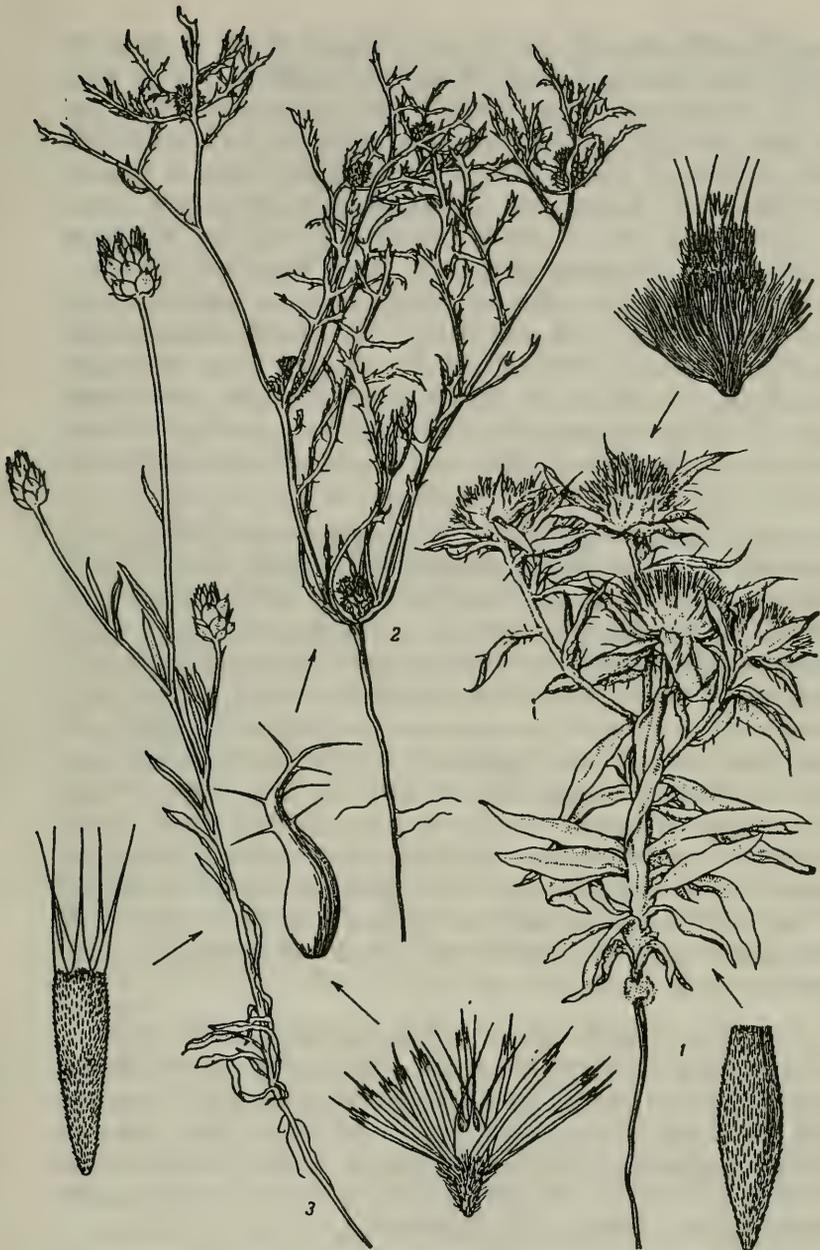
USSR as ornamental plants for dry winter bouquets, wreaths, and garlands. The seeds of *X. cylindraceum* Sm. contain oil with the iodine number 105.8 (after A.A. Grossheim).

Note. The basic taxonomic studies on the genus *Xeranthemum* L. have been cited at the corresponding places of the present treatment. The brief but interesting review of the Czechoslovakian botanist J. Chrtek ("The relation between genus *Xeroloma* Cass. and genus *Xeranthemum* L.," *Novitates bot. Hort. bot. Universitatis Carolinae Pragensis*, 1961, pp. 3–5), published recently, should also be mentioned; it considers *Xeroloma* Cass. as a separate genus, and proposes two subgenera (*Xeranthemum* and *Xeranthelia* Chrtek) for the remaining four species of *Xeranthemum* L. and two sections (*Xeranthemum* and *Longipapposa* Chrtek), i.e., it proposes a rather detailed infrageneric division. For technical reasons (late receipt of the above mentioned issue of *Novitates*) I could not cite the new taxa proposed by J. Chrtek in the main text.

1. Capitula more or less narrow-cylindrical at flowering, 5–8(10) mm wide, enlarged after flowering 2.
- + Capitula ovoid or hemispherically ovoid at flowering 10–15(20) mm wide 3.
2. Outer involucre bracts glabrous, with short cusp at tip. Pappus scales five, almost equal 4. **X. longipapposum** Fisch. and Mey.
- + Outer involucre bracts finely tomentose on outer surface, obtuse. Pappus scales (7)10–15, highly unequal 5. **X. cylindraceum** Sm.
3. Inner involucre bracts erect, brown to purple or violet; outer bracts usually with wide, longitudinal brown stripe 3. **X. inapertum** (L.) Mill.
- + Inner involucre bracts radially recurved, pinkish or bright pink, occasionally white; outer bracts whitish or yellow, glossy, sometimes with narrow longitudinal, brown to purple stripe 4.
4. Pappus scales deltoid at base, very gradually attenuate into short subulate awn, much shorter than corolla and receptacular scales; capitula often with 100–120 florets 1. **X. annuum** L.
- + Pappus scales short-deltoid at base, abruptly attenuate into long subulate awn, almost as long as corolla and receptacular scales; capitula often with 30–40(60) florets ... 2. **X. squarrosus** Boiss.

Section 1. Xeranthemum—Euxeranthemum DC. Prodr. VI (1837) 528, pro sect. nom. illeg.—Pappus scales five.

1. **X. annuum** L. Sp. pl. (1753) 857; M.B. Fl. taur.-cauc. II, 302; J. Gay in Mém Soc. Hist. Nat. Paris, III, 358; Kalenicz. in Bull. Soc. Nat.



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Plate IV.

- 1—*Gymnaster savatieri* (Makino) Kitamura, habit, disk floret with achene, ligulate peripheral floret, stamens, involuclral bract; 2—*Conyzanthos* [sic;—thus] *graminifolius* (Spreng.) Tamamsch., habit, achene with pappus, stamen, involuclral bract, tubular floret, tubular-ligulate floret, style; 3—*Tripolium vulgare* Nees, habit, achene with pappus, disk floret, peripheral ligulate floret, style, involuclral bract, stamen.

Mosc. VII, 188; Boiss. Fl. or. III, 444 : Schmalh. Fl. II, 92; Hegi. Ill. Fl. VI, 2, 814; Grossh. Fl. Kavk. IV (1934) 162; Iljin in Fl. Yugo-Vost. VI, 377.—*X. annuum* β . *gracilius* Fisch. and Mey. in Nouv. Mém. Soc. Nat. Mosc. IV (1835) 336.—*X. radiatum* Lam. Fl. Fr. II (1793) 48; DC. Prodr. VI, 528.—*X. radiatum* var. *a. macranthum* C. Koch in Linnaea, XVII (1843) 38.—*X. radiatum* var. *a. caule stricto* etc. Ldb. Fl. Ross. II, 2 (1845–1846) 658.—*X. annettae* Kalenicz. in Bull. Soc. Nat. Mosc. VII (1834) 194.—*Centaurea dubia* S.G. Gmel. Reise, I (1770) 126.—**63** **lc.**: Gmel, Ibid. tab. 20; J. Gay, op. cit. tab. 7, fig. 1; Kalenicz. op. cit. tab. VI, fig. 1 and 3; Fisch. and Mey. op. cit. tab. XII; Rchb. Iconogr. bot. VII, fig. 864; O. Hoffm. op. cit. fig. 144, B-D; Hegi, op. cit. fig. 517, d-h, fig. 518; Iljin, op. cit. Fig. 694.—**Exs.**: Novopokr. Gerb. Donsk. Fl. No. 50; Callier, It. taur. 1900, No. 642; Pl. bulg. exs. No. 99; Orph. Fl. Graec. exs. No. 754; Fl. hung. exs. No. 886; Fl. exs. austro-hung. No. 976; Dörfel. Herb. norm., No. 4137.

— Annual. Plants 10–40(60) cm high, appressed white arachnoid-hairy tomentose. Stem erect, usually flexuous, virgate, with solitary terminal capitula on leafless branches. Leaves up to 3–4 cm long and 2–8(12) mm wide, almost sessile; lower leaves narrow-lanceolate, upper highly reduced, linear. Capitula with 100–120 florets, hemispherical-ovoid at flowering, (10)15–20 mm wide. Involucral bracts scarious, glabrous; outer bracts whitish or yellowish, sometimes with longitudinal brown to purple stripe, ovate, abruptly short acuminate, more or less appressed; inner bracts two times as long as outer, up to 5 mm wide, elliptical-linear, radially recurved, pinkish or bright pink (occasionally white). Anther appendages fimbriate. Achenes dark brown, oblong-deltoid, cylindrical-angular, 3–5 mm long and about 1 mm wide; pappus scales five, unequal, 2–3 mm long, deltoid at base, very gradually attenuate upward into short subulate awn, much shorter than corolla and receptacular scales. Flowering VI–X; fruiting VII–X.

In steppes, on chalk outcrops, sands, dry slopes, among shrubs in lower mountains, sometimes as a weed.—*European Part*: Middle Dnieper (south), Volga-Don (south), Trans-Volga Region (southwest), Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga (west); *Caucasus*: Ciscaucasia, Dagestan. *General distribution*: Central Europe (south), western Mediterranean, Balkans-Asia Minor (west). Described from Western Europe (Austria). Type in London.

2. **X. squarrosus** Boiss. Diagn. pl. or. ser. I, VI (1845) 101, incl. α . *pictum* Boiss. and β . *unicolor* Boiss.; Boiss. Fl. or. III, 444; Grossh. Fl. Kavk. IV, 162; Nikitin in Fl. Turkm. VII, 154; Gadzhiev in Fl. Azerb. VIII, 356.—*X. radiatum* var. *c. micranthum* C. Koch in Linnaea,

XVII, (1843) 38.—*X. radiatum* var. *b. caule subsquarroso* etc. Ldb. Fl. Ross. II, 2 (1845–1846) 658.—**Ic.**: Gadzhiev, op. cit., Plate XXXIX, Fig. 2.—**Exs.**: Herb. Fl. Cauc. No. 248; Aucher, Herb. or. No. 4777; Balansa, Pl. or. 1854, No. 269; 1855, No. 635; 1856, No. 882; Kotschy, It. cilic.-kurd. 1859, No. 308 and Pl. Syr. bor. 1862, No. 75; Bornm. Pl. exs. Anatol. or. 1889, No. 546; Sintenis, It. or. 1892, No. 4914.

Annual. Plants 10–40(60) cm high, appressed white arachnoid-hairy tomentose. Stem erect, usually slender-virgate profusely branched with solitary terminal capitula on leafless branches. Leaves up to 3–4 cm long and 3–4 mm wide, oblong-linear, sessile; lower leaves decurrent, upper highly reduced. Capitula with 30–40(60) florets, hemispherical-ovoid at flowering, 10–15 mm wide. Involucral bracts scarious, glabrous; outer bracts whitish, sometimes with longitudinal brown to purple stripe, glossy, ovate, abruptly short-acuminate, weakly squarrose; inner bracts 64 two to three times as long as outer bracts, up to 2.5–3.5 mm wide, linear-elliptical, radially recurved, glossy, pinkish or bright pink. Anther appendages fimbriate. Achenes dark brown, oblong-obdeltoid, cylindrical-angular, 3–4 mm long and about 1 mm wide; pappus scales five, unequal, 3–6 mm long, short-deltoid at base, abruptly attenuate into long subulate awn, almost as long as corolla and receptacular scales. Flowering VI–VII; fruiting VII–VIII.

Foothill plains to middle mountain zone (in Azerbaidzhan up to 1,900 m), on dry, shallow, stony and rocky slopes, and among shrubs.—*Caucasus*: Ciscaucasia, Dagestan, western, eastern and southern Transcaucasia, Talysh; *Soviet Central Asia*: mountainous Turkmenia (Kopetdag Range). *General distribution*: Eastern Mediterranean (northeast), Balkans-Asia Minor (east), Armenia-Kurdistan, Iran (northwest). Described from the Caspian Sea, from Gilan and the vicinity of Diyarbakir in northern Mesopotamia. Type in Geneva; isotype in Leningrad.

Note. Boissier, who described this species (Boiss. *Fl. or.* p. 445), included it here as a separate species, but later questioned whether it should be considered as a variety of *X. annuum*. However, subsequent work did not confirm the doubts, and present Caucasian plant taxonomists have clearly distinguished *X. squarrosus* Boiss. from *X. annuum* L.

Boissier (Boiss. *Fl. or.* l.c.) included under the synonyms of *X. squarrosus* β . *unicolor* Boiss. the species *X. annettae* Kalenicz., described by Kharkov botanist I.O. Kaleniczenko, from the vicinity of Stavropol in the northern Caucasus. If these species should prove convincingly to be the same, the name *X. annettae* Kalenicz. would take priority (published 11 years earlier) over *X. squarrosus* Boiss. However,

the study of the specimens of *X. annettae* preserved in Leningrad shows that they should be referred to *X. annuum* L.

Among the herbarium specimens cited by Boissier in describing this species, it appears to me more appropriate to select as type specimens those collected by Aucher from Gilan (Aucher, *Herb. or.* No. 4777), as these specimens correspond well to the diagnosis of Boissier, are precisely identified thanks to the presence of the number, and, besides, were distributed as duplicates to the largest herbaria of the world.

3. ***X. inapertum*** (L.) Mill. Gard. Dict. ed. 8 (1768) No. 2; Willd. Sp. pl. III, 3, 1902; J. Gay in Mém. Soc. Hist. Nat. Paris, III, 360; Kalenicz. in Bull. Soc. Nat. Mosc. VII, 191; Ldb. Fl. Ross. II, 2, 658; Boiss. Fl. or. III, 445; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 227; Hegi, Ill. Fl. VI, 2, 815; Grossh. Fl. Kavk. IV, 161; Karjagin, Fl. Apsherona (1952) 382; Gadzhiev in Fl. Azerb. VIII, 357.—*X. annuum* β. *inapertum* L. Sp. pl. (1753) 858, p. p. excl. ic. Moris.—*X. erectum* Presl, Delic. Prag. I (1822) 106; Fisch. and Mey. in Nouv. Mém. Soc. Nat. Mosc. IV, 338; DC. Prodr. VI (1837) 529; cum. β. *meyeri* DC.—*X. foetidum* Moench, Meth. pl. (1794) 582, p. p. nom. superfl.—**lc.**: J. Gay, op. cit. tab. 7, fig. 2; Kalenicz. op. cit. tab. VI, fig. 2; Fisch. and Mey. op. cit. tab. XII; Rchb. Iconogr. bot. VII, fig. 863; Hegi, op. cit. fig. 517 i-l; Karjagin, op. cit. Plate XX A-B; Gadzhiev, op. cit. Plate XXXIV, Fig. 4, **Exs.**: Fiori, Bég. Pamp. Fl. Ital. exs. No. 988; Todaro, Fl. Sic. exs. No. 600; Fl. Gall. et Germ. exs. Nos. 686, 1905 and 1905 bis; Fl. exs. austro-hung. No. 977.

Annual. Plants 10–40 cm high, appressed white arachnoid-hairy tomentose. Stem erect, usually flexuous, virgate, with solitary terminal capitula on leafless branches. Leaves up to 5–6(8) cm long and 4–7(10) mm wide, almost sessile, decurrent; lower leaves oblong-obovate, upper leaves linear-oblong. Capitula with 30–40 florets, ovoid at flowering, 10–15 mm wide. Involucral bracts scarious, glabrous, whitish, and usually with brown, longitudinal, broad stripes; outer bracts ovate, abruptly short-acuminate; inner bracts about one and one-half times as long as outer, up to 2.5–3 mm wide, lanceolate, acute, erect (not radially recurved), brown to purple or violet. Anther appendages setaceous. Achenes dark gray, narrow-obdeltoid, cylindrical-angular, about 5 mm long, and 1–1.5 mm wide; pappus scales five, more or less equal, about 5 mm long, deltoid or deltoid-lanceolate, usually gradually attenuate into thin finely barbed awn. Flowering V–VIII; fruiting VII–VIII. (Plate IV, Fig. 3).

Dry, shallow, and stony slopes, up to middle mountain zone, sometimes as weed.—*European Part*: ?Crimea; *Caucasus*: Ciscaucasia, Dagestan, eastern Transcaucasia, Talysh. *Soviet Central Asia*: (Reported

by O. and B. Fedtsch. op. cit. from "Northern Turkmenia," according to Karelin, but not confirmed by subsequent collections). *General distribution*: Central Europe (south), Atlantic Europe (southeast), western Mediterranean, eastern Mediterranean, Balkans-Asia Minor, ? Armenia-Kurdistan. Described from Western Europe (Italy, Switzerland, France). Type in London.

4. **X. longipapposum** Fisch. and Mey. in Nouv. Mém. Soc. Nat. Mosc. IV (1835) 337 ("*longepapposum*"); DC. Prodr. VI, 529; Ldb. Fl. Ross. II, 2, 659; Boiss. Fl. or. III, 445; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 227; Grossh. Fl. Kavk. IV, 162; Nikitin in Fl. Turkm. VII, 153; Gadzhiev in Fl. Azerb. VIII, 357.—**lc.**: Fisch and Mey. op. cit. tab. XII; Gadzhiev, op. cit., Plate XXXIV, Fig. 1.—**Exs.**: Pl. or. exs. No. 95; Sintenis, It. transcasp.-pers. 1900–1901, Nos. 681, 1852; Kotschy, Pl.-Pers. austr. No. 542.

Annual. Plants 10–30(50) cm high, appressed white arachnoid-hairy tomentose. Stem erect, usually divaricate and rather densely branched, slender-virgate, with solitary terminal capitula on leafless branches. Leaves up to 3–4 cm long and 2–3(5) mm wide, almost sessile, elliptical-linear to linear. Capitula with 10–15 florets, narrow-oblong to cylindrical at flowering, 5–6 mm wide. Involucral bracts scarious, glabrous; outer bracts whitish, small, deltoid to ovate, abruptly short-acuminate; inner
66 bracts three times as long as outer, up to 2–2.5 mm wide, linear to linear-lanceolate, acuminate, erect (not radially recurved), lilac-pink, later turning white. Anther appendages acute. Achenes silvery white, narrow-cuneate, almost linear, cylindrical-angular, 5–6 mm long and about 1 mm wide; pappus scales five, almost equal, 9–10 mm long, narrow-lanceolate, finely ciliate-barbate, very gradually acuminate, on average about one and one-half times as long as achenes. Flowering V–VII; fruiting VI–VIII.

Lower and middle mountain zone, on dry, shallow, and stony slopes, sometimes in steppe phytocenoses.—*Caucasus*: Southern Transcaucasia, Talysh; *Soviet Central Asia*: Dzhungaria-Tarbagatai (Dzhungarian Alatau), mountainous Turkmenia, Pamiro-Alai, Tien Shan. *General distribution*: Balkans-Asia Minor (east), Armenia-Kurdistan, Iran. Described from northwestern Iran (vicinity of the village of Seidkhoji in the region of Khoi). Type in Leningrad.

Section 2. Xeroloma (Cass.) DC. Prodr. VI (1837) 529.—*Xeroloma* Cass. in Dict. sc. nat. LIX (1829) 120 p. gen.—Pappus scales (7)10–15.

5. **X. cylindraceum** Sm. Prodr. fl. Graec. II (1813) 172; J. Gay in Mém. Soc. Hist. Nat. Paris, III, 362; Kalenicz. in Bull. Soc. Nat. Mosc.

VII, 197; DC. Prodr. VI, 529; Ldb. Fl. Ross. II, 2, 659; Boiss. Fl. or. III, 446; Schmalh. Fl. II, 92; Hegi, III. Fl. VI, 2, 813; Grossh. Fl. Kavk. IV, 162; Gadzhiev in Fl. Azerb. VIII, 356.—*X. annuum* β . *inapertum* L. Sp. pl. (1753) 858, p. p. quoad ic. Moris.—*X. foetidum* Moench, Meth. pl. (1794) 582, p. p. nom. superfl.—*X. inapertum* auct. non Mill. : M.B. Fl. taur.-cauc. II (1808) 302 and III (1819) 568; Fisch. and Mey. in Nouv. Mém. Soc. Nat. Mosc. IV, 340.—*X. incanum foetens, flore minore* Moris, Plant. hist. univers. III (1699) sect. 6, tab. 12, fig. 1. excl. descript.—**lc.**: J. Gay, op. cit. tab. 7, fig. 3, Kalenicz. op. cit. tab. VI, fig. 4; Fisch. and Mey. op. cit. tab. XII; Rchb. Iconogr. bot. VII, fig. 862; Hegi, op. cit. fig. 517a–c; Gadzhiev, op. cit. Plate XXXIV, Fig. 3.—**Exs.**: GRF No. 1781; Herb. Fl. cauc. No. 247; Aucher, Herb. or. No. 3242; Bormm. It. pers.-turc. 1892–1893, No. 1410; Orph. Fl. Graec. exs. No. 755; Fl. exs. austro-hung. No. 978; Fl. hung. exs. No. 886; Pl. Bulg. exs. No. 98; Fl. Gall. et Germ. exs. Nos. 884, 1024, 1024 bis.

Annual. Plants 10–40(60) cm high, appressed white arachnoid-hairy tomentose. Stem erect, usually straight and slender-irrigate, with solitary terminal capitula on leafless branches. Leaves up to 3–4(6) cm long and 2–4(7) mm wide, nearly sessile, decurrent; lower leaves lanceolate, upper linear. Capitula with 10–15 florets, narrow oblong-cylindrical at flowering, 5–10 mm wide, distinctly enlarged after flowering, turbinate or campanulate. Involucral bracts appressed; outer bracts ovate, obtuse, stiff-leafy and finely tomentose on outer surface, with wide light-colored membranous border along margin; inner bracts slightly longer than outer, up to 2.5–3 mm wide, lanceolate, subacute, almost erect (only weakly
67 radially divergent), pale pinkish or pink, later turning dark brown. Anther appendages aristate. Achenes dark gray, narrow-obdeltoid, compressed. 5–6 mm long and about 2 mm wide; pappus scales (7)10–15, unequal, (1.5–5)2.5–5 mm long, finely barbed along margin, narrow-deltoid below, abruptly attenuate into subulate awn, on average, about half as long as achene. Flowering V–VIII; fruiting VI–VIII(IX).

Foothill plains to middle mountain zone; on dry shallow and stony slopes, in shrubby areas and grassy phytocenoses, sometimes as a weed.—*European Part*: Bessarabia, Crimea; *Caucasus*: Ciscaucasia, Talysh. *General distribution*: Central Europe (south), Atlantic Europe (south), western and eastern Mediterranean, Balkans-Asia Minor, Armenia-Kurdistan. Described from the Mt. Bithynian Olympus (Turkey). Type in London (?).

Note. In accepting *X. cylindraceum* Sm. as the name for this species I am following Gay, the author of the first monograph of the genus *Xeranthemum* L. in almost its present circumscription (Gay, op. cit. 1827). Gay provided quite precise delimitation of the two species, which earlier

were combined under the name *X. inapertum* (L.) Mill. (1768). Besides, Gay acted exactly in accordance with the modern rules of botanical nomenclature, retaining the initial name, i.e., *X. inapertum* (L.) Mill., for one of these species, and adopting the earliest valid name *X. cylindraceum* Sm. (1813) for the other (the circumscription of which can easily be determined from Morison's polynomial and figure cited above and cited by both Linnaeus and Smith). The name *X. foetidum* Moench (1794), adopted by some authors for this species, cannot be considered valid, as it is nomenclaturally superfluous (nomen superfluum), given that *Xeranthemum inapertum* Linn. is listed as a synonym in his publication.

GENUS 1571. *Siebera* J. Gay^{1,2}

J. Gay in Mém. Soc. Hist. Nat. Paris, III (1827) 344, in adnot. nom. conserv.; DC. Prodr. VI (1837) 531; Benth. and Hook. f. Gen. pl. II (1873) 464; O. Hoffm. in Pflanzenfam. IV, 5 (1892) 315.—*Sieberia* Spreng. Anleit. 2, 1 (1817) 282.—*Siebera* Hoppe, Flora 2 (1819) 24.

Capitula many-flowered, small (up to 12–15 mm wide), campanulate. Involucre many-rowed, imbricate; involucral bracts wider below, abruptly attenuate into long, stiff, later spiny cusp; inner bracts long, much longer than florets, gradually reduced outward. Receptacle flat, densely covered with somewhat deeply incised scales. Florets variable: peripheral florets pistillate, fewer, sterile; their corolla bilabiate with short tube and erect lips; outer lip entire or three-toothed, inner smaller, bifid; disk florets bisexual, fertile, with tubular regular corolla, thin corolla tube, and slightly wider, deeply five-fid limb with narrow lobes. Anthers sagittate at base, with minute sharp cusp; filaments free, glabrous, flattened. Style of bisexual floret with or without very short branches. Achene of bisexual floret oblong-cuneate, sparsely pubescent, narrow at base, almost cylindrical, with numerous longitudinal grooves, and truncate apex; pappus cornate, of one row of many (8–10) transparent, subulately acuminate scales.

Annual, short, prickly (except involucre), whitish pubescent-hairy plant with alternate, narrow, entire leaves.

A monotypic genus.

1. *S. pungens* (Lam.) DC. Prodr. VI (1837) 531, incl. β . *nana* DC.; Boiss. Fl. or. III, 447; Nikitin in Fl. Turkm. VII, 154.—*X. gayana* Cass.

¹Treatment by I.A. Linczevsky.

²In honor of the botanist and traveler from Prague, Franz Wilhelm Sieber (1785–1844).

in Dict. sc. nat. LIX (1829) 126.—*Xeranthemum pungens* Lam. Dict. III (1789) 236.—**lc.**: Lam. Ibid. III, IV (1797) tab. 692, fig. 2.—**Exs.**: Aucher, Pl. or. No. 3351 (sec. Boiss. op. cit.); Kotschy, Pl. Pers. austr. 1845, No. 385; Bornm. It. pers. alt. 1902, No. 7296.

Annual. Plants (5)10–20(40) cm high, appressed white arachnoid-hairy tomentose. Stem simple or often branched from base, with more or less curved, ascending or almost erect branches. Leaves up to 2–3(5) cm long and 4–6(8) mm wide, sessile, elliptical to linear, rather broadly rolled down along margin. Capitula with 12–20 florets, up to 12–15 mm wide, solitary terminal on branches and surrounded by crowded, almost rosulate apical leaves, sometimes, with almost or totally abortive stems nearly at soil surface. Involucral bracts ovate or broad-lanceolate in lower part, finely white-tomentose, with wide membranous border, abruptly attenuate into long (up to 25–30 mm) awn, more spiny in fruit, and pinkish or purple in inner bracts; scales of receptacle shorter than florets, 11–14 mm long, free almost to base in linear, sinuate, subulate, 1 mm wide lobes. Achenes of bisexual florets whitish, 7–9 mm long and about 1 mm wide; pappus about 9–12 mm long, distinctly longer than corolla; pappus scales almost equal, linear-lanceolate or lanceolate, serrulate, gradually acuminate above, usually with more or less distinct midrib, terminating into finely subulate, finely plumose-barbate, 3–4 mm long awn. Flowering IV(VI); fruiting V(VII). (Plate V, Fig. 1).

Dry slopes in foothills and lower mountains sometimes on cultivated lands (according to Boissier, op. cit.).—*Soviet Central Asia*: mountainous Turkmenia (Pul-i-Khatum). *General distribution*: Eastern Mediterranean, Balkans-Asia Minor (eastern), Iran. Described from eastern Mediterranean (“Levant”). Type possibly in Paris.

69 *Note. S. pungens* (Lam.) DC. has so far been collected in our country only once, in 1895, by S.I. Korshinsky from southern Turkmenia, near Pul-i-Khatum. The specimens were in the herbarium under an incorrect name until they were correctly identified by M.M. Iljin in 1935.

The variety β . *nana* DC. mentioned above was described on the basis of dwarf specimens, apparently stunted because of water stress; such specimens are known from several places in its distribution area.

J. Gay, who described the genus *Siebera* is, however, not the author of the specific combination, because he did not publish such a combination (cf. p. 32 of International Code of Botanical Nomenclature); only 10 years later, De Candolle (DC. op. cit.) published an effective and actually valid specific combination.

GENUS 1572. *Chardinia* Desf.^{1, 2}

Desf. in Mém. Mus. Paris, III (1817) 455; DC. Prodr. VI (1837) 530; Benth. and Hook. f. Gen. pl. II (1873) 464; O. Hoffm. in Pflanzenfam. IV, 5 (1892) 315.

Capitula many-flowered, small (up to 20–25 mm wide), campanulate or turbinate, solitary, terminal on long leafless peduncles. Involucre many-rowed, imbricate; involucre bracts appressed, foliaceous-scaly or scaly, greenish-white, nonprickly; outer bracts appreciably reduced toward outer side; innermost bracts slightly longer, with slight pigmentation at base. Receptacle flat, densely covered with stiff and narrow scales. Florets variable; outer florets pistillate, very few (one to three), fertile; disk florets bisexual, fertile. Corolla of all florets tubular, regular, three to five-fid in the pistillate florets, five-fid in bisexual flowers, limbs with narrow and stiff lobes, fused above in some pistillate florets or free right from base in all florets. Achenes in pistillate florets oblong-obovoid, almost flat, with two-toothed lateral wings and ventral keel, corniculate above; pappus without or with 1–4 unequal stiff scales. Achenes of bisexual florets narrow-cuneate or cuneate, cylindrical, with numerous (15–20) fine oblong grooves, and truncate apex; pappus coronate, of one row of many (8–10) large aristate-acuminate scales.

Annual, often short, nonprickly, white-pubescent plants with alternate, narrow, entire leaves.

70 So far two species have been described in this genus.

Type species: *Chardinia orientalis* (L.) Ktze.

1. Achenes of bisexual florets narrow-cuneate, densely covered below (over one-third to half length) with long appressed bristles, sparsely short-setose above or almost glabrous (with few short bristles)...
..... 1. *C. orientalis* (L.) Ktze.
- + Achenes of bisexual florets cuneate (or oblong-turbinate), almost entirely covered with dense, long, appressed bristles
..... 2. *C. macrocarpa* C. Koch

1. *C. orientalis* (L.) Ktze. in Tr. Peterb. Bot. Sada, X (1887) 201; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 227; Grossh. Fl. Kavk. IV, 163; Papava in Zam. Sist. Geogr. Rast. [Tbilisi] 13, 80 and Fl. Gruzii, VIII, 432; Nikitin in Fl. Turkm. VII, 155; Gaddzhiev in Fl. Azerb. VIII, 358.—*C. orientalis* var. *erivanica* Tamamsch. in Fedde, Report. XXXVIII (1935) 171 (sphalm. "*verivanica*").—*Xeranthemum annuum* γ. *orientale*

¹Treatment by I.A. Linczevsky.

²In honor of Jean Chardin (1643–1713), the French traveler of the Orient.

L. Sp. pl. (1753) 957.—*X. orientale* Mill. Gard. Dict. ed. 8 (1768) No. 3; Willd. Sp. pl. III, 1902.—*C. xeranthemoides* Desf. in Mém. Mus. Paris, III (1817) 456; J. Gay in Mém. Soc. Hist. Nat. Paris, III, 366; Fisch. and Mey. in Nouv. Mém. Soc. Nat. Mosc. IV, 341; DC. Prodr. VI, 530; Ldb. Fl. Ross. II, 2, 659; Boiss. Fl. or. III, 446.—**lc.**: Desf. op. cit. tab. 21; J. Gay, op. cit. tab. 8; Fisch. and Mey. op. cit. tab. XIII; O. Hoffm. op. cit. fig. 71, G, H; Papava, op. cit. 84, Fig. II.—**Exs.**: GRF No. 883; Ed. H.B.P. No. 98; Aucher, Herb. or. No. 3350; Kotschy, Pl. Pers. austr. Nos. 217, 807 and It. syr. 1855, No. 471; Balansa, Pl. or. 1855, Nos. 636, 1857, No. 1280.

Annual. Plants 10–30(50) cm high, appressed white arachnoid-hairy tomentose. Stem erect, simple or often more or less strongly branched, less often from base, usually with weakly curved and somewhat thick branches. Leaves up to 4–5(7) cm long, and 10–15 mm wide; narrow-elliptical to narrow-lanceolate, almost linear, obtuse or subacute; lower leaves basally narrowed into petiole; upper leaves sessile or almost sessile. Capitula with 8–10 florets, almost cylindrical when young, greatly enlarged at fruiting, broad-turbinate, up to 10–20(25) mm wide. Involucral bracts glabrous; outermost very small, broad-ovate; middle bracts much larger, broad-obovate, acuminate and mucronate, herbaceous in middle with wide membranous border; inner bracts narrower, broad-lanceolate or lanceolate, more gradually long acuminate; receptacular scales much shorter than florets, narrow-linear, 10–12 mm long and 0.5–2 mm wide. Achenes of pistillate florets glabrous, 10–12 mm long and 4–6 mm wide; achenes of bisexual florets narrow-cuneate, 8–10 mm long and 1–2 mm wide, densely covered below (over half to one-third length) with long bristles, in middle one-third (or often almost to tip) sparsely short-
71 setose, upper one-third (sometimes upper two-thirds) almost glabrous (with very few short bristles). Pappus (10)12–17 mm long, much longer than corolla; pappus scales lanceolate, (1.5)2–3 mm wide, very gradually attenuate into aristate cusp, thicker at base, with distinct midrib, puberulent, margin very finely ciliate. Flowering IV–VI; fruiting V–VII. (Plate V, Fig. 2).

Dry stony and loamy slopes in foothills, lower mountains and middle mountain zone, sometimes as weed in cultivated fields.—*Caucasus*: Eastern and southern Transcaucasia, Talysh; *Soviet Central Asia*: mountainous Turkmenia, Syr-Darya (Mogoltau), Pamiro-Alai, Tien Shan (west, up to Karatau). *General distribution*: Eastern Mediterranean (east), Balkans-Asia Minor (east), Armenia-Kurdistan, Iran. Described from the eastern Mediterranean (Syria ?). Type in London or Paris.

Note. *C. orientalis* var. *erivanica* Tamamsch., mentioned above, is distinguished by achenes with reddish pubescence and reddish inside pappus scales.

2. **C. macrocarpa** C. Koch in *Linnaea*, XXIV (1851) 382; Papava in *Zam. Sist. Geogr. Rast.* [Tbilisi] 13, 80; Grossh. *Opred. Rast. Kavk.* 473.—**lc.**: Papava, *op. cit.* 84, Fig. 1.—**Exs.**: *Fl. or. ed. W. Siehe*, No. 198 (“*C. xeranthemoides* Desf.”).

Annual. Differs from preceding species in shape and pubescence of achene of bisexual florets; achenes cuneate (or oblong-turbinate) and densely covered with long appressed bristles almost entirely, as well as by shape and size of pappus scales: slightly broader, shorter and abruptly narrowed (and not very gradually) into aristate cusp. Flowering IV–VI; fruiting V–VII.

Dry slopes in lower mountains and middle mountain zone (in Asia Minor to 1,600 m).—*Caucasus*: Southern Transcaucasia (the only locality between the villages of Shorbulag and Avdalar near Erevan). *General distribution*: Balkans-Asia Minor (two localities in Asia Minor; in Lycaonia and Cappadocia), ? Armenia-Kurdistan. Described from Armenia or Asia Minor (place of collection not indicated by the author, apparently unknown to him) from the specimens collected by Hundelsheimer, a companion of Tournefort in his famous trip to the Orient in 1700–1702. The type specimen was in Berlin (?).

Note. This species was not recognized by Boissier (*Boiss. Fl. or.* III, 446), in his time nor by other botanists subsequently, who considered it simply a synonym of *C. orientalis* (L.) Ktze. (*C. xeranthemoides* Desf.).

Recently (1947), however, V.I. Papava (*op. cit.*) reported *C. macrocarpa* C. Koch from the USSR and presented a series of arguments in favor of restoring it as a separate species. Papava studied two herbarium specimens from: 1) the vicinity of Erevan (S. Tamamschian, 1931); and 2) Asia Minor (the above cited No. 198, W. Siehe, 1912).

72 I saw a duplicate of the second of these specimens (duplicates of it apparently are widely distributed), and based on a study of the achenes, the differences between the two species, given above in the key, as well as in the description of *C. macrocarpa* C. Koch, were formulated. As can be seen, these differences are generally similar to those indicated by Papava. Further study, especially of these characters, in all of the abundant herbarium material of the genus *Chardinia* Desf. preserved in the Herbarium of V.L. Komarov Botanical Institute, Academy of Sciences of the USSR yielded very interesting results.

First, it was found that among the large number of specimens examined from Asia Minor, many of which (or more precisely their duplicates) are cited by Bossier (*op. cit.*), none was found besides the already mentioned No. 198, W. Siehe with the characters of *C. macrocarpa* C. Koch; thus, the conclusion of V.I. Papava concerning the distribution of the latter species mainly in Asia Minor has not yet

been confirmed. Typical *C. macrocarpa* C. Koch (as might be visualized on the basis of Koch's diagnosis and W. Siehe's Herbarium specimens) also was not found among the abundant material from the Caucasus and Soviet Central Asia. On the contrary, the mass examination of this material revealed that the pubescence of the achenes of *C. orientalis* (L.) Ktze. varies almost to the degree (cf. description of the achene of the bisexual floret in the description of this species) that the long appressed pubescence of the achene of *C. macrocarpa* C. Koch, nearly throughout its length, possibly could be considered as one of the extreme manifestations of the intraspecific variation of *C. orientalis* (L.) Ktze. and that, perhaps, Boissier, indeed, was not very correct in combining these species. Incidentally, it seems to me still somewhat early to make a final decision now: the collection and critical study of new material are necessary, and for this reason it is more convenient, practically, to consider the forms of interest to us as separate species, for now.

Correct typification is of great importance; so far it appears to be inadequate in both cases. Because after the Linnaean basionym *C. orientalis* (L.) Ktze., that is to say *Xeranthemum* γ. *orientale* L., the Tournefort polynomial "*Xeranthemum orientale, fructu maximi*," was listed in the synonymy, there is reason to believe that the specimen so named (i.e., the type) from Tournefort's Oriental collection may be located in London, in the Linnaen Herbarium, or, besides that, in Paris, where the main Herbarium of Tournefort is preserved.

As indicated by Koch at the end of the diagnosis of *C. macrocarpa* C. Koch, the specimen from the Hundelsheimer Herbarium (which should be treated as the type specimen) was designated as "*Xeranthemum armenum, fructu maximo*," which speaks to the probability of this specimen originating in particular from Armenia and to its similarity (which also could be suspect) with the type of the previous species. In the event this specimen is lost or impossible to find in Hundelsheimer's Herbarium, it would be appropriate to select a neotype, which could be collected (together with a sufficient number of duplicates for distribution to the largest herbaria of the world) from the vicinity of Erevan.

GENUS 1573. *Amphoricarpus* Vis.^{1, 2}

Vis Fl. dalmat. II (1847) 27 ("Amphoricarpus"); Benth. and Hook. f. Gen. pl. II (1873) 465; O. Hoffm. in Pflanzenfam. IV, 5 (1892) 316.—*Amphorocarpus* Post and Ktze. Lexic. gen. Phaner. (1903) 26.

¹Treatment by I.A. Linczevsky.

²From the Greek words *amphoreus*—an obovate pot with two handles above, and *carpus*—fruits; based on the shape of achene of the pistillate florets of the type species.



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Plate V.

1—*Siebera pungens* (Lam.) DC., whole plant; achene with pappus; 2—*Chardinia orientalis* (L.) Ktze., whole plant; achene of pistillate floret; achene of bisexual floret (with pappus).

Capitula many-flowered, small (up to 15–20 mm wide), initially oblong, later campanulate or hemispherical, solitary, terminal. Involucre many-rowed, imbricate; involucre bracts appressed, stiff-herbaceous, with narrow membranous border; outer bracts gradually reduced outward; inner-most bracts slightly longer, erect. Receptacle flat, densely covered with stiff and narrow, undivided or more or less deeply split scales. Florets variable; outer florets pistillate, few (in one row), fertile; disk florets bisexual, fertile. Corolla tubular, regular, with more or less long five-fid limb cleft up to half its length. Anthers sagittate at base, long caudate-fimbriate; filaments free, glabrous. Style branches in bisexual florets very short. Achenes of pistillate florets oblong-obovoid, strongly compressed, with numerous veins and two entire, narrow, lateral wings, rounded or corniculate above, somewhat flat on outer side, convex and carinate on inner side. Achenes of bisexual florets obconical, cylindrical-angular, slightly compressed and curved. Pappus in both types of achenes one-rowed, usually of numerous, narrow, almost setaceous or narrow-linear and very gradually almost setose-acuminate, finely serrate-ciliate or barbed scales, fused at base (for varying distance).

Perennial, not spiny, white pubescent-hairy herbs with alternate, lanceolate or linear-lanceolate, entire leaves.

The genus comprises two species, one of which grows in the Caucasus and the other in the Balkan Peninsula.

Type species: *Amphoricarpus neumayeranus* (Vis.) Vis. (*Jurinea neumayeriana* Vis.)

- 75 Section 1. **Chodatella** Alb. in Bull. Herb. Boiss. II (1894) 249.—*Barbeya* Alb. in Zap. Kavk. Otd. RGO, XVI (1894) 143 p. gen., non Schweinfurth (1891).—*Alboviodoxa* Woron. ex Grossh. in Oprod. Rast. Kavk. (1949) 473 p. gen.—Achenes of pistillate florets with wings rounded above (without corniculate projections). Pappus scales narrow, almost setaceous, numerous (30–40). Stem leafy almost to tip.

1. **A. elegans** Alb. in Bull. Herb. Boiss. II (1894) 247 and Prodr. fl. Colch. (1895) 141; Grossh. Fl. Kavk. IV, 163.—*A. kuznetzowi* Winkl. ex Lipsky in Tr. Peterb. Bot. Sada, XIV (1898) 284 and in Fl. Kavk. (1899) 355, nomen.—*Kusnetzovia caucasica* Winkl. in sched. and ex Lipsky, op. cit. (1898) 284, nomen, p. syn.—*Alboviodoxa elegans* (Alb.) Woron. in sched. (1931) and ex Grossh. Oprod. Rast. Kavk. 473; Kolak. Fl. Abkhazii, IV, 259 (“*Albowiodoxa*”); Papava in Fl. Gruzii, VIII, 435.—**Ic.:** Alb. in Bull. Herb. Boiss. II (1894) tab. 7; Kolak. op. cit. Plate XXVII; Papava, op. cit. 433, Fig. 406.—**Exs.:** GRF No. 3248.

Perennial. Plants 15–40 cm high; rhizome rather thick, woody, modified into more or less multicapitate caudex above, stems 5–10, almost erect, simple or sometimes with fewer short branches above,

densely feafy almost to tip, white-tomentose. Leaves light green above, almost glabrous (slightly arachnoid-hairy), silvery-white tomentose beneath, sessile, oblong-lanceolate, or lanceolate, 4–7 cm long and 8–12(15) mm wide, very gradually acuminate above; middle leaves often subobtuse at base; uppermost leaves greatly reduced. Capitula with 30–60 florets, oblong when young, enlarged at fruiting, campanulate or hemispherical, up to 15–20 mm wide. Involucral bracts light green or purple above; outermost bracts small, white-tomentose, deltoid-lanceolate or oblong-elliptical; middle bracts much larger, slightly arachnoid-hairy and crimped-ciliate along margin to almost glabrous, broad ovate-elliptical, mucronate; inner bracts glabrous, glossy, with wide membranous margin, broad-lanceolate to linear, acuminate; receptacular scales as long as florets, linear, undivided or slightly lacerate, 10–12 mm long and 0.5–0.8 mm wide. Corolla pale pink. Achenes of pistillate florets with short and sparse appressed pubescence, about 5 mm long and 2 mm wide, with 8–9 mm long pappus; achenes of bisexual florets with short and dense appressed pubescence, 4–5 mm long and about 1 mm wide, with 10–11 mm long pappus. Flowering VII–VIII; fruiting VIII–IX. (Plate VI, Fig. 1).

Limestone rocks and stony slopes in alpine zone, at 1,900–2,300 m.—*Caucasus*: Western Transcaucasia (limestone ranges of Abkhazia and western Georgia, from the Bzyb River Basin to the Inguri River Basin). Endemic. Described from the Khechigvar Valley near the Chipshiram Mountain in the Bzyb Range and from the Migariya Mountain above the village of Kurdsu in Megrelia. Type in Geneva, isotype and paratypes preserved in Leningrad.

76 *Note.* *A. elegans* Alb. belongs to the group of “limestone endemics” described in rather large numbers by Albov and other botanists from the mountains of the western Caucasus.

As can be seen from the list of synonyms given above, different viewpoints have existed in relation to the taxonomic position of *A. elegans*.

Albov, having described this plant at first as a separate genus, *Barbeya* Alb., in the same year, 1894, reduced it to the rank of a section of genus *Amphoricarpus* Vis. A.A. Grossheim, in agreement with Albov, accepted this species in *Amphoricarpus*, but subsequently (op. cit. 1949) considered it necessary to validate the generic name *Albovidoxa* Woron., until then unpublished and appearing on an herbarium label (*Herb. Fl. Cauc.* No. 499, ined.), and the combination of *A. elegans* (Alb.) Woron. A.A. Kolakovskiy (op. cit. 1949) agreed with Grossheim, but a little later, at the end of 1949, issued the species in question in the “Herbarium of the Russian Flora” (under No. 3248 cited above) as *Amphoricarpus elegans* Alb. Papava (op. cit.) included *A. elegans* in *Albovidoxa* Woron.

It may also be noted that this plant was already known to Winkler in 1890 from collections of Kuznetsov and was named by the former (in *sched. ad herb. et ic.*) as a new genus and species—*Kusnetzovia caucasica* Winkl.

My critical consideration of this question, taken up in view of the obvious need, led to the following conclusions.

1. In publishing the generic name *Alboviodoxa* Woron. ex Grossh. (which, as was mentioned above, should have replaced the homonym *Barbeya* Alb.), A.A. Grossheim did not indicate any difference from the genus *Amphoricarpus* Vis.

2. U.N. Woronow, ignoring the Latin description of the genus *Alboviodoxa* cited above on the herbarium label prepared for issue, distinguished it from *Amphoricarpus* by essentially the same characters for which Albov established section *Chodatella* Alb. (see above), namely: a) all scales of receptacle entire (not mixed, entire and often lacerate); b) achenes of pistillate florets with apically rounded lateral wings (and not corniculate); and c) pappus scales setaceous, finely toothed-scabrous (and not linear, indistinctly finely serrate-ciliate).

3. Further study of the herbarium material showed that: a) the receptacular scales in *A. elegans* are definitely not always entire, and slightly lacerated scales are very common among them; b) the achene of pistillate florets in *A. elegans* actually always has rounded (not corniculate) wings, but it is extremely similar in its other morphological details to the analogous achene of *A. neumayeranus*; and c) the pappus scales on the achenes of *A. elegans* are actually always narrow, almost setaceous, about 0.1 mm wide, numerous (30–40) and almost in a single row in the achenes of pistillate and bisexual florets, whereas the pappus scales of pistillate florets in *A. neumayeranus* are always broader, narrowly linear, 0.2–0.3 mm wide, and much less numerous (four to 77 eight), while those of bisexual florets vary (in different specimens) in width from 0.1 to 0.3 mm, i.e., from almost setaceous to narrowly linear and somewhat more numerous (12–20), but still many fewer (one-third to half) in number than in *A. elegans*; I could not find significant differences in the nature of pubescence of the pappus scales between the two types, except for only a slight difference in the density of this pubescence.

Thus, as the most significant differences between *A. elegans* and *A. neumayeranus*, only the following can be listed: the shape of the upper part of achenes of pistillate florets (absence or presence of small corniculate projections, a continuation of lateral wings), the shape (more precisely, the width) and relative number of the pappus scales, as well as (in addition to the differences listed earlier) the nature of the foliage on the stems.

All these characters, it appears to me, can hardly be considered as more than sectional differences, especially considering the extremely similar achene morphology of the bisexual florets, involucre bracts, capitula, leaves, and also the entirely similar nature of pubescence on the whole plant in both species.

Therefore, I can only agree, obviously, with Albov, who established (op. cit. 1894, 249) two monotypic sections in the genus *Amphoricarpus* Vis., one of which includes the Caucasian "limestone endemic" *A. elegans* Alb., and the other *A. neumayeranus* (Vis.) Vis., which grows on the limestone mountains of the southwestern Balkan Peninsula (Dalmatia). The unique range discontinuity and ecological specialization (limestone in both cases!) provided the basis for Albov (ibid. 250) to include this pair of species among the relicts of the Tertiary Flora. It may be added that quite a few of the ranges of the Tertiary relict species listed in the detailed review of V.P. Maleev (Tertiary Relicts in the Flora of Western Caucasus and Main Stages in the Quaternary History of the Flora and Vegetation. Materials on the History of the Flora and Vegetation of the USSR, I, 1941, pp. 61–144) are extremely similar in the nature of their discontinuity from the range of *Amphoricarpus* Vis. species.

GENUS 1574. *Carlina* L.^{1, 2}

L. Sp. pl. (1753) 828; DC. Prodr. VI (1837) 545 p. p. excl. sect. 3; Benth. and Hook. f. Gen. pl. II (1873) 465; O. Hoffm. in Pflanzenfam. IV, 5 (1892) 316.—*Mitina* Adans. Fam. II (1763) 116.—*Athamus* Neck. Elem. I (1790) 85.—*Carlowitzia* Monech. Meth. Suppl. (1802) 225.—*Chromatolepis* Dulac, Fl. Hautes-Pyrén. (1867) 526.

Capitula many-flowered, rather larger to very large (up to 150–200 mm wide), broadly campanulate or almost hemispherical, sessile or subsessile among basal rosette or leaves or terminal, solitary or nearly corymbose. Involucre many-rowed; outer involucre bracts wider, leafy, prickly-toothed, more or less squarrose; middle bracts narrower and shorter, appressed and imbricate below, cristate-prickly, with furcate spines; innermost bracts long, much longer than florets, linear, entire, stiff-scaly and lustrous, whitish or yellow, sometimes purple, usually divergent. Receptacle flat, fleshy, densely covered with long stiff scales, almost as long as florets, more or less deeply incised into thin bristles. All florets similar, bisexual. Corolla tubular, regular, with cylindrical,

¹Treatment by I.A. Linczevsky.

²Origin of the name not known precisely.

narrowly five-fid limb, purple or yellow. Anthers sagittate at base, with long and narrow caudate processes ciliate along margin; filaments glabrous. Style branches very short. Achenes oblong, almost cylindrical, without ribs, densely pubescent, truncate, with one-rowed pappus of numerous scales, deeply split into long plumose bristles.

Biennial and perennial plants, sometimes stemless herbs, less often shrubs (Canary Islands) with basal or alternate, toothed or pinnatifid, lobed or incised leaves with spiny teeth or lobes, less often leaves undivided, somewhat sparsely ciliate-spiny.

The species of *Carlina* L. are distributed in the Mediterranean Region (including the Canary Islands and northern Africa), Western and Eastern Europe, and in the temperate zone of Asia (east to the Baikal Region).

Type species: *Carlina vulgaris* L.

Note. *Carlina* L. is a complex and confusing taxonomic group, most species of which (as well as a large number of infraspecific taxa) were described from Western Europe. It is well known that particularly in such cases the study of the taxonomic composition and the resolution of the nomenclatural problems are difficult, and to some extent sometimes simply impossible without a monographic study of the whole genus. The situation is further complicated by the extreme morphological variability of *Carlina* L. species, which was also reflected in pre-Linnaean botany (16th century) in the form of the name *Camaeleon* (= *Chamaeleon*, which, as is known, has long been used to designate properties like variability, inconsistency, instability, etc.), by which, for example, the species that is now called *C. acaulis* L. was known (as "*Camaeleon niger vulgaris*"). Naturally, the present analysis, not based on some fresh and complete monographic review of the genus, cannot be critical, and is more a presentation of the traditional understanding of Russian taxonomists concerning the endemic species of *Carlina* L., with some nomenclatural and taxonomic additions.

1. Plants with well developed, tall (up to 80–120 cm high) stem often branched above. Leaves entire, more or less deeply spinose-toothed along margin or thin-spiny; upper cauline leaves surrounding capitulum, almost as long as capitulum or much shorter. Capitula 25–60 mm wide 2.
- + Plants without stem, with single capitulum, among basal rosette of leaves, or with short (up to 20–40 cm long), usually ascending simple stems bearing solitary capitula. Leaves pinnatilobate to pinnatisect; upper cauline leaves surrounding capitulum much longer than it. Capitula 70–150(200) mm wide 4.
2. Innermost involucre bracts light purple 3. *C. lanata* L.

- + Innermost involucre bracts light yellow 3.
3. Leaves more or less deeply spiny-toothed along margin; middle and upper leaves ovate-lanceolate or ovate; upper leaves surrounding capitulum, usually much below it, less often almost as long 1. *C. vulgaris* L.
- + Leaves finely ciliate- or serrate-spiny along margin; all leaves lanceolate or linear-lanceolate; upper leaves, surrounding capitulum, almost as long as capitulum 2. *C. biebersteinii* Bernh. ex Hornem.
4. Plants without stem. Leaves pinnatilobate, with almost deltoid, large-toothed lobes, arachnoid-hairy above, tomentose beneath. Capitula up to 150–200 mm wide. Pappus bristles connate at base in groups of 16–18 4. *C. onopordifolia* Bess. ex Szafer, Kulcz., B. Pawl.
- + Plants without stem or with short (up to 20–40 cm tall), usually ascending, simple stem bearing solitary capitulum. Leaves more or less deeply (sometimes up to midrib) and often irregularly pinnatisect or pinnatipartite, glabrous or arachnoid-hairy, but never tomentose. Capitula 70–150 mm wide. Pappus bristles connate at base in groups of five to eight 5.
5. Leaves deeply (up to midrib) and irregularly pinnatisect, with short, angular, more or less distant lobes, glabrous or subglabrous above, somewhat arachnoid-hairy beneath. Usually without stem, often mountain (Carpathians) plants 5. *C. acaulis* L.
- + Leaves less deeply incised, with long and close-set lobes, prickly and arachnoid-hairy on both surfaces, more dense along petiole and beneath along midrib. Plants with short (up to 20–40 cm long) stem. 6. *C. cirsioides* Klok.

1. *C. vulgaris* L. Sp. pl. (1753) 828; M.B. Fl. taur.-cauc. II, 282; DC. Prodr. VI, 546; Ldb. Fl. Ross. II, 2, 675 p. p.; Boiss Fl. or. III, 448; Schmalh. Fl. II, 93 p. p.; Fedtsch. and Fler. Fl. 999; Hegi, III. Fl. 80 IV, 2, 821 p.p.; Hayek, Prodr. Fl. Balc. (1931) 693; Grossh. Fl. Kavk. IV, 163; Kolak. Fl. Abkhazii, IV, 260; Klok. in Vizn. Rosl. URSR, 560; Papava in Fl. Gruzii, VIII, 435; Szafer, Kulcz. B. Pawl. Rośl. Polskie (1953) 708; Kirp. in Majeovski, Fl., 8th edition, 595, in note; Nikitin in Fl. Turkm. VII, 156 p. p. excl. descr.; Gaddzhiev in Fl. Azerb. VIII, 359.—*C. vulgaris* L. var. *araneosa* K.-Pol. and Preobr. in Izv. Peterb. Bot. Sada, XIV, 3 (1914) 318; Grossh. Fl. Kavk. IV, 163.—*C. vulgaris* L. β. *sublanata* DC. Prodr. VI (1837) 546 an p. p.; Ldb. Fl. Ross. II, 2, 675; ? *C. Koch* in Linnaea, XXIV, 384.—*C. caulescens* Gilib. Fl. Lithuan. III (1781) 195 (non vidi)—*C. acaulis* auct. non L.: Ldb. Fl. Ross. II, 2, 674 p. p. quoad specim, osil.—*C. lanata* auct. non

L.: *Habl. Pall. Georgi* sec. Ldb.: op. cit. 675.—*Ic.*: Fedtsch. and Fler. op. cit. Fig. 1000; Hegi, op. cit. fig. 524, 526, 527, tab. color, 269, fig. 4; Dostal, *Klič. Květ. ČSR* (1954) fig. 2515.—*Exs.*: *Fl. cauc. exs.* No. 174; *Fl. exs. reip. Boh.*—*Slov. Nos.* 285, 962; *Fl. exs. austro-hung.* No. 3765; *Billot, Fl. Gall. et Germ. exs.* No. 1508.

Biennial. Plants 20–80 (125) cm high. Stem erect, simple or with few branches above, more or less densely arachnoid-pubescent. Leaves entire, oblong-lanceolate and lanceolate (basal and lower cauline leaves) to ovate-lanceolate and ovate (middle and upper cauline leaves), 2–10(15) cm long and 0.5–2 cm wide, glabrous above, more or less densely arachnoid-hairy beneath, usually deeply spinose-toothed along margin; basal leaves petiolate; cauline leaves sessile, gradually reduced above, uppermost leaves surrounding capitulum, usually much below it, less often almost at level. Capitula 30–45(50) mm wide, usually fewer (one to five), terminal on stem and branches, almost corymbose. Outer involucre bracts green, leafy, oblong-lanceolate, arachnoid-hairy (sometimes rather densely), toothed-spinose along margin; middle bracts brownish or dark purple, along margin cristate- and branched-spinulose (with branched spinules); innermost bracts light green, stiff-scaly and lustrous, linear, much longer than middle bracts, radially divergent; inner bracts yellowish-purple. Achenes 2–4 mm long; pappus two to four times as long as achenes, up to 8–9 mm long, bristles connate at base in groups of two to three. Flowering VI–IX.

In taiga (south), forest and forest-steppe zones, dry meadows, dry slopes, open forests, on forest glades, in scrub, along forest fringes; in southern regions (the Caucasus and Soviet Central Asia) found in mountains, from forest to subalpine zone; sometimes on deposits, waste lands and along roads.—*European Part*: Almost all regions, approximately from 62°N (in the west) and 60°N (in the east, in the Urals) to Caucasus, Crimea, and foothills of the Carpathians; not found 82 in semidesert zone; more typical forms found in the west (see note). *Caucasus*: All regions. *Soviet Central Asia*: mountainous Turkmenia (western Kopetdag). *General distribution*: Scandinavia (south, approximately up to 62°N), Central and Atlantic Europe, western Mediterranean (north), Balkans-Asia Minor (north). Described from Western Europe. Type in London.

Note. Judging from the sufficiently large collection preserved in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR, the more typical form of *C. vulgaris* L. (with a shorter and wider toothed-incised and stiff spiny basal and cauline leaves, the uppermost of which are shorter than the capitulum) within the limits of the European part of the USSR is more frequently found in the west (in the Baltic Region, Ladoga-Ilmen, partly along Upper Dnieper). At the same time, more or



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Plate VI.

- 1—*Amphoricarpus elegans* Alb., whole plant; achene of bisexual floret;
 2—*Carlina acaulis* L., whole plant; achene with pappus.

less abundant collections of the same form are available from almost all regions of the European part of the USSR, which by its characters (long basal and lower cauline leaves, but short and stiff-spinose upper leaves) appears to be intermediate between *C. vulgaris* L. and its closely related species *C. biebersteinii* Bernh., which is also widely distributed in the European part of the USSR. In the past, this form was described as *C. intermedia* Schur (Schur, *Enum. pl. Transsilv.* 1866, 413), but some authors subsequently considered it as a subspecies, *C. vulgaris* L. ssp. *intermedia* (Schur) Hayek (op. cit. 694), or variety, *C. vulgaris* L. var. *intermedia* (Schur) Lindb. f. (Haralo Lindberg in *Meddel. Soc. pro fauna et flora fennica*, 26, 1900, 70). Identification of this form is not easy; the material for a precise understanding of its distribution is still insufficient.

2. *C. biebersteinii* Bernh. ex Hornem. Hort. Hafn. Suppl. (1819) 94; Kryl. Fl. Zap. Sib. XI, 2873; Kirp. in Majevski, Fl. 8th edition, 595; Popov, Fl. Sr. Sib. II, 750.—? *C. longicaulis* Somm. and Lev. in Nuov. Giorn. bot. Ital. 2 (1895) 91 and in Tr. Peterb. Bot. Sada, XVI, 250.—*C. longifolia* Rchb. Pl. Crit. VIII (1830) 25, tab. 761, non. Viv. (1824); Lindb. f. in Meddel. Soc. pro fauna et flora fennica, 26 (1900) 69; Iljin in Fl. Yugo-Vost. VI, 378; Grossh. Opred. Rast. Kavk., 473; Popov, Ocherk Rast. i Fl. Karpat., 251; Klok. in Vizn. Rosl. URSS, 560; Szafer, Kulcz. B. Pawl. Rosl. Polskie, 709.—*C. longifolia* Rchb. var. β . *pontica* Boiss. Fl. or. III (1875) 448; Grossh. Fl. Kavk. IV, 163; Papava in Fl. Gruzii, VIII, 436.—*C. vulgaris* L. var. *longifolia* Korsh. Tent. Fl. Ross. or. (1898) 234; Fedtsch. and Fler. Fl. Europ. Ross. 999.—*C. vulgaris* L. γ . *microcephala* Ldb. Fl. Ross. II, 2 (1845–1846) 675 an p. p.—*C. acaulis* auct. non L.; Ldb. Fl. Ross. II, 2, 674 p. p. quoad specim. altaica.—*C. nebrodensis* auct. non Guss.: Ldb. Fl. Ross. II, 2, 675; Kryl. Fl. Alt. III (1904) 684 (pro *C. vulgaris* L. var. *nebrodensis* Kryl.); Pavlov, Fl. Tsent. Kazakhst. III, 292.—? *C. racemosa* auct. non L.: Gilib. sec. Ldb. Fl. Ross. II, 2 (1845–1846) 675; Georgi, sec. Ldb. l.c.—*C. vulgaris* auct. non L.: Ldb. Fl. alt. IV (1833) 13; Kar. and Kir, Enum. pl. alt. No. 507; Ldb. Fl. Ross. II, 2 675 p. p.; Turez. in Bull. Soc. Nat. Mosc. XX, 3, 49 (Fl. baic.-dahur. No. 672); Schmalh. Fl. II, 93 p. p.; O. and B. Fedtsch. Perech. Rast. Turkm. IV, 237; Pavlov, op. cit. 292.—Ic.: Iljin, op. cit. Fig. 695; Klok. op. cit. Fig. 296; Kirp. op. cit. Fig. 224.—Exs.: Wolosz, Fl. polon, exs. No. 541; Fl. exs. austrohung. No. 3763.

83 Biennial. Plants 20–80(120) cm high. Stem erect, simple or slightly branched above, usually weakly arachnoid-pubescent. Leaves undivided, lanceolate or linear-lanceolate, 2–10(20) cm long and 0.5–2 cm wide, glabrous or subglabrous above, arachnoid-hairy beneath, margin finely

and quite often (almost ciliate or serrate) spinulose; basal leaves petiolate; cauline leaves sessile, gradually reduced upward, uppermost leaves, surrounding capitulum, more or less as long as capitulum. Capitula (25)35–40(60) mm wide, usually fewer (one to five), terminal on stem and branches almost corymbose. Outer involucre bracts green, leafy, linear-lanceolate, arachnoid-hairy, margin ciliate-spinulose; middle bracts brownish or dark purple, margin cristate and branched-spinulose (with branched spinules); uppermost bracts light yellow, stiff-scaly and lustrous, linear, much longer than middle bracts, divergent. Corolla dark or yellow purple. Achenes 2–4 mm long; pappus two to four times as long as achene, up to 8–9 mm long, its bristles connate in groups of two or three at base. Flowering VI–IX.

In taiga (south), forest and forest-steppe zones, in dry meadows, dry slopes, open (pine, mixed, birch) forests, forest glades, among shrubs, along borders; in Western Siberia, often in birch fellings; in Central Siberia, according to Popov. (op. cit.), “steppe plant, somewhat of a weed”; in western Caucasus—in forest zone; sometimes on deposits, wastelands, near roads.—*European Part*: Almost all regions, approximately from 62° to 60°N toward south; not found in semidesert zones; *Caucasus*: Western Transcaucasia; *Western Siberia*: Ob (south, up to 56°–58°N), Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Angara-Sayans. *General distribution*: Scandinavia (south), Central and Atlantic Europe, western Mediterranean (north), Balkans-Asia Minor (north). Described from cultivated specimens in the Copenhagen Botanical Garden. Type in Copenhagen.

3. *C. lanata* L. Sp. pl. (1753) 828; DC. Prodr. VI, 546; incl. β . *monocephala* DC. and γ . *prolifera* DC.; Ldb. Fl. Ross. II, 2, 676; Vis. Fl. Dalm. II, 29; Boiss. Fl. or. III, 451; Nym. Consp. Fl. Eur. 400; Hayek, Prodr. Fl. Balc. 696.—*lc.*: Sibth. and Sm. Fl. Graeca, tab. 836.—*Exs.*: Balansa, Pl. d’Alger, 1852, No. 502; Billot, Fl. Gall. et Germ. exs. No. 2290; Bornm. It. syr. No. 883.

Biennial or annual (?). Plants 10–20(40) cm tall. Stem erect, simple or almost cymosely branched (with central almost sessile capitulum and lateral capitula surrounding it on peduncles), densely long arachnoid-lanate. Leaves hard coriaceous, convolute, lanceolate or broad-lanceolate, 3–10 cm long and 1–1.5(2) cm broad, more or less densely arachnoid-tomentose, margin shallow crenate-dentate, with short teeth, each with 1–2 or 3 spinules; basal leaves petiolate, cauline sessile, semiamplexicaul; uppermost leaves crowded, subtending capitulum, and usually equal to it or slightly longer. Capitula 25–40(60) mm across, few (often 1–3), solitary, terminal on stem and branches. Outer involucre bracts leafy, lanceolate, spinulose-dentate, longer than innermost; middle bracts linear-

lanceolate with simple or (on lower side) branched spinules; innermost bracts bright purple, stiff-scaly and lustrous, linear, acute, much longer than middle ones, longer than florets by 6–8 mm, outwardly divergent. Corolla purple. Achene about 3 mm long; pappus two and one-half to three times as long as achene, up to 9–10 mm long, its bristles connate below in groups of three to five.

The conditions of its growth in the Caucasus are not known; it probably grows as a weed, because it is reported by Boissier (Boiss. op. cit.) for the neighboring territories (Anatolia, Syria, Greece) growing on fallow or waste lands, and along roads.—*Caucasus*: Western Transcaucasia (the only locality in the vicinity of Batumi known since the times of Ledebour; most probably not collected later). *General distribution*: Mediterranean (west and east), Balkans-Asia Minor. Described from Southern Europe (Italy and southern France). Type in London.

Note. Some authors consider this species as an annual, others a biennial plant. It perhaps belongs to the category of the so-called “perennating” plants (i.e., usually annual, but in some years under suitable weather conditions behaving as biennial or perennial) that are very commonly found in the Mediterranean Region.

4. ***C. onopordifolia*** Bess. ex Szafer, Kulcz. B. Pawl. Rosl. Polskie (1924) 641; DC. Prodr. VI, 545, nomen. p. sun.: Nym. Consp. fl. Eur. II, 400; nomen p. syn.; Popov, Ocherk Rast. i Fl. Karpat., 251, in note; Klok. in Vizn. Rosl. URSR, 560 and in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 356, 357, in note; A. Jas. i B. Pawl. in Fragm. Florist. et Geobot. [Krakow] II, 2, 12; Shelest in Ukr. Bot. Zhurn., XIII, 4, 45.—*C. acanthifolia* auct. non All.: Bess. Enum. pl. Volh. (1822) 32 (No. 1057); Boiss. Fl. or. III, 448 p. p. quoad pl. ross.—*C. acanthifolia* [var.] β . *cynara* auct. non All. nec. DC.; Ldb. Fl. Ross. II, 2, (1845–1846) 674; Schmalh, Fl. II, 93 p. p. quoad pl. ross.; Fedtsch. and Fler. Fl. Evrop. Ross. 1000.—*lc.*: Kozłowska in Mém. Acad. Polon. Sc. et Lettr. sér. B. III (1931) tab. 5, fig. 9 (non vidi); A. Jas. and B. Pawl. op. cit. fig. phot. 1–6.

Perennial. Without stem. Leaves in basal rosette; outer leaves petiolate, inner sessile; all leaves pinnatilobate, with almost deltoid, spinose, large-toothed lobes; arachnoid-hairy above, tomentose beneath, 5–15(50) cm long and 1.5–7 cm wide. Capitulum large, up to 150–200 mm wide when fully open, solitary among rosette of leaves. Outer involucrel bracts glabrous above, spatulately broadened and pointed; middle bracts brown to deep brown, almost linear, both cristate-branched spinulose along margin; outermost bracts light yellow, stiff-scaly and lustrous, linear, slightly broadened above base and gradually acuminate

beyond, much longer than outer bracts, 30–35 mm longer than florets, erect or radially divergent. Corolla yellow (?). Achenes 5–6 mm long; pappus three to four times as long as achenes, up to 20 mm long, its bristles connate at base in groups of 16–18. Flowering VIII–IX.

85 Dry south slopes, in shrubby outgrowths.—*European Part*: Upper Dnieper (extreme southwest Kremenets), Middle Dnieper (western bank of Dnieper-Vinnitsa, Kamenets-Podolskii, Balta), Upper Dniester (north, submountainous part—Rogatin, Zolochev, Belyi Kamen), Bessarabia (Rashkov on Dniester, after Schmalhausen). *General distribution*: Central Europe (southern part of Poland-Malopolska and Lubelska hills). Described from western Ukraine and southern Poland. See Note 1 regarding the type specimen.

Note 1. The name *C. onopordifolia* Bess. was first published by De Candolle (DC. op. cit.) as a synonym of another species—*C. acanthifolia* All. *β. cynara* DC., with a reference to the herbarium specimen of Besser 1831 (“in Podolia prope Winnica”). This name (as a synonym) was not valid (according to Article 37 of the International Code of Botanical Nomenclature). The first description of *C. onopordifolia* Bess. based on the material collected in Ukraine was published in 1897 by Schmalhausen (op. cit.) but again under the same name as in the case of De Candolle. As far as can be determined, the name *C. onopordifolia* Bess. was first accepted and provided with a description by the Polish botanists Szafer, Kulczynski and B. Pawlowski (l.c.) in 1924, which should, therefore, also be considered as the date of valid publication of this name. Because the type specimen of the species was not designated in this publication, it would be necessary (in accordance with Article 7, Note 3 of the International Code) to select a lectotype later from the material cited in the description, i.e., from one of the four localities mentioned here. As far as is known to me, the Polish botanists still have not published a lectotype selection for this species.

Note 2. *C. onopordifolia* Bess. ex Szafer, Kulczynski and B. Pawlowski, according to all authors, is an extremely rare species, representing the northeastern (North Cis-Carpathian) race from the Mediterranean complex (or series) of *C. acanthifolia* All. In spite of the very close affinity of these two species, some differences of *C. onopordifolia* are quite sharp. We point out, for example, that the pappus bristles in *C. onopordifolia* are connate at the base in groups of 16–18, whereas in *C. acanthifolia* they are in groups of 9–10; besides of course, it is desirable to compare these species on more extensive material than we had.

The range of *C. onopordifolia* is restricted to the Volyno-Podolsk hills of southwestern Ukraine and in the west, in Poland, to the adjoining Lubelska and Malopolsk uplands, but the species is found only at a few

places and in small numbers. The Polish botanists, who have long been interested in this species, confirmed by 1956 three localities in Poland, which were all declared State Reserves; it may be noted that in Poland, besides *C. onopordifolia*, *C. acaulis* L. is also protected by the State.

86 The above-cited article of A. Jasiewicz and B. Pawlowski (l.c.), reporting the discovery of a new (third) locality *C. onopordifolia* in 1954, provided much interesting information on the biology and ecology of this species. It has been established, for example, that *C. onopordifolia* should be considered a perennial and not a biennial-triennial, although isolated specimens may likely grow faster. There have been reports of a small number of specimens flowering simultaneously, for example, in the third locality mentioned above (slopes of the limestone-chalky Waly in Krakow Province), where more than 20,000 specimens have been found (very fewer in other habitats); only about 60(!) flowering plants were found in 1954. A very interesting new hybrid has been found at the same habitat: *C. onopordifolia* Bess. ex Szafer, Kulcz. and B. Pawl. × *C. acaulis* L.: × *C. szaferi* A. Jas. and B. Pawl. (op. cit., p. 19).

5. *C. acaulis* L. Sp. pl. (1753) 828; Szafer, Kulcz. B. Pawl. Rosl. Polskie (1924) 641 and (1953) 708; Hegi, Ill. Fl. VI, 2, 817; Klok. in Vozn. Rosl. URSR, 559 and Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 356, 357, in note.—*C. acaulis* [var.] *β. caulescens* (Lam.) Schmalh. Fl. II (1897) 93 p. p. quoad nomen; Hegi, Ill. Fl. VI, 2, 819; Popov, Ocherk Rast. i Fl. Karpat. 251.—*C. caulescens* Lam. Fl. Fr. II (1795) 7.—**lc.**: Fedtsch. and Fler. Fl. Evrop. Ross., Fig. 1001; Hegi, op. cit. figs. 519–523.—**Exs.**: Fl. exs. reip. Bohem.—Solv. No. 284; F. Schultz, Herb. norm. Nos. 87, 87 bis; Wolosz. Fl. polon. exs. No. 956. Callier, Fl. siles. exs. Nos. 621, 622.

Perennial. Without stem. All leaves in basal rosette petiolate, all irregularly and deeply (sometimes up to midrib) pinnatisect, with short, angular, spiny-toothed or distantly lobed, glabrous or subglabrous above, weakly arachnoid-hairy beneath, 4–12(25) cm long and 1.5–4(6) cm wide. Capitulum large, 70–150 mm wide when open, solitary among rosette of leaves. Outer involucre bracts herbaceous, green; middle bracts brownish to brown, cristate and sinuate-spiny along margin; innermost bracts whitish above, with wide dark purple stripe below on outside, stiff-scaly and lustrous, linear, acuminate, not or slightly broadened above, much longer than outer bracts, exceeding florets by 25 mm, erect or radially divergent. Corolla whitish or reddish. Achenes 4–6 mm long; pappus three to four times as long as achenes, up to 15–18 mm long, its bristles connate at base in groups of five to eight. Flowering VIII–IX (Plate VI, Fig. 2).

Meadows of forest and subalpine zone, on mountain slopes, forest glades.—*European Part*: Upper Dnieper (northwest region of Grodno),

upper Dniester (Carpathians and Cis-Carpathian Region). *General distribution*: Northern Europe, Atlantic Europe (south), western Mediterranean (north), Balkans-Asia Minor (west). Described from Europe (Italy and Germany). Type in London.

Note. Besides the typical acaulescent form of *C. acaulis* L., the 87 short-stem form, *C. acaulis* L. var. *caulescens* (Lam.) Schmalh., is also found in the Carpathian and Cis-Carpathian Region. It differs mainly in the presence of a short, 10–20(40?) cm high, ascending, leafy stem and slightly larger leaves than in the acaulescent form. According to M.V. Klokov (op. cit. 1954, 356), “there apparently is no taxonomic significance” to this form.

6. *C. cirsioides* Klok. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 355 and Vozn. Rosl. URSR (1950) 560, nomen et descr. breviss. ucr.—*C. acaulis* auct. non L. : Ldb. Fl. Ross. II, 2 (1845–1846) 674 p. p.; Schmalh. Fl. II, 93; Fedtsch. and Fler. Fl. Evrop. Ross., 999.—*C. acaulis* [var.] β . *caulescens* auct. non L. nec Schmalh.: Schmalh. Fl. II, 93; Fedtsch. and Fler. Fl. 1000.—*C. simplex* auct. non Waldst. and Kit.: Bess. Enum pl. Volh. (1822) 32 (No. 1052); Ldb. Fl. Ross. II, 2, 674.—*Exs.*: GRF No. 1523 (“*C. acaulis* L. var. *simplex* Waldst. and Kit.”).

Biennial. Plants 20–40 cm high. Stem ascending or almost erect, simple, sparsely floccose-arachnoid-hairy. Leaves petiolate, pinnatisect or lobed, with oblong, palmati- or short-pinnatifid, spiny-toothed, more or less close-set, floccose-arachnoid-hairy lobes, 5–45 cm long and 1.5–12 cm wide. Capitulum large, open, 70–100 mm wide when open, solitary, terminal surrounded by somewhat more dense cluster of leaves. Outer involucre bracts leafy; middle bracts brownish, cristate and branched-spinose along margin; innermost bracts whitish above, with wide dark purple stripe on outer surface, stiff-scaly and lustrous, linear, slightly broadened above base and gradually narrowed beyond, much longer than outer bracts, exceeding florets by 25 mm, erect or radially divergent. Corolla yellowish brown. Achenes about 3 mm long; pappus three to four times as long as achene, up to 12–14 mm long, its bristles connate at base in groups of five to eight. Flowering VII–IX.

Open forests, dry meadows, along steppe slopes.—*European Part*: Upper and Middle Dnieper (right bank of Dnieper. Upper Dniester (Carpathians)). *General distribution*: Central Europe (southeastern Poland-Lubelska Hills). Described from the vicinity of Belichi in Kiev Province, from the above-cited specimen No. 1523 “Herbarium of Russian Flora” (GRF). Type in Leningrad; isotypes in many places.

Note. Besides on the plains and low hummocky-undulating elevations along the right bank of the Dnieper, this species quite apparently occurs

rarely at rather high altitudes in the Carpathians. For example, K.N. Igoshina collected a unique specimen on September 11, 1948, from the southern slopes of Mt. Petros in the Carpathians at an altitude of 1600 m, which can be identified as *C. cirsioides* Klok. without any difficulty on the basis of the distinct pubescence, as well as the shape and size of the leaf lobes, and is not at all similar to the specimens of *C. acaulis* L. collected from the same region.

GENUS 1574a. *Thevenotia* DC.

DC. in Guill. Arch. Bot. II (1883) 331.

Capitula homogamous; florets tubular, bisexual. Outer involucre leafy, inner imbricate; involucre bracts plumosely spinescent. Receptacular scales incised. Filaments free; anthers appendages plumose. Achenes sericeous; pappus one-rowed with sericeous bristles connate at base. Annual herbs.

Besides our native species there is one more species in Iran.

Type species: *T. persica* DC.

1. *T. scabra* Boiss. Fl. or. III (1875) 455; Czern. in Fl. Uzb. VI (1962) 228, Plate XXIII.—*Atractylis scabra* Boiss. Diagn. pl. or. ser. I, 6 (1845) 109.

Annual. Stem 6–12 cm high, glabrous, with solitary spines, leafy, dichotomously branched. Leaves coriaceous, finely arachnoid-hairy, sinuate-spinosely toothed. Capitula almost sessile, solitary or in groups of two or threes, ovoid, 10–12 mm wide. Inner involucre bracts with dark-colored cusp. Florets purple; achenes oblong. Flowering VII–VIII.

High deserts.—*Soviet Central Asia*: Tien Shan, mountainous Turkmenia. *General distribution*: Iran. Described from Iran. Type in Geneva.

GENUS 1575. *Atractylodes* DC.^{1, 2}

DC. Prodr. VII (1838) 48; Fl. Koidz. Fl. Symb. Or.-As. (1930) 3; Kitam. Comp. Japon. I (1937) 18.—*Giraldia baroni* in Nuov. Giorn. bot. Ital. 4 (1897) 431, tab. 12.

Capitula homogamous, bisexual, with solitary florets, all fertile. Involucre almost cylindrical, involucre bracts many-rowed; outer bracts

¹Treatment by E.G. Bobrov.

²Named on the basis of similarity with the Mediterranean genus *Atractylis*. The name originates from the Greek word *atractos*—spindle; possibly named on the basis of fusiform root.

surrounding capitulum very large, long-pinnate; inner bracts—involucral bracts proper—much smaller, woolly along margin and above. Receptacle concave, scaly. Corolla tubular, five-fid into elliptical and weakly divergent lobes. Anthers sagittate at base. Style cylindrical; stigma bilobed with obtuse lobes, pubescent on outer surface. Achenes compressed, oblong-ovate lustrous, pubescent, covered with plumose bristles.

Perennial. Rhizomatous herbs, almost semishrubs in northeastern China. Leaves alternate, glabrous, usually petiolate, less often sessile; lower leaves usually trifid with orbicular or ovate lobes, sometimes lower leaves lobed, lyrate-lyrate-incised; upper leaves undivided.

Type species: *A. lancea* (Thunb.) DC.

The genus includes three or four species, distributed in the south and Soviet Far East, in northeastern China, Korea, and Japan. However, it must be mentioned that Japanese authors have described a few more species. Taking them into consideration, the total number of species reaches dozens. In my opinion, almost all of them are described without a sound basis. The error in establishing individual species can partly be explained by the following reasons.

The existing opinion that the native habitat of the type species is in Japan is erroneous. The type species and consequently also the genus were established on the basis of plants cultivated in Japan, which originated in China. These plants, cultivated in Japan as ornamentals for more than two centuries, have naturally been modified. The impression of the diversity of *Atractylodes* species could also be created from the fact that their leaves vary from simple and undivided to trifid-compound. They are also lyrate-pinnate. It should be mentioned that the lower leaves are usually lyrate-lobed or trifid-compound, whereas the upper leaves are undivided. Undivided lower leaves are usually found in young plants. The presence of petiolate and sessile leaves is important for distinguishing *Atractylodes* species. The former are typical for *A. ovata* (Thunb.) DC., distributed in the USSR, and sessile leaves for *A. chinensis* (Bge.) Koidz., the species most widely distributed in northeastern China, which has been repeatedly reported wrongly from Soviet territory.

- 89 1. *A. ovata* (Thunb.) DC. Prodr. VII (1838) 48; Koidz. Fl. Symb. Or.-As. (1930) 4; Kom. and Alis. Opređ. Rast. Dalnevost. Kr. II, 1058.—*A. lyrata* var. *ternata* (Kom.) Koidz. op. cit. 5.—*A. japonica* Koidz. ex Kitam. Comp. Japon. I (1937) 19, saltem p. p.—*Atractylis ovata* Thunb. ex Murr. Linn. Syst. veg. ed. 14 (1784) 730; Thunb. Fl. Japon. (1784) 306; Kom. Fl. Manchzh. III, 714.—*Acarna ovata* Willd. Sp. pl. III, 3

(1800) 1701.—*A. chinensis* auct. non Bge. (1836); Maxim. Prim. Fl. amur. (1859) 172, p. max. p.—**lc.**: Kom. and Alis. op. cit. Plate 316.

Perennial. Rhizome procumbent, 6–10 cm long, about 2 cm thick, usually producing two or three, 40–60 cm high stems. Stems erect, ribbed, usually simple, less often branched above, densely leafy. Leaves petiolate; petioles of lower leaves 3–6 cm long, shorter in upper leaves, lower leaves trifid, lobes-leaflets ovate or almost orbicular, 5–10 cm wide, lighter colored beneath, finely serrate and short-setose along margin; leaves reduced upward, trifid or undivided to broadly lanceolate. Capitula solitary, terminal on stem, or four or five, one each at apices of branches, erect; subtended and surrounded by large pinnatisect floral leaves. Involucral bracts imbricate, five or six-rowed, greenish, woolly above; outer bracts elliptical, inner bracts linear, both slightly colored above. Florets 10–12 mm long, with whitish, tubular corolla narrowed to half and parted into lanceolate lobes in broader part. Achenes oblong, about 4 mm long, ribbed, compressed and stiff white-hairy; pappus bristles plumose, about 8 mm long. Flowering VIII; fruiting IX.

Oak and mixed forests, along forest edges.—*Far East*: Zeya-Bureya, Uda (south), Ussuri. *General distribution*: Northeastern China (north), Korea (north). Described from cultivated plants in Japan originating from China. Type in Uppsala.

Note. As was also stated in the description of the genus, we are not convinced that specimens identical with those distributed in the south of the Soviet Far East are typical specimens of *A. ovata* (Thnb.) DC. The use of the name *A. ovata* (Thnb.) DC. for our plant without studying the type specimens of Thunberg, preserved in Uppsala, is only a tentative solution to the nomenclatural problem of this species.

Subtribe 2. CARDUINAE O. Hoffm. in Pflanzenfam. IV, 5 (1984) 317.—Trib. Carduaceae Cass. in Dict. sc. nat. VII (1817) 94 p. p.—Trib. Carlineae Cass. in Dict. sc. nat. VII (1817) 109 p. p.; X (1818) 156 p. p.; XX (1821) 357 p. p.; XLVII (1827) 497 p. p.; LX (1830) 569 p. p.; Opusc. phyt. I (1826) 292 p. p.; II (1826) 202 p. p.—Trib. Carduineae Cass. in Dict. sc. nat. X (1818) 156 p. p.; XX (1821) 359 p. p.; XLI (1826) 308 p. p.; L (1827) 463 p. p.; LX (1830) 571 p. p.; Opusc. phyt. I (1826) 296 p. p.; II (1826) 202 p. p.—Subtrib. Carduineae Less. in Linnaea, VI (1831) 86 p. p. and Synops. Comp. (1832) 8 p. p.; DC. Prodr. VI (1837) 617; Benth. in Benth. and Hook. f. Gen. Pl. II (1873) 213 p. p.; Boiss. Fl. or. III (1875) 457.—Subtrib. Centaurieae Less. Synops. Comp. (1832) 4 p. p.—Subtrib. Carlineae DC. op. cit. 531 p. p.—Subtrib. Silybeae DC. op. cit. 615.—Subtrib. Serratuleae DC. op. cit. 662 p. p.—Achene with straight, less often slightly oblique areole, mostly toothed near apex, glabrous (except in *Polytaxis* Bge.). Pappus bristles one- to many-rowed.

KEY TO GENERA OF SUBTRIBE CARDUINAE

1. Filaments hairy or densely barbate 2.
- + Filaments glabrous, less often glandular or slightly barbate; but if hairy, then outer florets sterile 7.
2. Plants not spiny 3.
- + Plants spiny 4.
3. Receptacle flat, honeycomb-pitted, pits bordered with short scales; achenes without apical border, with rounded margins; plants without stem or with short (up to 30 cm high, usually simple stem (Caucasus) 1585. **Jurinella** Jaub. and Spach
- + Receptacle almost cylindrical, convex, covered with long scales; achene with a small apical border; stems higher (50–100 cm), strongly virgate from base, numerous (Central Kopetdag) 1588. **Nikitinia** Iljin
4. Pappus of serrate bristles 5.
- + Pappus of plumose bristles 6.
5. Filaments free above, connate below due to dense, short, and slimy hairs; pappus surrounding crown of very short, thin, simple hairs forming ring at base; leaves with large white spots 1600. **Silybum** Adans.
- + Filaments wholly free; pappus without crown of short hairs inside; leaves without spots 1589. **Carduus** L.
6. Achene with thick pericarp, becoming hard and strong on maturity, ovoid-hemispherical, or more or less pyriform 1959⁺. **Laymra** Cass.
- + Achene with thinner pericarp, of different shape (cf. also step 26) 1592. **Cirsium** Mill.
7. Receptacle deeply pitted, receptacular pits with membranous, irregularly incised-toothed border; capitula large (4–7 cm wide; smaller; only in *O. frickii* Tamamsh.); plants strongly spiny 1601. **Onopordum** L.
- + Receptacle covered with bristles or scales, occasionally (in some *Saussurea* DC. species) glabrous 8.
- 9i 8. Pappus bristles scabrous or serulate, less often achenes without pappus (in some *Cousinia* Cass. species) 9.
- + All or only inner bristles of pappus plumose 17.
9. Anthers without basal appendages; achenes (mature) usually single in capitulum (Nurata Mountains in Soviet Central Asia) 1577. **Anura** (Juz.) Tschern.
- + Anthers with basal appendages; achenes more numerous in capitulum 10.
10. Pappus bristles connate at base into ring, readily shedding as a whole 11.

- + Pappus bristles not connate into ring at base, shedding individually 14.
- 11. Leaves not spinulose 12.
- + Leaves and involucre bracts spinulose 13.
- 12. Receptacle with a fewer scales; achenes oblong-turbinate, with indistinct ribs, without apical border (central Kopetdag) 1586. **Perplexia** Iljin
- + Receptacle densely covered with scales over large part; achenes obpyramidal, four-angled, ribbed, less often somewhat compressed, more or less oblong with apical border (cf. also step 21) 1584. **Jurinea** Cass.
- 13. Involucre bracts with scaly appendages; corolla tube always shorter than limb; basal processes short (1–2.5, less often up to 4 mm long), wide; inner pappus bristles slightly flattened above 1590. **Alfredia** Cass.
- + Involucre bracts without appendages; corolla tube longer than limb, less often variable in length; basal processes long and narrow; inner pappus bristles not flattened above, but longer and densely serrated 1591. **Olgaea** Iljin
- 14. Pappus of slightly unequal bristles, usually uniform in thickness 15.
- + Pappus of distinctly unequal bristles 16.
- 15. Involucre bracts coriaceous, with terminal spine, usually not uncinata; receptacular scales longer than or almost as long as achene, less often half to one-third as long; pappus bristles readily shedding 1578. **Cousinia** Cass.
- + Involucre bracts membranous, spinulose at tip; receptacular bristles one-fourth to one-fifth as long as achene; pappus bristles persistent, later shedding 1579. **Lipskyella** Juz.
- 16. Involucre bracts with stiff terminal spine, not uncinata; receptacular bristles serrate-scabrous; plants perennial; leaves spinose (Tien Shan) 1580. **Hypacanthium** Juz.
- 92 + Involucre bracts with terminal, thin, uncinata spine; receptacular scales scabrous; plants biennial; leaves without spines 1576. **Arctium** L.
- 17. Capitula heterogamous, peripheral florets sterile, central florets bisexual 1593. **Notobasis** Cass.
- + Capitula homogamous; all florets tubular, bisexual 18.
- 18. Receptacle with scales, less often papillae (glabrous in some *Saussurea* DC. species) 19.
- + Receptacle with bristles 22.
- 19. Achenes covered with scattered long hairs, recurved in lower part, spreading above; bristles of inner row of pappus connate to variable

- height into tube (3–5.5 mm long), appressed-hairy on outer side 1583. **Polytaxis** Bge.
- + Achenes glabrous; pappus bristles not connate into tube 20.
20. Pappus many-rowed; its bristles variable in length, connate at base into ring or firmly attached to achenes and without ring 21.
- + Pappus of one or two rows; bristles of outer row of pappus short, scabrous or slightly plumose, readily shedding individually; bristles of inner row equal, always long-plumose, connate at base into ring, persistent 1582. **Saussurea** DC.
21. Anthers covered with long, very thin, flexuous, fragile readily shedding hairs; pappus without 2–5 mm long inner bristles (Soviet Central Asia) 1587. **Pilostemon** Iljin
- + Anthers glabrous; pappus with two to five longer inner bristles (cf. also step 12) 1584. **Jurinea** Cass.
22. Pappus bristles not connate at base into ring, readily shedding individually, short-plumose. Alpine and subalpine plants with bipinnatisect leaves (Tien Shan) 1581. **Schmalhausenia** Winkl.
- + Pappus bristles connate at base into ring and shedding together 23.
23. Capitula surrounded by apical leaves; outer involucrel bracts with plumose and prickly process; plants annual-biennial 1594. **Picnomon** Adans.
- + Capitula not surrounded by apical leaves; prickly process of involucrel bracts not plumose; plants perennial 24.
24. Receptacle fleshy; leaves very large, wide, bipinnatisect, forming rosette. Cultivated plants 1599. **Cynara** L.
- + Receptacle not fleshy; leaves almost entire, undivided, or pinnatifid 25.
- 93 25. Achenes weakly flattened on both sides, not ribbed 26.
- + Achenes not flattened, ribbed-angular 27.
26. Achenes with obliquely truncate apex; pappus many-rowed (cf. also step 6) 1592. **Cirsium** Mill.
- + Achenes flat-tipped, with saucer-shaped depression; pappus in two rows of light golden bristles, slightly cystoid below and pointed above (Soviet Central Asia) 1596. **Lamyropappus** Knorr. and Tamamsch.
27. Stem winged; leaves oblong-elliptical or lanceolate; achenes white, pale or dark brown; pappus many-rowed, of short-plumose bristles, outer bristles shorter 1598. **Modestia** Charadze and Tamamsch.
- + Stem not winged; leaves linear or linear-lanceolate, achenes dark brown or almost black; pappus usually in two rows of almost equal, long-plumose bristles 1597. **Ancathia** DC.

GENUS 1576. *Arctium* L.^{1,2}

L. Sp. pl. (1753) 816.—*Bardana* Hill. Veg. syst. IV (1762) 28.—*Lappa* Adans. Fam. pl. (1763) 116.

Capitula homogamous. Receptacle flat, somewhat fleshy, covered with numerous bristles initially flat, later spirally twisted. Involucre glabrous or arachnoid-hairy, many-rowed; involucre bracts linear or lanceolate, outer and middle bracts narrowed into distinct uncinately tip; inner bracts more or less membranous, erect. Florets bisexual, similar, all fertile, with regular, tubular, five-lobed corolla. Stamens with free glabrous filaments; anthers sagittate below, acuminate above. Style surrounded with suprapistillate disk at base persisting in fruit, with linear and basally curved hairy branches. Achenes oblong, laterally compressed, truncate at apex, ribbed, usually somewhat rugose between ribs (especially at base and near tip), less often smooth; pappus short, its bristles unequal, scabrous, in many rows, free to base, shedding; areole basal, straight. Biennial, almost nonprickly large herbs with alternate, large, simple, petiolate leaves and branched inflorescence-corymbose or paniculate.

The genus is of Mediterranean origin, some of its 11 species are widely distributed as ruderal plants.

Economic Importance: The species of this genus, particularly the ones not widely distributed (*A. lappa*, *A. minus*, *A. tomentosum*), are ancient medicinal plants. Their roots are known in the pharmacopea under the name *Radix Bardanae* and contain inulin, sugar, and essential oil. Their various preparations are used for treatment of many diseases. The oil, which is 25–30% in fruits of burdock (*Oleum Bardanae*), also finds medicinal application. The young roots and branches are used as food. Melliferous plants.

1. All involucre bracts terminating in hook, or inner-most either gently curved and then apically not broadened, mostly green, less often reddish; corolla limbs without glandular hairs on outer side. Common inflorescence corymbose or racemose (in latter case peduncles short or capitula sessile) 2.
- + Inner involucre bracts more or less broadened upward, acute or obtuse, with short straight cusp at tip, usually purple in upper part; corolla limbs on outer side with small multicellular glandular hairs. Common inflorescence corymbose or racemose with more or less distinct peduncles 6.

¹Treatment by S.V. Juzepczuk and E.V. Sergievskaya.

²From the Greek name of burdock, arcion or arceion, first mentioned by Dioscorides.

2. Common inflorescence corymbose; peduncles more than 1 cm (up to 12 [sic] cm) long..... 3.
- + Common inflorescence racemose; peduncles rather short or capitula sessile 5.
3. Capitula very large, involucre 20–30 (with cusp 40–50 mm) wide; middle and outer involucre bracts up to 1.5 mm wide at base of curved part; achenes about 7 mm long, pitted-rugose.....
..... 1. **A. platylepis** (Boiss. and Bal.) Sosn. ex Grossh.
- + Capitula 13–20 (with cusp 30–35) mm wide; middle and outer involucre bracts 1–1.5 mm wide at base of curved part; achenes 5–6(6.5) mm long, pitted-rugose only at apex or near base, or almost smooth 4.
4. Common inflorescence corymbose; peduncles up to 10 cm long. Inner involucre bracts as long as or longer than florets. Achenes with distinct longitudinal ribs near apex and base, pitted-rugose, finely punctate..... 2. **A. lappa** L.
- + Common inflorescence corymbose-racemose; peduncles 1–3 cm long. Inner bracts much shorter than florets. Achenes with indistinct longitudinal ribs, elsewhere smooth, with large dots.....
..... 3. **A. leiospermum** Juz. and C. Serg.
- 95 5. Branches of common inflorescence virgate, often arcuately curved. Capitula 1.5–2.5 cm wide, with cusp 3–4 cm; inner involucre bracts as long as or longer than florets. Achenes 6–8 mm long..
..... 4. **A. nemorosum** Lej.
- + Branches of common inflorescence erect, upward spreading. Capitula globose-ovoid, terminal, 1–1.5 cm wide, with cusp 2–2.5 cm. Inner involucre bracts shorter than florets. Achenes 4–5 mm long..... 5. **A. minus** Bernh.
6. Involucre glabrous or only slightly arachnoid-hairy. Innermost involucre bracts acuminate..... 7.
- + Involucre more or less distinctly arachnoid-hairy, occasionally glabrous. Outermost involucre bracts truncate or even emarginate at apex, with small cusp 7. **A. tomentosum** Mill.
7. Capitula glabrous or indistinctly arachnoid-hairy. Inner involucre bracts spatulate at apex, crenate-toothed and crimped along margin, acuminate. Stem in upper part and branches of common inflorescence almost smooth; leaves weakly toothed, with nonprickly teeth..... 6. **A. palladinii** (Marc.) Grossh.
- + Capitula glabrous; involucre bracts with finely ciliate-toothed margins, their broader part oblong, not spatulate. Stem in upper part and branches of inflorescence strongly scabrous, tuberculate; leaves with large-toothed margin, teeth terminating in distinct spinules 8. **A. radula** Juz. and C. Serg.

Section 1. Eglandulosa Aréne in Bull. Jard. Bruxelles, XX (1950).—Inner involucre bracts linear-lanceolate, not broadened upward, often nonpigmented or a little purple. Corolla limbs without glandular hairs.

1. *A. platylepis* (Boiss. and Bal.) Sosn. ex Grossh. Fl. Kavk. IV (1934) 164; Klok. Fl. Abkh., IV, 264.—*Lappa platylepis* Boiss. and Bal. in Boiss. Fl. or. III (1875) 458.—*A. lappa* subsp. *platylepis* Aréne in Bull. Jard. Bruxelles, XX (1950) 74, 77.—**lc.**: Aréne, *Ibid.* 79, pl. IIIA.

Biennial. Plants more than 1 m high. Stem erect, strong, deeply longitudinally sulcate, often reddish, branched, with strong and erect upward spreading branches almost as long as main stem. Leaves petiolate, broad-ovate; bases of lower leaves cordate; uppermost leaves truncate, margin crenate-toothed, with teeth terminating in small thin spine, green above, glabrous or sparsely pubescent, grayish arachnoid-hairy tomentose beneath; basal leaves with swollen petioles; cauline leaves greatly reduced, but uppermost relatively large, often closer to capitula. Common inflorescence corymbose or corymbose-paniculate, dense capitula somewhat condensed, although solitary on 1–5 cm, less often up to 7 cm long peduncles, larger than in *A. lappa*. Involucre 2–3 cm wide (excluding cusp), 4–5 cm with cusp, glabrous or slightly arachnoid-hairy. Involucre bracts 1.5–2.25 mm wide, wider and flatter as compared to *A. lappa*; cusps (divergent part) lanceolate from base, up to 1.5 mm wide at base, with subulate tip (except innermost bracts); all bracts with terminal spinule; outer bracts often strongly hooked; innermost bracts more linear, up to 2 mm wide, as long as outer bracts, longer than florets, pubescent; often all involucre bracts dark violet. Corolla usually purple, slightly larger than in *A. lappa*, with campanulate 5.5–6 mm long limbs and 2.5 mm long lobes, abruptly narrowed into 8–9 mm long tube (in *A. lappa* up to 5–6 mm long), much broader at base; apical appendages of anthers narrow and pointed, 0.3 mm long, basal appendages simple or two- or three-parted, 1.25 mm long. Achenes 7 mm long and 2.5–3 mm wide, oblong-turbinate, with truncate apex, longitudinally sulcate, transversely crenulate throughout, rugose, brown to dark brown with almost black pattern; pappus 3.5 mm long. Flowering VII–VIII. (Plate VII, Fig. 2).

Forest covered mountain slopes, subalpine tall grasslands.—*Caucasus*: Ciscaucasia (State Reserve), western Transcaucasia (Abkhazia), southern Transcaucasia (Bakuriani), eastern Transcaucasia (northern Azerbaidzhan). *General distribution*: Eastern Anatolia. Described from Habakher in Lazistan. Type in Geneva.

Note. Undoubtedly an endemic species of the Caucasus with a discontinuous range, known from several places. The material of this

species is heterogeneous, which indicates its tendency to form local races. For instance, the dark purple color of the involucre bracts recorded in the description was observed by us only in specimens from the western Caucasus. The hook of the outer involucre bracts, which are also longer, characterizes mainly the Azerbaidzhan and Bakurian specimens. Characteristics not typical of the Caucasian form of this species (slightly narrower arachnoid involucre bracts, etc.) are mentioned in the descriptions and figures of typical *A. platylepis*. The lack of authentic specimens and the scant Caucasian material do not permit the segregation of any taxonomic entities.

Aréne's monograph of the genus recognizes *A. platylepis* (considered as a "subspecies" of *A. lappa*) as "an alpine Pontian race." We, on the contrary, are inclined to accept *A. platylepis* as a Tertiary relict plant, probably the ancestor of the widely distributed but, apparently always ruderal and synanthropic *A. lappa*. Aréne further reported the existence of intermediate forms between *A. platylepis* and *A. lappa* in Lazistan and Cappadocia. Incidentally, the Turkestanian form separated by him as similar to the "intermediate," in our opinion, belongs to a separate species, not having any direct relationship with *A. platylepis*.

- 97 2. **A. lappa** L. Sp. pl. (1753) 816 excl. var. β .—*A. lappa* subsp. *majus* Aréne in Bull. Jard. Bruxelles XX (1950) 75; Fedtsch. and Fler. Fl. Evrop. Ross. III, 1001; Grossh. Fl. Kavk. IV, 164.—*A. majus* Bernh. Syst. Verz. Pfl. Erf. (1800) 154; Syreistsch. III. Fl. Mosk. Gub. III, 289.—*Lappa vulgaris* Hill. Veg. syst. IV (1762) 28.—*L. major* Gaertn. De fruct. II (1791) 379; Ldb. Fl. Ross. II, 748; Schmalh. Fl. II, 94.—**Ic.**: Rchb. Ic. Fl. Germ. XV, 812; Syreistsch. op. cit. 290; Hegi, III. Fl. VI, II, 828.—**Exs.**: Woloszcz. Fl. polon, exs. No. 650.

Biennial. Plants 60–150 cm high, reaching up to 3 m. Root branched, fleshy, thick, fusiform, up to 60 cm long. Stem erect, strong, longitudinally sulcate, often reddish; branches numerous, erect, spreading, covered with papilliform hairs mixed with glandular hairs, but mostly arachnoid-hairy. Leaves petiolate, broadly cordate-ovate, sparsely crenate-toothed or entire, green and sparsely pubescent above, finely gray-tomentose beneath with scattered yellowish glandular hairs; basal leaves up to 50 cm long, on ridged, tumid, more than 30 cm long petioles; cauline leaves abruptly reduced, uppermost somewhat cordate at base. Capitula borne sparsely in corymbose-racemose inflorescence, sometimes on peduncles up to 10 cm or longer, and almost at same height at tips of branches, globose, large, 13–20 mm wide excluding cusp, with cusps 20–35 mm long. Involucre bracts glabrous or weakly arachnoid-hairy; lower bracts lanceolate, carinate, 1–1.5 mm wide, weakly ciliate-toothed along margin, narrowed into linear-lanceolate, erect spiny tip; middle

bracts appressed-pubescent; inner lanceolate, green, sometimes purple, pubescent, gradually narrowed into weak apical hook as long as or longer than floret. Corolla purple-red, abruptly narrowed into 5–6 mm long tube, limb 4–5 mm with 1.5–2 mm long lobes; apical appendage of anthers 0.2 mm long, narrow and pointed, basal appendages 0.75 mm long, simple or bifid. Achenes 6–6.5 mm long, 2.5–2.75 mm wide, narrow-obovate, with narrow areole, pappus attachment surrounded by four to six tubercles; achenes longitudinally ribbed, transversely rugose near upper end, to lesser extent, at lower end, grayish to brown, with zig-zag dark brown to almost black pattern; pappus 3–3.5 mm long. Flowering VIII–IX. (Plate XII, Figs. 10, 11).

At garbage dumps, near inhabited areas, along roads and fences, banks of rivers and rivulets, rarely in cultivated fields.—*European Part*: Balkhash Region, Karcha-Lapland, Ladoga-Ilmen, Upper Dnieper, Upper Volga, Volga-Kama, Middle Dnieper, Volga-Don, Trans-Volga Region, Lower Volga, Lower Don, Black Sea, Upper Dnieper, Bessarabia (?) Crimea; *Caucasus*: All regions; *Western Siberia*: Upper-Tobol; *Far East*: Ussuri, Zeya-Bureya, Sakhalin. *General Distribution*: Scandinavia, Atlantic and Northern Europe, Mediterranean Region, Balkans-Asia Minor, Iran, Indo-Himalayas, Tibet, Mongolia, China, Japan, introduced into North and South America. Described from Western Europe. Type in London.

- 98 *Note*. In the Far East and Japan, besides the typical *A. lappa*, specimens with larger capitula and wider involucre bracts, strongly resembling the Caucasian *A. platylepis* in appearance, are often found. Similar specimens, sometimes collected in the European part of the USSR (Mogilev), are also known in cultivation (in the Botanical Gardens they are called "*Lappa grandiflora*"). I assume that these forms are only a modification of *A. lappa* and do not have a direct relationship with *A. platylepis*. It should also be noted that a part of the Crimean plants and those from the southern regions of the European part of the USSR are distinguished by a smaller capitulum, their size being closer to that of *A. minus*.

3. *A. leiospermum* J. z. and C. Serg. in Bot. Mat. Gerb. Bot. Inst., Akad. Nauk SSSR, XVIII (1957) 299.—*A. lappa* auct. omnium Fl. Asiae Mediae, non L.

Biennial. Tall plants with strong, erect, deeply sulcate stems; branches numerous, usually turning red, erect, spreading or sometimes strongly, covered with fine papilliform hairs and dense, yellowish glandular hairs, without arachnoid-hairy pubescences. Leaves petiolate, broadly ovate, with cordate base, crenulate-toothed, green, and almost glabrous above, slightly grayish-tomentose beneath with dense covering

of fine glandular hairs; basal leaves about 30 cm long and 25 cm wide, with long prickly, tomentose, tumid, often turning red, more than 20 cm long petioles; cauline leaves rather abruptly reduced, upper leaves with truncate base. Common inflorescence corymbose-racemose. Capitula in isolated groups, clustered on relatively short, 1–3 cm long peduncles, globose, medium to large, 1–1.5 cm wide excluding cusps, 2.5–3.5 cm long with cusp. Involucral bracts similar to those of *A. lappa*, but inner bracts much shorter than florets, appressed-pubescent. Corolla purple, abruptly narrowed into 6–7 mm long tube, limb campanulate, 5–6 mm long with about 2.5 mm long lobes. Anthers about 5 mm long, apical appendages up to 0.5 mm long, basal appendages about 0.75 mm long, undivided or bifid. Achenes 5–6 mm long, 2–2.75 mm wide; narrow-obovate, with narrow areola of pappus attachment surrounded by small tubercles, brown to gray with almost black spots and wide zig-zag stripes, almost smooth, with indistinct longitudinal ribs; pappus up to 3 mm long. Flowering VII–VIII, fruiting XI.

Valleys and river banks, along streams and irrigation channels, near springs, found as a crop weed, on deposits and in orchards.—*Soviet Central Asia*: Aralo-Caspian Region, Balkash Region, Tien Shan, Syr-Darya, Pamiro-Alai, mountainous Turkmenia; *Western Siberia*: Irtysh, Altai; *Eastern Siberia*: Angara-Sayans. *General Distribution*: Dzhungaria-Kashgaria. Described from the village of Klyuchevka of the former Aulieata District of Syr-Darya Region. Type in Leningrad.

4. **A. nemorosum** Lej. in Lej. and Court. Mag. d'Hort. I (1833) 289; Fedtsch. and Fler. Fl. III, 1001; Grossh. Fl. Kavk. IV, 164 p. min. p.—*A. intermedium* Lge. Handl., Dansk. Fl. (1851) 463.—*Arctium minus* subsp. *nemorosum* Boswell. Engl. Bot. V (1886) 25; Aréne in Bull. Jard. Bruxelles, XX, 96.—*A. minus* var. *nemorosum* Th. Dur. in De Wild. and Th. Dur. Prodr. Fl. Belg. II (1903) 479.—*A. macrospermum* Hayek, Sched. fl. Styr. exs. XIII and XIV (1908) No. 29.—*Lappa nemorosa* Koern. Schr. Phys.-ökon. Ges. Königsb. V (1864) 63 and in Arch. Ver. Naturg. Mecklenb. XXIII (1870) 189; Schmalh. Flora II, 94.—*L. macrosperma* Wallr. in Linnaea, XIV (1840) 639.—*L. intermedia* Rchb. Ic. Fl. Germ. XV (1853) 54.—*L. minor* var. *nemorosa* Crép. Man. Fl. Belg. ed. 5 (1884) 259.—*Ic.*: Rchb. op. cit. tab. 81, fig. 1; Hegi, III. Fl. VI, II, 826, 830.—*Exs.*: Fl. Hung. exs. No. 590; Fl. Ital. exs. No. 383.

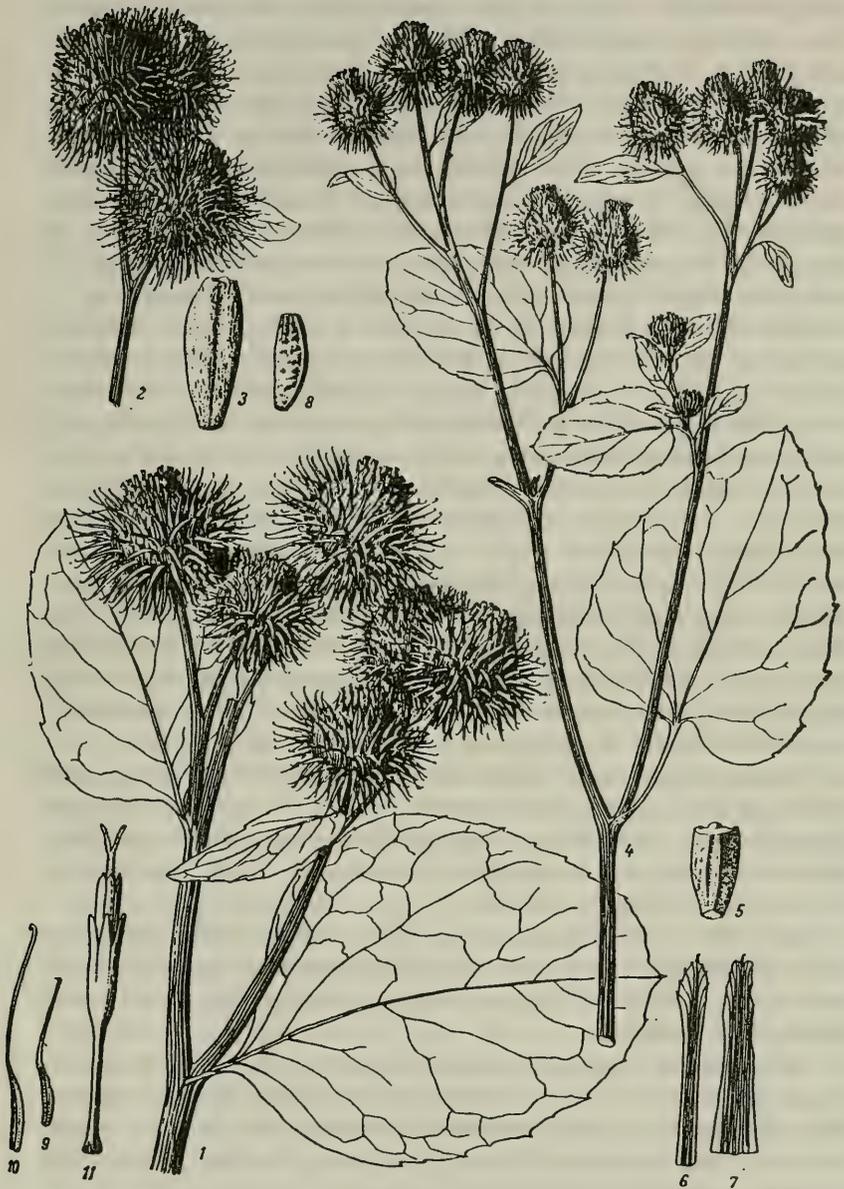
Biennial. Plants up to 2 m high. Stem erect, strong, longitudinally sulcate, green or reddish; branches numerous, long, lower branches usually arcuate below, covered with short, papilliform hairs mixed with glandular hairs and more or less densely arachnoid-hairy. Leaves petiolate, cordate-ovate, sparsely crenate-toothed, usually thin, green,

and sparsely puberulent or glabrous above, weakly tomentose and grayish-green beneath, with scattered, fine, yellowish glandular hairs to almost glabrous; basal leaves up to 50 cm long, with hollow, up to 60 cm long petioles; cauline leaves abruptly reduced, uppermost leaves weakly cordate at base, narrowed into petiole, with apical spines. Common inflorescence racemose, upper capitula solitary or clustered in heads of two to six, lower isolated, upper crowded, sometimes corymbose; all capitula short-peduncululate, or lower ones almost sessile, slightly compressed-spherical, slightly narrowed at apex, (1.5)2–2.5 cm long. Involucre mostly glabrous, less often slightly arachnoid-hairy; involucre bracts lanceolate, carinate; middle bracts densely puberulent on outer side, ciliate-small toothed, along margin, 1.5–1.75 cm wide, narrowed into narrow-lanceolate, almost horizontal cusp, up to 1 mm wide at base, in lower part trihedral, flat above, terminating in stiff spinule; inner involucre bracts lanceolate, flat, up to 2 mm wide, green or purple, gradually and finely acuminate, terminating in spinule or slightly incurved at apex, about as long as florets or slightly longer. Corolla purple-red, abruptly narrowed into 5–6 (up to 8) mm long tube, limbs 5–7 mm with 1.5–2 mm long lobes; apical appendage of anthers narrow, 0.3–0.5 mm long, basal appendages simple or bifid, up to 1 mm long. Achenes 100 7–8 mm long, narrow, obovoid, with narrow areole and truncate apex, areole surrounded by fewer small tubercles, transversely rugose throughout, brownish with black pattern; pappus 2.5–3 mm long. Flowering VI–VIII. (Plate VII, Figs. 2, 3).

Forests, mainly broad-leaved forests, their edges, forest glades, clearings, gorges.—*European Part*: Ladoga-Ilmen? (Valdai Hills), Upper Volga (?) (Melenki), Upper Dnieper, Volga-Kama, Trans-Volga, Volga-Don, Upper Dniester, Black Sea Region, Lower Don, Crimea; *Caucasus*: Ciscaucasia (Zheleznovodsk). *General distribution*: Scandinavia, Central Europe, Atlantic Europe. Described from France. Type in Paris.

5. **A. minus** Bernh. Syst. Verz. Erf. (1800) 134, s. str.; Syreistsch. III. Fl. Mosk. Gub. III, 290; Fedtsch. and Fler. Fl. Evrop. Ross. 1001.—*A. minus* subsp. *eu-minus* Syme, Engl. Bot. V (1866) 26.—*Lappa minor* Hill. Veg. Syst. IV (1762) 28; Ldb. Fl. Ross. II, 748; Schmalh. Fl. II, 94.—**lc.**: Engl. Bot. tab. 702; Reichb. Ic. Fl. Germ. XV, tab. 811; Syreistsch. op. cit. 291; Hegi, III. Fl. VI, II, tab. 269.—**Exs.**: Pl. Finl. exs. No. 985; Wolosz. Fl. polon. exs. 836.

Biennial. Plants 0.5–1.20(1.5) m high. Root thick, fusiform, fleshy. Stem erect, more or less strong, longitudinally sulcate, green or reddish, branches numerous, erect, spreading, like stems covered with short papilliform hairs divergent in different directions, mixed with glandular hairs and less often (particularly in lower part of stem) with arachnoid-



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Plate VII.

1—*Arctium platylepis* (Boiss. and Bal.) Sosn., upper part of plant; 2, 3—*A. nemorosum* Lej., inflorescence and achenes; 4, 5, 6—*A. palladinii* (Marc.) Grossh., upper part of plant, achene, inner involucre bract; 7—*A. tomentosum* Mill., inner involucre bract; 8, 9—*A. minus* Bernh., achene, involucre bract; 10, 11—*A. lappa* L., involucre bract, floret.

hairy pubescence. Leaves petiolate, broad ovate; lower leaves cordate at base, entire or sinuate-toothed, with short acicular cusp at apex, green and glabrous or sparsely pubescent above, grayish-green beneath due to sparse fine tomentum with shining, fine, sessile glandular hairs, less often white-tomentose; basal leaves smaller than in *A. nemorosum*, with hollow petioles; upper cauline leaves short-petiolate, ovate, with almost truncate or angular base, irregularly crenate-toothed. Common inflorescence racemose, terminal capitula clustered in heads of three to six, sessile or short-pedunculate, and sometimes corymbose at tip of main axis, slightly pressed-globose, narrowed at apex, without cusp 1–1.5 cm, with cusp (1.5)2–2.2(2.5) cm wide, 1.3–1.8 cm long. Involucre without or with arachnoid-hairy pubescence; middle involucreal bracts
102 densely puberulent on outside, lanceolate, carinate, ciliate-toothed, 0.5–1 mm wide at base, narrowed into linear-lanceolate, horizontal stiff spine; all bracts, including inner, green or slightly reddish; inner bracts narrow-linear, gradually narrowed into slightly bent cuspidate tip. Corolla longer than inner involucreal bracts, pinkish-red to purple, abruptly narrowed into initially violet, later reddish, 4.5 mm long tube; limbs 4–5 mm with 1.5 mm long lobes; apical appendage of anthers obtuse, not narrow, 0.2 mm long, basal appendage simple or bifid to many-parted 0.5 mm long. Achenes 4–5 mm long, 1.75–2 mm wide, with 1.5–2 mm long pappus, turbinate, ridged, often three or four-angled, truncate, transversely rugose at both ends, with small tubercles near point of pappus attachment, brownish with dark brown zig-zag pattern. Flowering VII–IX.

Among debris, near inhabited areas, along roads, dumps, and canals.—*European Part*: Baltic Region, Ladoga-Ilmen, Karelia-Lapland, Upper Dnieper, Upper Volga, Middle Dnieper, Volga-Don, Volga-Kama, Trans-Volga Region, Lower-Don, Bessarabia?, Black Sea Region, Crimea. Described from Germany.

Note. This species is reported in the literature as widely distributed in the Caucasus; however, none of the specimens from there seen by us with the identification "*A. minus*" belong to this species; most of them belong to *A. palladinii*.

Nevertheless, judging from the description, the plants named as *Lappa glabra* γ . *caucasia* C. Koch (*Linnaea*, XVII, 43) and reported from Georgia and Armenia should be included only under *A. minus*. However, I did not see the herbarium specimens; therefore, it is included tentatively among the synonyms of *A. minus*.

A. minus Bernh. forms the following hybrids.

1) \times *A. nothum* (Rühm.) Weiss in Hallier. Kochs Synops. II (1902) 1512.—*Lappa notha* Rühm. Jahrb. Bot. gart. Berl. I (1881) 238.—*L. intermedia* Schur. in Verh. Mittl. Sibenb. Ver. Nat. Hermansst. IV, 6 (1853) 35, non Lge. nec Rchb.—*L. subracemosa* Simank. Enum. fl.

Trans. (1886) 340.—*A. subracemosum* Nym. Consp. Fl. Eur. suppl. II, 1 (1889) 179.—*Lappa janczewskii* Dyb. in *Wszéchwiat* (1904) No. 46.—*A. lappa* subsp. *majus* × *A. minus* subsp. *eu-minus* Aréne in Bull. Jard. Bruxelles, XX (1950) 124.—**Exs.**: Callier, Fl. Siles, exs. No. 1311.—*European Part*: Middle Dnieper (Sumy Region, Grebennikovo), Trans-Volga Region (Buguruslan' Region).

2) *A. minus* Bernh. × *A. nemorosum* Lej.

Found among shrubs in forest clearings.—*European Part*: Trans-Volga Region (Buguruslan Region, Sosnovsko-Arkhangelskaya estate).

Note. So far only one specimen of this hybrid is known from the territory of USSR. We note that there are no fully reliable published reports concerning the occurrence of the second parent (*A. nemorosum*) from the Trans-Volga Region.

103 Section 2. **Glandulosa** Aréne in Bull. Jard. Bruxelles, XX (1950) 112.—Inner involuclral bracts more or less broadened upward, root purple; corolla limbs in lower (undivided) part covered with small, yellowish, multicellular glandular hairs on outer side.

6. **A. palladinii** (Marc.) Grossh. Fl. Kavk. IV (1934) 164; Kolak. Fl. Abkhazii, IV, 264. Papava in Fl. Gruzii, III, 438.—*Lappa palladini* Marc. in Allg. Bot. Zeitschr. VI, 11 (1900) 200; Tr. Bot. Sada Yurev. Univ. 1, 147.—*A. bardana* MB. Fl. taur.-cauc. II (1808) 263 p. p.—*A. tomentosum* (resp. *Lappa tomentosa*) auct. cauc. saltem p. max p. non Mill. (resp. Lam.)—*A. tomentosum* var. *glabrum* Aréne in Bull. Jard. Bruxelles, XX (1950) 118 p. p. non Körn.—*A. transcaucasicum* Sosn. ex Grossh. Opred. Rast. Kavk. (1949) 474; Papava in Fl. Gruzii, VIII, 441.—**lc.**: Markovich, op. cit. Fig. 1, 2c, 3c, 4c.—**Exs.**: GRF No. 927.

Biennial. Plants more than 2 m high. Stem erect, strong, branched, longitudinally sulcate, green or reddish; branches usually long, numerous, erect, spreading (often in same plane), rough due to stiff irregular papilliform hairs, arachnoid-hairy pubescent, mixed with fine glandular hairs. Leaves petiolate, with cordate base, ovate, entire or crenate-toothed, cuspidate, green and sparsely hispid above, grayish-green beneath due to somewhat dense arachnoid-tomentose pubescence, mixed with yellow glandular hairs. Common inflorescence corymbose with lateral branches longer than main axis. Capitula globose, broadly open at apex, excluding cusp 0.9–1.2 cm, with cusp 1.5–2.2 mm wide and 1.5–2.1 cm long, readily disintegrating on maturity, glabrous or occasionally slightly arachnoid-hairy. Involuclral bracts ciliate-toothed; lowermost bracts short, recurved, narrow-lanceolate, spiny-tipped; lower involuclral bracts lanceolate, carinate, narrowed into linear-lanceolate not sharply curved cusp, terminating in less strongly curved hook than in *A. tomentosum*; inner involuclral bracts purple in upper half, linear-lanceolate; innermost

covered with fine appressed hairs, carinate in middle, often crimped along upper margin, crenate-toothed, spatulate. Corolla much long than involucre bracts, reddish-purple, sparsely yellowish glandular-hairy; tube up to 6–7 mm long; limb about 7 mm long with 3.5–4 mm long lobes. Anthers up to 5–6 mm long, apical appendages sharply narrowed into 0.2 mm long cusp, basal appendages 0.75 mm long, mostly undivided or bifid. Achenes 3.5–5 mm long, 2–2.5 mm wide, obpyramidal, with narrow areole, ribbed, with indistinct tubercles, brownish gray, finely punctate, mature achenes over entire surface crenate-pitted-rugose; pappus up to 3 mm long. Flowering VII–VIII, fruiting up to X. (Plate VII, Fig. 6).

104 Forests, banks of rivers and streams, gardens, weedy meadows, debris dumps.—*Caucasus*: Ciscaucasia, Dagestan, eastern, western, and southern Transcaucasia. Endemic? *General distribution*: Iran? Described from Alagir in Northern Ossetia. Type or isotype in Leningrad.

7. **A. tomentosum** Mill. Gard. Dict. ed. 8 (1768) No. 3; Syreistsch. III. Fl. Mosk. Gub. III, 291; Fedtsch. and Fler. Fl. Evrop. Ross. 1000; Grossh. Fl. Kavk. IV, 164; Kryl. Fl. Zap. Sib. XI, 2875.—*A. lappa* var. β . L. Sp. pl. (1753) 860.—*Lappa tomentosa* Lam. Fl. Fr., II (1778) 37; Ldb. Fl. Ross. II, 749; Schmalh. Fl. II, 94.—**lc.**: Rchb. Ic. Fl. Germ. XV (1852) tab. 811; Syreistsch. op. cit. 291; Hegi. III. Fl. VI, II, tab. 270, 833.—**Exs.**: Wolosz Fl. polon. exs. No. 745; Fl. Ital. exs. No. 1170; Pl. Finl. exs. No. 1398.

Biennial. Plants 60–150 cm high. Root fleshy, thick, fusiform, brown. Stem erect, strong, longitudinally sulcate, green or reddish; branches numerous, erect, spreading, less often (in shady places) slightly arcuate, covered, like stems with papilliform hairs mixed with glandular and arachnoid-hairy pubescence. Leaves petiolate, ovate, with cordate to broadly cordate base, entire or sparsely toothed, obtuse, distinctly mucronate, green and glabrous or slightly appressed-pubescent above, densely grayish or whitish arachnoid-hairy tomentose beneath with sessile golden glandular hairs; upper leaves short-petiolate, ovate or ovate-oblong, petioles of basal leaves solid, tomentose, often reddish to brown. Common inflorescence corymbose. Capitula almost corymbose, numerous, globose, slightly narrowed at apex, excluding cusp 11–18 mm and with cusp 18–30 mm wide, 13–20 cm long, readily disintegrating on maturity, densely arachnoid-hairy pubescent or occasionally glabrous. Middle involucre bracts densely puberulent on outer side, sometimes mixed with glandular hairs, ciliate-toothed; outermost involucre bracts short, with fine sharply recurved, hooked cusp; outer involucre bracts lanceolate, carinate, broader at base, 1.25–1.5 mm wide, narrowed into linear-lanceolate, horizontally divergent hooked cusp; innermost

involucral bracts purple, broadened at base up to 2.75 mm, linear-lanceolate, somewhat obtuse or sinuate, with small prominent but not hooked cusp; all involucral bracts often purple. Corolla much longer than inner involucral bracts, reddish-purple, sparsely yellowish glandular-hairy, campanulate, broadened upward; tube 4.5–6 mm long, broader at base; limb 4–4.5 mm with 2–2.5 mm long lobes. Apical appendages of anthers more or less sharply narrowed, 0.2 mm long; basal
 105 appendages 0.6 mm long, simple or bifid. Achenes 5–6 mm long, turbinate, with obtusely truncate upper end and narrow areole of pappus attachment, ribbed, transversely rugose, grayish to brown, brownish or with dark zig-zag spots against lighter background; pappus 2.5–3 mm long. Flowering VII–IX. (Plate VII, Fig. 7).

Among debris, kitchen gardens, along road, near walls and fences. A widely distributed weed.—*European Part*: Baltic Region, Ladoga-Ilmen, Karelia-Lapland, Dvina-Pechora, Volga-Kama, Upper Volga, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga Region, Lower Don, Upper Dniester, Black Sea Region, Bessarabia, Crimea; *Caucasus*: Possibly, in Ciscaucasia; *Western Siberia*: Upper Tobol, Irtysh, Ob', Altai; *Eastern Siberia*: Yenisei, Angara-Sayans, Yakutia (introduced); *Far East*: Ussuri (introduced); *Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region, Tien Shan, Syr-Darya, Pamiro-Alai (north), Dzhungaria-Tarbagatai. *General distribution*: Scandinavia, Atlantic and Central Europe (England), Balkans-Asia Minor, Dzhungaria-Kashgaria. Described from England. Type in London.

Note. Most of the herbarium collections from the Caucasus attributed to this species actually belong to *A. palladinii*, and only plants from a few localities in the northern Caucasus can be included under *A. tomentosum*.

Economic Importance: To a great extent, ornamental plants; being extremely common, however, they are not used for this purpose in the Soviet Union.

A. tomentosum Mill. forms the following hybrids.

1) × *A. ambiguum* Nym. Consp. Fl. Eur. suppl. II (1889) 179.—*A. lappa* × *A. tomentosum* Beck. Fl. Nied. Oest. (1893) 1228.—*L. major* × *L. tomentosa* Hausskn. in Oest. bot. Zeit. schr. (1864) 206.—*L. ambigua* Celak. Prodr. fl. Böh. (1871–1872) 249.—*L. tomentosa* var. *denudata* Lge. Handb. Dansk. fl. ed. 3 (1864) 288.—*lc.*: Lge. Fl. dan. tab. 2915.—*Exs.*: Wolosz. Fl. polon. exs. No. 631; Callier Fl. Siles. exs. No. 1310.

Found among debris, together with the original species.—*European Part*: Upper Volga, Volga-Don, Trans-Volga Region (Buguruslan Region).

Note. A fairly widespread hybrid, readily forming wherever *A. lappa* and *A. tomentosum* grow together.

2) \times *A. leiobardana* Juz. and C. Serg. hybr. nov.—*A. leiospermum* Juz. and C. Serg. \times *A. tomentosum* Mill.

In general appearance and characters of inflorescence, it is more similar to *A. leiospermum*, from which it differs by broad and apically colored inner involucre bracts and sometimes also by a weakly arachnoid-hairy involucre.

Found in wastelands, along river banks.—*Soviet Central Asia*: Dzhungaria-Tarbagatai, Tien Shan.

Note. A hybrid described for the first time, which occasionally is found in Soviet Central Asia within the range of *A. leiospermum*.

3) *A. nemorosum* Lej. \times *A. tomentosum* Mill.—*A. minus* 3) *macrocephalum* Rupr. Fl. ingr. (1860) 541.

106 Wastelands, clearings.—*European Part*: Ladoga-Ilmen (Kronstadt), Volga-Don (Gorodishche Region).

—*Note.* Borshchow's old collections of this plant in Kronstadt deserve special attention. Ruprecht (op. cit.) considered these specimens as a variety of *A. minus*, but later (on the herbarium label) considered them as the hybrid *A. minus* \times *A. tomentosum*. The large achenes compel me to include the Borshchow's plant under the above-mentioned hybrid; apparently, we are dealing here with an introduced plant.

4) \times *A. mixtum* Nym., Consp. Fl. Eur. suppl. II (1889) 179.—*Lappa mixta* Simonk. Term. Füz. 2 (1878) 145.—*L. ritschliana* Aschers. in Berl. Deutsche bot. Ges. IX (1891) 99.—*L. minor* \times *tomentosa* Porc. Fl. distr. Roman Nasend. in Transilv. (1885) 113.—*A. minus* subsp. *euminus* \times *A. tomentosum* Aréne in Bull. Jard. Bruxelles, XX (1950) 126.—**Exs.**: Callier, Fl. Siles, exs. No. 1309.—*European Part*: Baltic Region, Ladoga-Ilmen (Lake Dubets), Upper Volga (Melenki), Trans-Volga Region (vicinity of Pugachev, Buguruslan District), Volga-Kama (Kirov, Ufa). Crimea?

8. **A. radula** Juz. and C. Serg. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVIII (1957) 300. *A. platylepis* Sosn. in Sched. non Boiss. and Bal.

Biennial. A tall plant; stem erect, strong, longitudinally deeply sulcate, strongly rugose at least in upper part due to strong conical tubercles, sometimes partly finely tomentose. Leaves petiolate, somewhat hard, ovate, with cordate base, deeply crenate-toothed, with variable teeth, often quite large, terminating in rather long and strong spine; green and sparsely short-setose above; rough, densely grayish- or white-tomentose beneath. Common inflorescence corymbose with strong divaricate branches; peduncles up to 1.4 cm long. Capitula crowded,

globose, excluding cusp 1.5–2 cm, with cusps 2.5–3 cm wide, 1.5–2.5 cm long. Involucre entirely glabrous; involucre bracts ciliate-toothed, their cusps narrow-lanceolate, almost three-ridged, with apical hook, recurved in outer involucre bracts, rather short, erect and squarrose in inner bracts; inner involucre bracts linear, gradually broadened upward and later gradually narrowed into spiny cusp (in innermost bracts without hook), very scarcely fimbriate-toothed along upper margin, purple in upper part. Corolla not or slightly longer than involucre bracts, purple on outer side, with scattered glandular hairs; tube 6.5 mm long, limb about 8 mm long, with 4 mm long lobes. Anthers 6–7.5 mm long, their apical appendages abruptly narrowed at apex, basal appendages simple. Achenes about 6 mm long, 2.5 mm wide, flattened-obovoid-pyramidal, 107 ribbed, with rather distinct, somewhat sharp tubercles on ribs, brown with dark brown spots and stripes, somewhat rugose mainly in upper part and at base. Flowering VII.

Among shrubs, near habitations.—*Caucasus*: Eastern Transcaucasia. Described from Chingyly on Lake Sevan. Type in Leningrad.

GENUS 1577. *Anura* (Juz.) Tschern.^{1, 2}

In Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR XVII (1962) 107.—*Cousinia* sect. *Anura* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 512, 546.

Capitula homogamous, with fewer florets (three to five), all florets bisexual, tubular; involucre bracts imbricate, appressed, terminating in very short, incurved cusp; receptacles setose, receptacular bristles smooth; filaments free; anthers without basal appendages; achenes with straight hilum, usually fused with receptacle, as a rule, only one achene in a capitulum; pappus setose, pappus bristles scabrous, readily shedding individually.

Perennial herb, densely covered at base with numerous reticulate remains of old leaves, basal leaves in well-developed rosette, cauline leaves sessile.

Type species: *A. pallidivirens* (Kult.) Tschern.

1. *A. pallidivirens* (Kult.) Tschern. in Bot. Mag. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 107.—*Cousinia pallidivirens* Kult. in Tr. Sredneaz. Gos. Univ., Ser. VIII C, VI (1929) 3; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR 8 (1940) 546.—*lc.*: Kult. op. cit., Fig. 2.

¹Treatment by O.V. Tscherneva.

²From the Greek word literally meaning "tailless."

Perennial. Stem densely covered at base with numerous reticulate remains of previous year's leaves, erect, 25–50 cm high, striate-sulcate, arachnoid-hairy pubescent, sparsely and paniculately branched from base, in turn, branches repeatedly branched, each twig with one capitulum; inflorescence dense, corymbose-paniculate. Leaves coriaceous, glabrous above with reticulate prominent venation, grayish tomentose beneath; basal leaves petiolate with basally broadened petioles, ovate, almost entire or sometimes very finely prickly-toothed, slightly crimped along margin, apex prickly-acuminate, cauline leaves very abruptly reduced upward, lower leaves sessile, semiamplexicaul, base large prickly-toothed on both sides, ovate, very finely prickly-toothed or with almost entire, apex with short prickly cusp; middle leaves sessile, semiamplexicaul, coarsely prickly-toothed at the base, ovate-oblong, finely prickly-toothed; upper leaves oblong, sessile, sparsely prickly-toothed. Capitula numerous, on 108 fragile short peduncles, 15 mm long and 5 mm wide, somewhat oblong-cylindrical, glabrous, with fewer florets (three to five). Involucral bracts appressed, slightly divergent at apex, with very short incurved cusp, slightly carinate, greenish in the middle, with white border; inner bracts almost membranous, obtuse, very short-acuminate; corolla whitish or pale yellow. Anthers without tail-like basal appendage. Receptacular bristles smooth. Achenes 8 mm long and 3 mm wide, white, with longitudinal dark striations, oblongate-oval, usually only one achene in capitulum. Flowering VI–VII; fruiting VII–VIII. (Plate XXIX, Fig. 2).

Middle mountain belt.—*Soviet Central Asia*: Pamiro-Alai (Nurata Mountains). Endemic. Described from the Aktau Mountains near Tamana. Type in Tashkent.

GENUS 1578. *Cousinia* Cass.^{1, 2}

Cass. in Dict. sc. Nat. XLVII (1827) 503; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 6; Boiss. Fl. or. III (1875) 458; Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 181; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 507.

Capitula homogamous, all florets bisexual, tubular; involucral bracts usually imbricate, with strong cusp. Receptacle setose; receptacular bristles smooth or scabrous. Filaments free; anthers connate into tube; apical appendages of anthers variously shaped, basal appendages plumose.

¹Treatment by O.V. Tscherneva.

²Named after the 19th-Century French historian, Victor Cousin, or after Louis Cousin, member of the French Academy of 17th Century.

Achenes with straight hilum, obovbid or obpyramidal; pappus setose, bristles scabrous, usually yellowish, readily shedding, less often pappus absent.

Annual, biennial, often monocarpic perennial or perennial herbs, or semishrubs. Leaves alternate, undivided, pinnatisect, or lyrate; basal leaves often rosulate. Stems leafy, less often leafless, simple or branched with capitula aggregated in racemose or paniculate, less often in semicorymbose inflorescence.

The genus comprises more than 500 species, mainly distributed in Northwest and Soviet Central Asia.

Type species: *C. orientalis* (Adams) C. Koch.

Economic Importance: Some species of *Cousinia* are rubber producers. For example, according to the results of analysis of the Laboratory of Rezinotrest, *C. resinosa* Juz. contains 7.88% rubber and 67.92% resin. The presence of rubber has also been confirmed in other species close to *C. resinosa*, as also in *C. vicaria*, *C. dolichophylla* and *C. lanata*. Some species of the genus are good fodder plants, e.g., *C. triflora*, *C. resinosa*, etc.

109 *Note.* The proposed classification of the genus cannot be considered final, because a phylogenetic classification can be proposed only after a monographic study of the genus as a whole. The classification proposed here is mainly a further development of the system proposed by S.V. Juzepczuk in Tr. Tadz. Bazy Akad. Nauk SSSR (8, 1940), since, in fact, the available classifications of the genus by A.A. Bunge (1865) and K. Winkler (1897), especially by the latter, err toward extreme artificiality.

Juzepczuk, in his above-cited work, reported that he borrowed this classification from a still unpublished review of the Soviet Central Asia species of *Cousinia*, which, unfortunately, remains unpublished and is not traceable even in his archives. Juzepczuk worked on *Cousinia* for many years and was a great authority on this genus; unfortunately, he could not complete the work. Thus, I share the responsibility of describing, among other species, also those mentioned in the herbarium of Juzepczuk, whom I consider as my teacher.

1. Annuals, without well-developed rosette of basal leaves, root not thicker than stem 2.
- + Biennials or perennials with well-developed rosette of basal leaves (often withering before flowering or fruiting); root thicker than stem (or thicker than individual stems, if stems many) 16.
2. Receptacular bristles distinctly or weakly scabrous 3.
- + Receptacular bristles smooth 7.
3. Capitula almost globose, glabrous; involucrel bracts upright, with

- fine, smooth, straight cusp; corolla pink
 244. **C. tenella** Fisch. and Mey.
- + Capitula broadly cylindrical or ovoid-oblong; involucrel bracts usually with decurved or horizontal cusp; corolla whitish or grayish yellow, if pale pink, capitula always arachnoid-hairy 4.
4. Capitula clustered terminal, ovoid oblong, 4 mm wide (excluding cusps) 169. **C. angusticeps** Juz.
- + Capitula solitary terminal, 6–11 mm wide (excluding cusps)... 5.
5. Receptacular bristles very long and strongly scabrous; corolla grayish-yellow; cusps of involucrel bracts scabrous
 30. **C. pygmaea** Winkl.
- + Receptacular bristles very long and weakly scabrous; corolla whitish, pale pink or creamish, cusp of involucrel bracts smooth 6.
6. Involucrel bracts with sharply decurved weak cusp
 167. **C. tedshenica** Tschern.
- 110 + Involucrel bracts with horizontal, narrow-lanceolate, long cusp ...
 168. **C. murgabica** Tschern.
7. Cauline leaves narrowed toward both ends, not amplexicaul; stem strongly branched dichotomously from base; involucrel bracts with deltoid-lanceolate or narrow-lanceolate, somewhat uncinat cusp 8.
- + Cauline leaves (at least upper) amplexicaul; stem somewhat sparsely branched dichotomously; involucrel bracts with subulate-linear or narrow-lanceolate, but always straight, cusp 9.
8. Stem glabrous, lustrous; involucrel bracts thick, carinate, deltoid-lanceolate, with straight cusp; outer bracts horizontal; inner bracts white 232. **C. minuta** Boiss.
- + Stem partly floccose-arachnoid-hairy; involucrel bracts narrow-lanceolate, all erect; outer bracts narrowed into weakly uncinat cusp; inner bracts purple 170. **C. eugenii** Kult.
9. Leaves green on both sides; multicellular hairs mainly along veins, and sessile glandular hairs scattered beneath throughout; arachnoid-hairy pubescence sparse 10.
- + Leaves grayish or nearly white-tomentose beneath, arachnoid-hairy pubescence predominant 14.
10. Involucrel bracts straight, erect or horizontal 11.
- + Involucrel bracts more or less decurved or nearly falcate 13.
11. Leaves glandular above; capitula 9–10 mm wide (excluding cusps) 161. **C. polytimetica** Tschern.
- + Leaves with multicellular hairs above, isolated glandular hairs scattered throughout; capitula 5–8 mm wide (excluding cusps) 12.

12. Capitula 5–6 mm wide (excluding cusps); involucre bracts 5–8 mm long, upward spreading, with fine cusps; achenes glabrous, with undivided, longitudinal wings as thick ribs 159. *C. dichotoma* Bge.
- + Capitula 7–8 mm wide (excluding cusps); involucre bracts 9–15 mm long, horizontal or erect, but always with strong deltoid cusp; achenes pitted-rugose, with emarginate longitudinal wings as thick ribs 160. *C. erectispina* Tschern.
13. Capitula 5–6 mm wide (excluding cusps); involucre bracts with falcately decurved cusp 163. *C. sylvicola* Bge.
- 111 + Capitula 7–8 mm wide (excluding cusps); involucre bracts with somewhat decurved cusp 162. *C. patentispina* Tschern.
14. Stem glandular, with arachnoid-hairy pubescence leaves sparsely tomentose beneath; achenes with undivided longitudinal wings as thick ribs 166. *C. orthacantha* Tschern.
- + Stem eglandular; leaves sparsely grayish-tomentose beneath; achenes with longitudinal emarginate wings, as thick ribs 15.
15. Leaves glabrous above; capitula 8–9 mm wide (excluding cusps); involucre bracts eglandular, with horizontal cusp; inner bracts purple 165. *C. pusilla* Winkl.
- + Leaves glandular above; capitula 11–14 mm wide (excluding cusps); involucre bracts profusely glandular, with erect broad cusp; inner bracts non-pigmented 164. *C. bungeana* Rgl. and Schm.
16. Involucre bracts, at least outer and middle or only middle bracts, cristate-prickly-toothed, i.e., with two to seven pairs of thin horizontal spinules, without appendages 17.
- + Involucre bracts glabrous along margin, or scabrous, never cristate-spinose-toothed, but some bracts spinescent 25.
17. Capitula 12–20 mm wide (excluding cusps), solitary on stem or few; receptacular bristles unequal, longest ones slightly scabrous or with one or two crenations; corolla pale yellow, whitish, or light pink 18.
- + Capitula 4–10 mm wide (excluding cusps), always aggregated at branch tips in corymbose heads or lax panicles; receptacular bristles smooth; corolla yellow 20.
18. Capitula globose-cylindrical, 15–20 mm wide (excluding cusps); leaves basal, long-petiolate, entire with remote, thin, short and basally frequent spines continuing on petiole; corolla pale yellow; receptacular bristles very long with one or two crenations 118. *C. rigida* Kult.
- + Capitula globose-ovoid or oblong-cylindrical, 12–15 mm wide (excluding cusps); basal leaves short-petiolate, with broad petioles, crenate-prickly toothed; corolla whitish or light pink; receptacular bristles very long, somewhat scabrous 19.

19. Leaves on both sides finely gray-tomentose, more densely beneath; stem white arachnoid-hairy 119. *C. mindshelkensis* B. Fedtsch.
- 112 + Leaves light green on both sides, glossy, densely glandular, sometimes finely white-tomentose along margin or entirely; stem glandular, with papillae scattered throughout 120. *C. gomolitzkii* Juz.
20. Capitula with fewer florets, usually with three florets; achenes usually solitary 125. *C. triflora* Schrenk.
- + Capitula with many florets; achenes usually fewer or numerous 21.
21. Basal Leaves 18–20 cm long and 3.5 cm wide, oblong-lanceolate; capitula on very short peduncles, readily shedding; outer and middle involucre bracts with scarious margin from base, not so in upper one-third, but with two or three pairs of horizontal spines on both sides up to apex; lateral and apical spines, uncinately incurved; anther tube smooth 46. *C. anomala* Franch.
- + Basal leaves 25–50 cm long and 10–25 cm wide, ovate-lanceolate or elliptical; capitula not shedding; horizontal spines straight along margin of outer and middle involucre bracts; tip not uncinately; if apical spine uncinately, then usually up to 3 mm long; anther tube short-pilose or sparsely sericeous above 22.
22. Inflorescence compact, broadly corymbose; capitula 8–10 mm wide (excluding cusps) 23.
- + Inflorescence lax paniculate; capitula 6–7 mm wide (excluding cusps) 24.
23. Capitula 22 mm long and 10 mm wide (excluding cusps); leaves sparsely arachnoid-hairy above, with glandular hairs scattered throughout; outer involucre bracts more or less inclined, erect 123. *C. horrescens* Jus.
- + Capitula 17–19 mm long, 8–9 mm wide (excluding cusps); leaves sparsely arachnoid-hairy above, later glabrous, eglandular; all involucre bracts more or less appressed 121. *C. alberti* Rgl. and Schmalh.
24. Basal leaves sparsely glandular; involucre bracts numerous (about 60), with long uncinately cusp 122. *C. pentacantha* Rgl. and Schmalh.
- + Basal leaves densely glandular; involucre bracts about 40–50, acuminate into long, slightly bent spine 124. *C. pentacanthoides* Juz.
25. Involucre bracts with uncinately incurved apical cusp 26.
- + Involucre bracts with straight apical cusp 30.
26. Involucre bracts (outer and middle) with one or two large glandular hairs on both sides along margin 27.

- 113 + Involucral bracts eglandular along margin 28.
27. Capitula densely arachnoid-hairy tomentose
 43. **C. tomentella** Winkl.
 + Capitula glabrous 42. **C. umbrosa** Bge.
28. Capitula globose, oblong-cylindrical, or almost ovoid, 10–12 mm wide, with long subulate cusps 29.
 + Capitula ovoid readily shedding, 5–6 mm wide, with short fine cusps 45. **C. lappacea** Schrenk
29. Basal and lower cauline leaves 20–60 cm long (including petiole), ovate, more or less cordate, apically roundish and not spinescent, crenate-lobate, glabrous and green above, finely gray-tomentose beneath 44. **C. pseudarctium** Bornm.
 + Basal leaves much smaller, pinnatipartite or pinnatilobate, acuminate-spinescent, with finely prickly-toothed lobes; green and sparsely glandular above; green, densely glandular, with arachnoid-hairy pubescence of long, flexuous, flattened hairs beneath
 41. **C. arctioides** Schrenk
30. Stem more or less uniformly winged throughout or almost so (sometimes wingless only in inflorescence branches and on lower internodes) 31.
 + Stem entirely wingless or discontinuously winged because of sheathing bases of cauline leaves 64.
31. Leaves soft, basal and lower cauline leaves entire, crenate-toothed or with two pairs of teeth only at base 32.
 + Leaves thin coriaceous, basal and lower cauline leaves pinnatipartite or pinnatisect, lyrate-lobate or pinnatilobate 44.
32. Involucral bracts numerous (more than 100), narrow, with fine subulate cusp 33.
 + Involucral bracts fewer (20–50), wider, with more or less broadly lanceolate cusp 35.
33. Capitula glabrous, 10–12 mm wide
 219. **C. leioccephala** (Rgl.) Juz.
 + Capitula arachnoid, 8–15 mm wide 34.
34. Leaves acuminate above; capitula globose-oblong, 12–15 mm wide (excluding cusps); inner involucral bracts with narrow-ovate, about 1 mm wide, gradually narrowed appendages
 218. **C. severtzovii** Rgl.
 + Leaves arachnoid-hairy above; capitula ovoid, 8–10 mm wide (excluding cusps); inner involucral bracts with broadly ovate, about 4 mm wide, abruptly narrowed apical appendages
 220. **C. pulchella** Bge.
- 114 35. Capitula in groups of few, terminal on branches, on short peduncles or sessile, readily shedding, 4–5(6) mm wide (excluding cusps) 36.

- + Capitula solitary terminal on branches, persistent, (6)8–25 mm wide 37.
- 36. Plants about 60 cm high, with 2–3 mm wide wings on stem; involucre bracts 25, about 2.5 mm wide 47. *C. pseudomollis* Winkl.
- + Plants 15–40 cm high, with narrower, 1–2 mm wide wings on stem; involucre bracts more numerous, about 40, approximately 1.5 mm wide 48. *C. leptacantha* (Bornm.) Juz.
- 37. Biennials with one stem; stem wings usually crenate-toothed, 3–8 mm wide; inner involucre bracts membranous, often extended in appendages 38.
- + Perennials, usually with few stems; stem wings entire, 1–2 mm wide, inner involucre bracts gradually narrowed, without membranous appendages 42.
- 38. Plants almost entirely nonprickly in vegetative parts, leaves and stem wings undivided; corolla greenish yellow 222. *C. regelii* Winkl.
- + Plants more or less prickly, leaves and stem wings spinose-toothed; corolla pink or purple 39.
- 39. Receptacular bristles scabrous; inner involucre bracts membranous, brown with light colored margin 223. *C. arachnoidea* Fisch. and Mey.
- + Receptacular bristles smooth; inner involucre bracts with membranous, light colored, 3–5 mm wide appendages 40.
- 40. Basal and lower cauline leaves obovate-orbicular or ovate, crenate-spinose-toothed or weakly lobate.... 172. *C. macroptera* C.A.M.
- + Basal and lower cauline leaves oblong, remotely lobate or finely spinose-toothed 41.
- 41. Plants entirely gray-tomentose; capitula 10–12 mm wide (without cusps); outer involucre bracts about 2 cm long; inner bracts with obtuse, about 3 mm wide appendages ... 227. *C. ortholepis* Juz.
- + Plants less pubescent; capitula 7–9 mm wide; outer involucre bracts shorter, about 1 cm long; inner bracts with broader, about 5 mm wide, appendages 226. *C. platylepis* Schrenk
- 42. Capitula on short peduncles, aggregated at branch tips usually in twos; involucre bracts with fine, short erect cusp 140. *C. alaica* Juz.
- 115 + Capitula usually solitary at tips of stem and branches; involucre bracts with fine falcate cusp 43.
- 43. Inner involucre bracts broadened above, membranous, roundish-ovate, with short and fine cusp; corolla deep yellow; receptacular bristles smooth 141. *C. fallax* Winkl.
- + Inner involucre bracts linear, thicker, acute; corolla whitish; receptacular bristles scabrous 139. *C. grisea* Kult.

44. Receptacular bristles scabrous 45.
 + Receptacular bristles smooth 53.
45. Wings of stem up to (4)5–7 mm wide, spinose-toothed or almost pinnatifid; capitula 10–25 mm wide; inner involucre bracts with wide membranous appendages, if appendages inconspicuous, then capitula always large, 22 mm wide 46.
 + Wings of stem 2–4 mm wide, sometimes with solitary teeth; capitula 6–10 mm wide; inner involucre bracts without appendages 50.
46. Stem weakly branched with three or seven capitula; leaves soft, almost glabrous, all leaves pinnatisect 147. *C. ulotoma* Bornm.
 + Stem strongly branched, with much larger number of capitula; leaves thin-coriaceous, weakly spinose; middle and upper leaves distinct in shape from basal and lower cauline leaves and not pinnatisect 47.
47. Involucre bracts squarrose with straight cusp; corolla pink or (light) grayish-yellow 48.
 + Involucre bracts with arcuately bent cusp; corolla deep yellow 49.
48. Stem branched only in upper half, with about 20 capitula; involucre bracts about 45; florets 2–3 mm longer than involucre bracts, with purple corona 143. *C. kuekenthali* Bornm.
 + Stem branched from base, with 25–65 capitula; involucre bracts about 75; florets about 5–7 mm longer than involucre bracts, with grayish-yellow corona 144. *C. neglecta* Juz.
49. Entire plant moderately pubescent; capitula 6 mm wide (excluding cusps); leaves lanceolate, almost undivided, with one or two pairs of teeth at base 146. *C. decurrentifolia* Juz.
 + Entire plant densely pubescent; capitula about 10 mm wide; leaves pinnatisect 145. *C. dissectifolia* Kult.
50. Corolla yellow 157. *C. botschantzevii* Juz.
 + Corolla pink 51.
51. Basal leaves pinnatisect, almost without spines, grayish on both sides, arachnoid-hairy tomentose; capitula densely arachnoid-hairy; involucre bracts narrowed into long carinately sulcate spine 221. *C. pauciramosa* Kult.
 + Basal leaves lyrate-pinnatifid, green above, loosely arachnoid-hairy, capitula weakly arachnoid-hairy; involucre bracts narrowed into strong short cusps 52.
52. Plants green, scantily arachnoid-hairy pubescent; capitula 15–25 mm wide (excluding cusps); inner involucre bracts broadened above into almost roundish membranous appendage, usually pink or purple 224. *C. microcarpa* Boiss.

- + Plants grayish-green, with more densely pubescent stem and leaves; capitula 10–15 mm wide; inner involucrel bracts broadened into ovate whitish or light brown appendages 225. **C. ninae** Juz.
- 53. Capitula 4–10 mm wide (excluding cusps)..... 58.
- + Capitula 11–15–25 mm wide (excluding cusps)..... 54.
- 54. Capitula globose-pyramidal, 25 mm wide (excluding cusps); involucrel bracts erect or somewhat horizontal, stiff, carinate; achenes without pappus 171. **C. hystrix** C.A.M.
- + Capitula broadly ovoid to broadly cylindrical; 11–15 mm wide; involucrel bracts with subulate, decurved thin cusp; all achenes with pappus..... 55.
- 55. Stem weakly branched; branches long, usually wingless below capitula, single headed; basal leaves deeply pinnatifid, with linear crenate-spinose-toothed lateral lobes 56.
- + Stem cymosely branched above, branches somewhat reduced, narrow-winged right up to capitula; basal leaves pinnatisect, with unequal, narrow-lanceolate lateral lobes, in turn pinnatifid and spinescent 57.
- 56. Capitula ovoid, 12–14 mm wide (excluding cusps); involucrel bracts narrowed into strongly divergent, 4–4.5 mm long, falcate cusp 23. **C. dolichoclada** Juz.
- + Capitula globose-cylindrical, 15 mm wide; involucrel bracts narrowed into weakly divergent 2–3 mm long falcate cusp 22. **C. sogdiana** Bornm.
- 57. Stem and leaves white arachnoid-hairy; capitula globose ovoid, 12–15 mm wide (excluding cusps); involucrel bracts falcate with subulate, up to 3 mm long cusp... 20. **C. dissecta** Kar. and Kir.
- + Stem and leaves white-tomentose; capitula oblong-ovoid, 11–12 mm wide; involucrel bracts with abruptly recurved, 6–7 mm long cusp. 21. **C. perovskiensis** (Bornm.) Juz.
- 117 58. Corolla whitish or pink; if pale yellow, then plant very densely white-tomentose; capitula small, with three to six florets, aggregated at branch tips; achenes glabrous, smooth, roundish above..... 59.
- + Corolla yellow; anther tubes purple; plants never densely white-tomentose; achenes three or four-angled, toothed above..... 60.
- 59. Plants biennial; capitula, like entire plant, very densely white-tomentose with three to six florets; corolla pale yellow, later turning pink..... 50. **C. mollis** Schrenk
- + Plants perennial; capitula, like entire plant, more pubescent, greenish, with 8–10 florets; corolla pink..... 49. **C. fascicularis** Juz.
- 60. All involucrel bracts, except inner, falcately decurved 61.
- + Involucrel bracts erect, sometimes outer bracts attenuate into divergent cusp 63.

61. Wings of stem 1–2 mm wide; capitula truncate at base; involucre bracts sparsely glandular dorsally 28. *C. turkmenorum* Bornm.
 + Wings of stem 4–5 mm wide; capitula roundish at base; involucre bracts eglandular 62.
62. Capitula 4–5 mm wide (excluding cusps); involucre bracts cuspidate with short, 1–1.5 mm long, slightly bent cusp 25. *C. oxiana* Tschern.
 + Capitula 9–10 mm wide (excluding cusps); involucre bracts narrowed in long, about 5 mm long, abruptly falcately decurved cusp 24. *C. alata* Schrenk
63. Wings 2–3(5) mm wide, all involucre bracts erect, sometimes with very short cusp 26. *C. psammophila* Kult.
 + Wings usually up to 3–15 mm wide; outer involucre bracts attenuate in deflected erect cusp; middle bracts with erect cusp 27. *C. schistoptera* Juz.
- 64(30) Semishrubs or small shrubs 65.
 + Herbs, perennial or biennial 74.
65. Capitula 4–6 mm wide, aggregated at stem and branch tips 66.
 + Capitula solitary, on long slender peduncles at stem and branch tips 68.
66. Corolla pink or whitish 67.
 + Corolla yellow, with purple anther tubes 6. *C. hypopolia* Bornm. and Sint.
- 118 67. Leaves narrow oblong-lanceolate; basal leaves 8–9 cm long, 15–17 mm wide (including lobes); involucre bracts with thin, somewhat falcate cusp; corolla pink or purple 4. *C. leptcephala* Fisch. and Mey.
 + Leaves broad lanceolate, 10–15 cm long and 40–45 mm wide; involucre bracts with thin, short, deflected erect cusp; corolla whitish 5. *C. albiflora* (Bornm. and Sint.) Bornm.
68. Capitula 5 mm wide (excluding cusps); involucre bracts closely appressed, with very short erect cusp 2. *C. turcomanica* Winkl.
 + Capitula 7–12 mm wide; involucre bracts narrowed in thin, arcuately or somewhat falcately decurved, less often with almost horizontal cusp 69.
69. Leaves glabrous and green above, densely white-tomentose beneath; involucre bracts with short, almost arcuate cusp; corolla whitish, with purple anther tubes 18. *C. antonowii* Winkl.
 + All leaves grayish-green and arachnoid-hairy above, densely white-tomentose beneath; involucre bracts with strongly falcately decurved or horizontal cusp; corolla yellow or flesh-red 70.

70. Tall, strongly flexuously branched semishrub; leaves of vegetative shoots sessile, in groups of three to six leaves on flowering shoot alternate, one or two, oblong-lanceolate, 3–8 cm long and 3–5 mm wide 1. *C. badghysi* Kult.
 + Short, many stemmed semishrubs; leaves sessile, usually amplexicaul, basal leaves petiolate, 7–10 cm long and 20–35 mm wide 71.
71. Corolla flesh-red; involucre bracts with more or less horizontal cusp 9. *C. oreoxerophila* Kult.
 + Corolla yellow; involucre bracts with arcuately decurved cusp 72.
72. Stem sparsely leafy; Upper leaves few, strongly reduced, usually not enclosing capitula 10. *C. chaetocephala* Kult.
 + Stem densely leafy; upper leaves numerous, usually enclosing capitula 73.
73. All leaves crenate-spinose-toothed
 8. *C. stahliana* Bornm. and Gauba
 + All leaves almost entire, only with one or two short spinose teeth 7. *C. mucida* Kult.
74. Cauline leaves few, almost undivided, somewhat undeveloped (much smaller than basal leaves), hence stem appearing almost leafless (especially above); corolla golden-yellow; stem always with remains of petioles of old leaves near base; if remains present, then membranous 75.
 119 + Cauline leaves (at least lower and middle) more or less well developed, stem more or less leafy throughout; corolla purple, white or pale yellow, or golden yellow, but in latter case leaves amplexicaul or pinnatisect; stem basally with, sometimes without, remains of old petioles 82.
75. Basal leaves undivided or weakly pinnatilobate 76.
 + Basal leaves pinnatipartite, sometimes undivided only in lower half or pinnatisect throughout 79.
76. Involucre bracts with more or less strongly deflexed cusp
 128. *C. refracta* Juz.
 + Involucre bracts with erect or horizontal cusp 77.
77. Capitula 10 mm wide (excluding cusps); involucre bracts with erect, thin, 2–4 mm long cusp 78.
 + Capitula 10–12 mm wide; involucre bracts with horizontal, 5–7 mm long cusp 127. *C. medians* Winkl.
78. Basal leaves usually undivided, sometimes with one or two pairs of lateral lobes at base 126. *C. aurea* Winkl.
 + Basal leaves pinnatilobate throughout or only in upper half
 129. *C. schmalhauseni* Winkl.

79. Basal leaves pinnatisect throughout 80.
 + Basal leaves undivided in lower half
 130. *C. karatavica* Rgl. and Schmal.
80. Involucral bracts with erect or erect-spreading, very short,
 sometimes almost dart-shaped cusp
 133. *C. korolkovii* Rgl. and Schmal.
 + Involucral bracts with divergent, falcate or strongly deflexed cusp
 81.
81. Cusps of involucral bracts divergent, falcate
 131. *C. haesitabunda* Juz.
 + Cusps of involucral bracts strongly deflexed, straight
 132. *C. chlorantha* Kult.
82. Leaves green above, hard coriaceous, with very prominent, white,
 glossy, veins, usually with scattered white spines throughout
 40. *C. raddeana* Winkl.
 + Veins of leaves never bearing spines, often with or without apical
 spines 83.
83. Biennial or perennial monocarpic plants with one-leafed, usually
 nonfibrous root 84.
 120 + True perennials with many-branched strongly fibrous root ... 183.
84. Outer and middle involucral bracts abruptly narrowed medially,
 later broadening in rather wide spatulate appendages 85.
 + Outer and middle involucral bracts gradually narrowed in cusp or
 abruptly narrowed at transition in narrow, trihedral, subulate cusp
 96.
85. Receptacular bristles smooth or crenulate 86.
 + Receptacular bristles scabrous 90.
86. Monocarpic perennials, with thickened root collar, covered with
 remains of old leaves, and woody root 87.
 + Biennials, usually with unthickened root collar, roots not woody
 89.
87. Anther tubes velutinous due to fine, flexuous, arachnoid-hairs
 148. *C. lasiosiphon* Juz.
 + Anther tubes glabrous 88.
88. Branches and stem densely leafy; leaves long, broadly decurrent;
 appendages of involucral bracts carinate, with two opposite teeth
 at base, spinescent 155. *C. beckeri* Trautv.
 + Leaves usually crowded in lower part of stem, stem and branches
 almost leafless above; leaves not decurrent; involucral appendages
 coriaceous, green, more or less sulcate, deltoid-triangular, shortly
 spinescent, smooth along margin, 7–12 mm wide at base and 12–
 20 mm long 154. *C. freynii* Bornm. and Sint.
89. Stem arachnoid-hairy floccose; leaves almost entire; capitula

- globose, 25–35 mm wide (excluding cusps)..... 230. *C. simulatrix* Winkl.
- + Stem less arachnoid-hairy; leaves finely spinose-toothed; capitula ovoid-oblong, smaller, 15–20 mm wide..... 231. *C. vvedenskyi* Tschern.
90. Monocarpic perennials; appendages of involucre bracts rather wide, with two to four pairs of spinescent teeth along margin; achenes ribbed, toothed above 91.
- + Biennials; appendages of involucre bracts usually smooth or scabrous along margin, but always without spinescent teeth; achenes smooth, apically obtuse or indistinctly longitudinally ribbed, but then corolla yellow 94.
91. Corolla yellow; anther tubes pink..... 150. *C. cynaroides* (MB.) C.A.M.
- + Corolla pink; anther tubes pink or yellow 92.
- 121 92. Basal leaves lyrate, with large, roundish-cordate terminal lobe; cauline leaves broadly and shortly excurrent along stem..... 152. *C. lyrata* Bge.
- + Basal leaves broad-lanceolate, pinnatifid, or finely and crenate-spinose-toothed; cauline leaves sessile, broadly and long decurrent 93.
93. Plants 80–100 cm high, capitula 40 mm wide (excluding cusps) 149. *C. onopordioides* Ldb.
- + Plants 15–30 cm high; capitula 15–17(25) mm wide (excluding cusps) 153. *C. purpurea* C.A.M.
94. Corolla yellow; achenes indistinctly ribbed 151. *C. macrocephala* C.A.M.
- + Corolla pink; achenes smooth, globose above 95.
95. Basal leaves lyrate, with large ovate terminal lobe; inner involucre bracts membranous, two times as long as adjacent involucre bracts, forming “corona” 228. *C. ferganensis* Bornm.
- + Basal leaves pinnatisect into narrow-deltoid lobes; inner involucre bracts not forming corona 229. *C. subappendiculata* Kult.
96. Monocarpic perennials with strongly thickened root collar; root collar resinous-sticky in living plant, sometimes covered with numerous remains of old leaves 97.
- + Biennials with relatively slender root, if monocarpic, then always without resinous-sticky root collar 126.
97. Stem glabrous, whitish, glossy, sometimes finely arachnoid-hairy pubescent; corolla pink; leaves usually not decurrent, often all leaves, except upper, petiolate or sessile, and very indistinctly decurrent 98.
- + Stem always pubescent, never glossy; corolla yellow or whitish; cauline leaves often very broadly long-decurrent 99.

98. Stem repeatedly divaricately branched, terminating in umbelliform branching, comprising two to eight short branchlets bearing capitula; capitulum solitary borne at base of fork; umbelliform branching appears to have common involucre of modified leaves; capitula 6–7 mm wide (excluding cusps); involucre bracts 12–14, middle bracts 35–40 mm long, with sulcate-deltoid divergent cusp; receptacular bristles weakly scabrous above 51. *C. eryngioides* Boiss.
- + Stem repeatedly dichotomously branched; capitula at base of dichasia sessile, others on peduncles, 4–5 mm wide; involucre bracts more numerous, about 25, middle bracts 15 mm long, terminating in short, almost horizontal, deltoid cusp; receptacular bristles smooth 52. *C. margiana* Juz.
- 122
99. Florets three to five in capitulum 100.
- + Florets more numerous in capitulum, in any case not less than 10 101.
100. Capitula almost sessile, cylindrical, with globose or somewhat narrowed base; lower and middle involucre bracts with somewhat deflected cusp; corolla whitish 88. *C. dichromata* Kult.
- + Capitula on short peduncles, ovoid, with truncate base; lower and middle involucre bracts terminating in short and erect cusp; corolla yellow 89. *C. egens* Juz.
101. Capitula numerous, all or at least those terminal on branches of common inflorescence more or less approximate or aggregated in heads 102.
- + Capitula few, solitary, in lax, more or less paniculate inflorescence 118.
102. Capitula aggregated at apices of branches in groups of 15–40, forming heads; capitula narrow-cylindrical 103.
- + Capitula aggregated in groups of 3–12 in relatively dense inflorescence, but not forming heads 104.
103. Heads dense; apical leaves almost as long as head, as if forming common involucre; stem white-tomentose; lateral lobes of basal leaves terminating in strong cusp 91. *C. agelocephala* Tschern.
- + Heads more lax; apical leaves shorter than head and usually not resembling common involucre; stem floccose-arachnoid-hairy; lateral lobes of basal leaves terminating in short weak cusp 90. *C. congesta* Bge.
104. Capitula narrow-ovoid or cylindrical, 3–6 mm wide (excluding cusps) 105.
- + Capitula ovoid or broadly ovoid, 7–14 mm wide (excluding cusps) 109.

105. Involucral bracts few (10–15), 3–4 mm wide, coriaceous, carinate toward apex, acute 87. **C. platystegia** Tschern.
 + Involucral bracts somewhat narrower, herbaceous, somewhat flat, gradually attenuate into cusp 106.
106. Capitula narrow-cylindrical; involucral bracts closely appressed with short, 2–4 mm long, erect cusp, without constriction at base 86. **C. maracandica** Juz.
 + Capitula narrow-ovoid; involucral bracts with distinct constriction at the transition into longer (about 10 mm long) erect cusp 107.
- 123 107. Cauline leaves rather long-decurrent; capitula about 20 mm long and 6 mm wide (excluding cusps); receptacular bristles weakly toothed above 85. **C. horridula** Juz.
 + Cauline leaves short-decurrent; capitula usually somewhat longer than 10–17 mm and about 4–6 mm wide; receptacular bristles smooth 108.
108. Capitula aggregated in relatively dense inflorescences, 10 mm long and 4 mm wide (excluding cusps); achenes 3 mm long 71. **C. syrdariensis** Kult.
 + Capitula usually solitary on peduncles, in relatively lax inflorescences, 17 mm long and 6 mm wide; achenes 4–4.5 mm long 72. **C. turkestanica** (Rgl.) Juz.
109. Plants tall, (40)60–100(150) cm high, with lax inflorescences; petioles of basal leaves usually spinose along sides up to base... 110.
 + Plants shorter, 15–60 cm high, with more compact, almost semicorymbose inflorescence; petioles of basal leaves without spines in lower part 113.
110. Very tall plants, 100–150 cm high, with almost 2 cm thick stem, involucral bracts flat, green, sparsely glandular dorsally, closely appressed to each other, with only slightly divergent short cusp. 92. **C. androsowii** Juz.
 + Plants somewhat shorter, (40)60–100 cm high, with slender stem; involucral bracts without glands, somewhat carinate, with almost trihedral, divergent, strong cusp 111.
111. Capitula 10 mm wide (excluding cusps) broadly ovoid; involucral bracts 20, upward spreading 79. **C. sporadocephala** Juz.
 + Capitula 6–9 mm wide (excluding cusps), ovoid or narrow-ovoid; involucral bracts about 25, with somewhat recurved cusp 112.
112. Middle involucral bracts usually not exceeding (in capitulum) florets; innermost bracts almost linear 77. **C. polycephala** Rupr.
 + Middle involucral bracts distinctly (by almost 5 mm) exceeding florets; innermost bracts almost spatulate 78. **C. finitima** Juz.

113. Capitula broadly ovoid, 12–14 mm wide (excluding cusps) ... 114.
 + Capitula smaller, 7–10 mm wide (excluding cusps) 115.
114. Capitula 13–14 mm wide (excluding cusps); middle involucre bracts 35 mm long, lanceolate, gradually acuminate in strong, carinately sulcate, 12–15 mm long, almost falcate-attenuate cusp 76. **C. scleracantha** Kult.
 + Capitula 12 mm wide (excluding cusps); middle involucre bracts 20–22 mm long, gradually acuminate in divergent, 6–10 mm long cusp 82. **C. ambigens** Juz.
- 124 115. All plants densely pubescent; capitula densely arachnoid-woolly 116.
 + Plants sparsely pubescent; capitula finely arachnoid-hairy 117.
116. Leaves short-decurrent; capitula 8–10 mm wide (excluding cusps); receptacular bristles scabrous 80. **C. spiridonovii** Juz.
 + Leaves broadly long-decurrent; capitula 7–9 mm wide; receptacular bristles smooth 81. **C. transoxana** Tschern.
117. Stem floccose-tomentose; leaves green and sparsely arachnoid-hairy above; capitula 8–10 mm wide (excluding cusps); achenes 5.5–6 mm long 84. **C. kazachorum** Juz.
 + Stem densely white-tomentose; leaves grayish-green due to fine, appressed, white tomentum; capitula 7–8 mm wide; achenes 4.5 mm long 83. **C. resinosa** Juz.
118. Receptacular bristles unequal, longest bristles scabrous above 119.
 + All receptacular bristles smooth 122.
119. Capitula about 20 mm wide (excluding cusps); all involucre bracts densely scabrous dorsally 73. **C. juzepeczukii** Tschern.
 + Capitula 12–17 mm wide; involucre bracts dorsally smooth 120.
120. Capitula basally somewhat roundish 75. **C. pungens** Juz.
 + Capitula basally noticeably foveate 121.
121. Leaves green and finely arachnoid-hairy above, white-tomentose beneath; upper cauline leaves ovate; involucre bracts 25–27; middle bracts narrowed in middle into carinate, erect cusp 74. **C. umbilicata** Juz.
 + Leaves on both sides arachnoid hairy-tomentose; more densely beneath; upper cauline leaves narrow-ovate or almost lanceolate; involucre bracts about 40; middle bracts abruptly narrowed from ovate base in long, almost horizontal cusp 65. **C. dolicholepis** Schrenk
122. Involucre bracts somewhat short, narrowed into short, erect, cusp 66. **C. vicaria** Kult.
 + Involucre bracts narrowed into long, more or less divergent cusp 123.

123. Cauline leaves divided into narrow lobes almost up to midrib; involucre bracts weakly scabrous at base 124.
 + Cauline leaves less deeply divided; or upper leaves often undivided; involucre bracts scabrous entirely 125.
124. Basal leaves bipinnatisect, with almost linear, prickly-pointed pinnules; capitula ovoid, 12–15 mm wide (excluding cusps); involucre bracts about 40 70. *C. tenuisecta* Juz.
 + Basal leaves pinnatisect; with pinnatifid lobes; capitula broadly cylindrical, (12)17–20 mm wide; involucre bracts about 60 69. *C. minkwitziae* Bornm.
125. Capitula ovoid, 10–15 mm wide (excluding cusps); involucre bracts strongly scabrous, weakly arachnoid-hairy; with somewhat squarrose or recurved wide cusp 68. *C. scabrida* Juz.
 + Capitula almost globose, 18–20 mm wide; involucre bracts with dense arachnoid-hairy tomentum, almost covering their more or less rough surface, and with strongly recurved, narrow cusp
 67. *C. angreni* Juz.
- 126(96). Receptacular bristles smooth 127.
 + Receptacular bristles scabrous 132.
127. Achenes glabrous, smooth 128.
 + Achenes ribbed or flattened with rather wide wings 129.
128. Corolla pink 188. *C. glabriseta* Kult.
 + Corolla yellow 189. *C. triceps* Kult.
129. Capitula globose, 13–15 mm wide (excluding cusps); involucre bracts numerous, terminating in fine, falcate cusp
 29. *C. olgae* Rgl. and Schm.
 + Capitula ovoid-cylindrical, if globose, then large, 25–30 mm wide; involucre bracts fewer, with broader, strong, usually spreading erect or decurved but not falcate cusp 130.
130. Capitula ovoid-cylindrical, 7–10 mm wide (excluding cusp); achenes ribbed 131.
 + Capitula globose, 25–35 mm wide (excluding cusp); achenes flattened with wide wings along margin
 158. *C. spryginii* Kult.
131. Involucre bracts about 50, dorsally glandular and arachnoid-hairy; middle involucre bracts narrowed from a broad, appressed base into 22–24 mm long, divergent cusp; corolla yellow
 217. *C. centauroides* Fisch. and Mey.
 + Involucre bracts about 80, arachnoid-hairy; middle involucre bracts with 15–22 mm long, decurved or almost horizontal cusp; corolla pale purple 216. *C. divaricata* Winkl.
132. Involucre glabrous or weakly arachnoid-hairy, of numerous narrow bracts, terminating in subulate cusp, almost as wide as thick (at

- base usually not more than 1 mm, less often 1.5 mm wide) 133.
- + Involucre usually arachnoid-hairy, less often glabrous; bracts not so numerous, wider, terminating in narrow, broadly linear, or lanceolate cusps, more or less distinctly wider than thick (with maximum width 1–6 mm at base or above) 149.
- 126 133. Innermost involucre bracts membranous, white or purple, very prominent forming well-developed “crown” or “collar”, surrounding florets 134.
- + Innermost involucre bracts not prominent and not forming well-developed “crown” or “collar”, surrounding florets 139.
134. Involucre bracts with erect or erect-spreading cusp 173. *C. radians* Bge.
- + Involucre bracts with more or less strongly spreading, often arcuate cusp 135.
135. Capitula 18–22 mm wide (excluding cusps) 174. *C. coronata* Franch.
- + Capitula not more than 15 mm wide (excluding cusps) 136.
136. Stems with numerous, up to 50, capitula; involucre bracts with short, very fine falcate cusp (latter much shorter than half width of capitulum) 178. *C. leptocampyla* Bornm.
- + Stems with fewer capitula (usually not exceeding 20); involucre bracts usually with longer, stiff, horizontal, not curved or slightly curved cusp (latter, at least in middle bracts, as long as or longer than half width of capitulum) 137.
137. At least lower cauline leaves deeply pinnatifid or lobate 176. *C. alpestris* Bornm.
- + Cauline leaves undivided 138.
138. Middle involucre bracts with long cusp, as long as width of capitulum 175. *C. pulchra* Winkl.
- + Middle involucre bracts with shorter cusp, as long as half width of capitulum or only slightly longer 177. *C. mulgediifolia* Bornm.
139. Involucre bracts with erect or spreading straight cusp 140.
- + Involucre bracts with more or less horizontal, divergent or decurved, often arcuate, cusp 143.
140. Capitula narrow-ovoid, 9–10 mm wide (excluding cusps); involucre bracts with very short cusp or obtuse and without spine; corolla whitish or pale yellow 243. *C. jassyensis* Winkl.
- + Capitula ovoid or broadly ovoid, 8–17 mm wide; but corolla always pink or purple; involucre bracts with well-developed cusp, or cusp short and obtuse 141.

- 127 141. Involucral bracts with short, more or less obtuse, roundish or short-pointed cusp 234. **C. submutica** Franch.
 + Involucral bracts with weak, well-developed, 3–6 mm long, spreading cusp 142.
142. Capitula ovate, 8–12 mm wide (excluding cusps); involucral bracts with 3–4 mm long cusp 239. **C. hastifolia** Winkl.
 + Capitula broad-ovoid, larger, 17 mm wide; involucral bracts with longer, 5–6 mm long, cusp 240. **C. transiliensis** Juz.
143. Capitula 6–7 mm wide (excluding cusps); involucral bracts with short, recurved cusp 233. **C. krauseana** Rgl. and Schm.
 + Capitula 10–18 mm wide (excluding cusps); involucral bracts with well-developed, horizontal, divergent or arcuate cusp 144.
144. Basal leaves lyrate, with a large, entire terminal lobe 237. **C. dubia** M. Pop.
 + Basal leaves pinnatisect 145.
145. Involucral bracts arcuate 146.
 + Involucral bracts horizontal or squarrose 148.
146. Corolla whitish or pale yellow 242. **C. margaritae** Kult.
 + Corolla pink 147.
147. Cauline leaves finely arachnoid-hairy above, white-tomentose beneath, similar to basal leaves, pinnatisect, with narrow-linear lateral segments 238. **C. kokanica** Rgl. and Schm.
 + Cauline leaves glabrous above, green, grayish-tomentose beneath, narrow-lanceolate or lanceolate, almost entire, with two to four pairs of teeth only near base 241. **C. waldheimiana** Bornm.
148. Capitulum globose, 11–12 mm wide (excluding cusps) strongly truncate at base; involucral bracts with nearly horizontal cusp; corolla yellow 236. **C. omphalodes** Tschern.
 + Capitula broadly ovoid, 15–17 mm wide; involucral bracts squarrose; corolla pink or whitish 235. **C. tamarae** Juz.
149. Achenes glabrous, smooth, roundish above 150.
 + Achenes four-angled, narrow-winged along edges, toothed above 156. **C. smironowii** Trautv.
150. Leaves soft, entire, almost without spine, decurrent 215. **C. integrifolia** Franch.
 + Leaves not decurrent, less often weakly decurrent or with sheathing base, and then more or less spinose 151.
- 128 151. Inner involucral bracts very prominent, usually reaching or exceeding florets (less often, as in *C. stellaris*, shorter than florets) and forming well-developed “collar” or “corona” around them ... 152.
 + Inner involucral bracts not prominent shorter than florets, not forming “collar” or “corona” around them 168.

152. Corolla yellow 213. *C. dimoana* Kult.
 + Corolla purple, pink or white 153.
153. Involucral bracts numerous (more than 100), relatively weak, narrow lanceolate, 2 mm wide at base, usually falcate 154.
 + Involucral bracts less numerous (40–60–100), stronger, 3–5 mm wide at base, erect, if divergent, as in *C. strobilocephala*, then cauline leaves short-decurrent 155.
154. Basal leaves more or less lyrate, spinulose-toothed along margin 209. *C. rosea* Kult.
 + Basal leaves pinnatisect, spinose-toothed along margin 210. *C. rhodantha* Kult.
155. Basal and lower cauline leaves pinnatisect, pinnatipartite or pinnatilobate, terminal lobe not larger than laterals 156.
 + Basal and lower cauline leaves lyrate or almost lyrate, with large terminal lobe 161.
156. Capitula ovoid or ovoid-oblong, 18–25 mm wide (excluding cusps), sparsely arachnoid-hairy 157.
 + Capitula flattened-globose or globose, (20)25–35 mm wide, densely arachnoid-hairy or almost tomentose 158.
157. Leaves light green and finely arachnoid-hairy above, arachnoid-hairy beneath; lower cauline leaves pinnatipartite or pinnatisect 204. *C. tianschanica* Kult.
 + Leaves grayish green and finely arachnoid-hairy above, grayish-tomentose beneath; lower cauline leaves pinnatilobate 198. *C. gulczensis* Kult.
158. Middle involucral bracts squarrose, strong 159.
 + Middle involucral bracts arcuately decurved, comparatively weak 160.
159. Basal and lower cauline leaves pinnatilobate; involucral bracts scabrous, carinate-sulcate, cuspidate, 3–3.5 mm long 207. *C. praestans* Tschern. and Vved.
 + Basal and lower cauline leaves pinnatisect or pinnatipartite; involucral bracts less scabrous, with 2–2.5 mm long cusp 206. *C. butkovii* Tschern. and Vved.
160. Leaves densely or sparsely grayish-arachnoid-hairy on both surfaces; involucral bracts numerous, about 100 208. *C. strobilocephala* Tschern. and Vved.
 129 + Leaves grayish green and finely arachnoid-hairy on both sides, more densely beneath, involucral bracts about 50–60 203. *C. laniceps* Juz.
161. Inner involucral bracts with broadly lanceolate or almost roundish, about 5 mm wide appendage, forming short, about 5–8 mm long, collar, not enclosing florets 162.

- + Inner involucre bracts with lanceolate, apically gradually acuminate appendage, forming long-radiate collar, equaling or exceeding florets 163.
- 162. Middle involucre bracts with strong, arcuate cusps; appendages of inner bracts dark purple 186. **C. grigorievii** Juz.
 - + Middle involucre bracts with horizontal cusps; appendages of inner involucre bracts whitish 182. **C. stellaris** Bornm.
- 163. Basal leaves with large terminal lobe and one to four pairs of lateral lobes; involucre bracts with strong tri-hedral spine, 2.5–3 mm wide at base, squarrose 164.
 - + Basal leaves with smaller terminal lobe and four to six pairs of lateral lobes; involucre bracts with thinner and shorter spine, 1.5–2 mm wide at base, almost all erect, only outermost sometimes decurved 167.
- 164. Leaves glabrous, above with roundish, almost cordate terminal lobe, and one or two (three) pairs of small lateral lobes 211. **C. rotundifolia** Winkl.
 - + Leaves arachnoid above, with greater number (three or four pairs) of larger lateral lobes 165.
- 165. Entire plant densely pubescent; capitula floccose-tomentose, ovoid-globose, (20)–25 mm wide (excluding cusps); inner involucre bracts narrow, 2.5 mm wide at base, exceeding adjacent middle involucre bracts by only 8–10 mm 201. **C. dshisakensis** Kult.
 - + Plants sparsely pubescent; capitula densely arachnoid-hairy, globose-cylindrical, 25–40 mm wide; inner involucre bracts 5–7 mm wide at base, exceeding adjacent middle involucre bracts by 15–35 mm 166.
- 166. Plants strong; leaves spinulose-dentate; involucre bracts strong, inner bracts long-radiate, exceeding adjacent involucre bracts by 25–35 mm 199. **C. schtschurowskiana** Rgl. and Schm.
 - + Plants less strong; leaves spinose-toothed; involucre bracts weaker, inner bracts radiate, exceeding adjacent middle involucre bracts by 15–20 mm 200. **C. pseudodshisakensis** Tschern. and Vved.
- 130 167. Leaves green and very finely arachnoid-hairy above, finely grayish-tomentose beneath; basal leaves lyrate, with four or five pairs of oblong lateral lobes; involucre bracts more or less flat 202. **C. princeps** Franch.
 - + Leaves grayish-green and sparsely pubescent above densely tomentose beneath; basal leaves lyrate, with five or six pairs of ovate or ovate-oblong lobes; bracts carinate 205. **C. mogoltavica** Tschern. and Vved.
- 168. Leaves glabrous above; capitula glabrous; involucre bracts about 25; middle bracts more or less flat, broad lanceolate, 10–14 mm wide at base, acuminate 185. **C. knorringiae** Bornm.

- + Leaves usually arachnoid-hairy above, if glabrous, then capitula always white- or rusty-tomentose or arachnoid-hairy; involucre bracts more numerous (40–100); middle bracts narrower, usually cuspidate 169.
- 169. Plants usually strongly branched; branches of common inflorescence and peduncles slender, greatly elongate; capitula up to 50, 10–15 mm wide (excluding cusps); involucre bracts with 1.5–2 mm wide cusps 170.
- + Plants usually weakly branched with rather thick branches of common inflorescence and peduncles; capitula usually not more than 10–(15); capitula (13)15–35 mm wide, involucre bracts with 1.5–3 mm wide cusps (at base) 171.
- 170. Cauline leaves terminating with relatively short and soft cusps; capitula weakly arachnoid-hairy; involucre bracts about 50, with somewhat short cusps, not as long as width of capitula 214. *C. darwasica* Winkl.
- + Cauline leaves terminating with very long and strong cusp; capitula densely white-pubescent or rusty-tomentose; involucre bracts about 80, with long cusps, usually as long as or longer than width of capitula 179. *C. alpina* Bge.
- 171. Inner involucre bracts more or less distinctly broadened upward, dark colored 184. *C. hilariae* Kult.
- + Inner involucre bracts gradually narrowed in thin and short cusp; usually light colored 172.
- 172. Cauline leaves sessile, short-decurrent; capitula strongly truncate at base or even concave, densely rusty-tomentose; involucre bracts numerous, about 100, with falcate cusp 212. *C. ferruginea* Kult.
- + Cauline leaves sessile, sometimes short-decurrent; capitula roundish or weakly truncate at base; involucre bracts not so numerous, 40–80 173.
- 173. All involucre bracts erect; cauline leaves broad-lanceolate, narrowed towards both ends 192. *C. speciosa* Winkl.
- 131 + Involucre bracts usually variable; outer bracts either decurved or almost horizontal, middle often squarrose or horizontal, inner erect; cauline leaves sessile, semiamplexicaul, usually broader at base 174.
- 174. Stems sparsely branched, with long, usually almost leafless or sparsely leafy, one-headed branches; capitula 20–35 mm wide (excluding cusps) 175.
- + Stems branched, with short, usually leafy (often very dense) one-headed branches; capitula 13–25 mm wide 179.
- 175. Leaves green and finely arachnoid-hairy above, grayish-arachnoid-hairy or grayish-tomentose beneath; achenes 4–5 mm long 176.

- + Leaves green and glabrous above, white-tomentose or glabrous beneath with flattened flexuous hairs only along midrib, or finely arachnoid-hairy 178.
- 176. Basal leaves almost bipinnatisect, petiolate, with usually dark petioles; cauline leaves pinnatipartite, sessile, with small auricles 195. **C. oxytoma** Rech. f.
 - + Basal leaves pinnatilobate, petiolate with short green petioles; cauline leaves prickly-lobate or spinose-toothed, sessile 177.
- 177. Capitula flat-globose, 20 mm wide (excluding cusps) weakly rusty-tomentose; involucre bracts about 80, outer and middle bracts 15–23 mm long 196. **C. ovczinnikowii** Tschern.
 - + Capitula broad-pyramidal, 20–25 mm wide, arachnoid-hairy; involucre bracts almost horizontal, less numerous, about 50, outer and middle bracts almost horizontal, 30–32 mm long 193. **C. batalinii** Winkl.
- 178. Basal leaves oblong-ovate, undivided or more or less lyrate, with large, broadly ovate terminal lobe and three or four pairs of wide, sessile, oblong lateral lobes petiolate; petioles long, almost as long as lamina, arachnoid-hairy like stem; achenes 7 mm long 197. **C. peduncularis** Juz.
 - + Basal leaves pinnatisect into numerous (12–15 pairs) narrow-lanceolate lateral segments, petiolate; petioles thickened near base, densely pubescent with thick, flexuous, flattened hairs throughout, like lower half of stem 194. **C. calva** Juz.
- 179. Outer and inner involucre bracts arcuately decurved or pendant 190. **C. fetissowii** Winkl.
 - + At least middle involucre bracts divergent or almost horizontal 180.
- 132 180. Capitula ovoid or ovoid-globose, 13–20 mm wide (excluding cusps) 181.
 - + Capitula globose-cylindrical, 25–30 mm wide 191. **C. schischkinii** Juz.
- 181. Basal leaves lyrate, with large, ovate, basally cordate lobe, finely spinose-toothed along margin; capitula ovoid, 13–15 mm wide (excluding cusps) 183. **C. buphtalmoides** Rgl.
 - + Basal leaves pinnatipartite or lyrate, then with oblong-roundish basal lobe, cuneately excurrent on petiole; capitula ovoid-globose, 15–20 mm wide 182.
- 182. Cauline leaves sessile, short-decurrent; involucre bracts about 60, inner bracts whitish; achenes about 4 mm long 180. **C. carduncelloidea** Rgl. and Schm.
 - + Cauline leaves sessile, semiamplexicaul, not decurrent; involucre bracts about 75, inner bracts often purple above; achenes about 4–5 mm long 181. **C. outichaschensis** Franch.

- 183(83). Basal leaves pinnatisect, with linear-lanceolate or almost linear entire segments, usually appearing like whorl around almost entire uniformly winged petiole 184.
- + Basal leaves undivided or pinnatilobate, less often pinnatipartite, then lobes deltoid, often boldly toothed or lobed, but never appearing like whorl 211.
184. Leaves soft, usually on both sides grayish and appressed-arachnoid-hairy; lateral segments of leaves usually in one plane..... 272. **C. caespitosa** Winkl.
- + Leaves usually stiff and coriaceous, if pubescent on both sides, then lateral segments of leaves never in one plane..... 185.
185. Involucral bracts with long, falcate cusp; receptacular bristles smooth; achenes wingless..... 245. **C. glaphyrocephala** Juz.
- + Involucral bracts with erect cusp; receptacular bristles scabrous, if smooth, then achenes winged 186.
186. Plants 60–120 cm high; inflorescence spicate or at least with tendency to form spikes, or almost paniculate, then achenes 5–7 mm wide and 12–14 mm long, winged 187.
- + Plants shorter; inflorescence never spicate 189.
187. Involucral bracts smooth; achenes 5 mm long and 3 mm wide... .. 248. **C. pseudolanata** M. Pop.
- 133 + Involucral bracts scabrous due to spinulose surface; achenes 10–14 mm long and 5–7 mm wide 188.
188. Leaves glabrous above; general inflorescence spicate or subspicate; receptacular bristles weakly scabrous or almost smooth 247. **C. lanata** Winkl.
- + Leaves scabrous above from spinulose surface; common inflorescence more or less paniculate; with erect spreading lateral branches; receptacular bristles strongly scabrous 246. **C. magnifica** Juz.
189. Leaf segments 3–7 mm wide, somewhat flat; wings of petiole more or less flat, well-developed 190.
- + Leaf segments 0.5–2 mm wide, usually recurved; wings of petiole usually reduced 194.
190. Leaves petiolate, scabrous from dense glandular hairs 191.
- + Leaves entirely glabrous or with fine sessile glandular hairs scattered throughout 192.
191. Stem arachnoid-hairy above; leaves green beneath or white-tomentose only along margin; capitula finely white arachnoid-hairy; involucral bracts sparsely glandular; corolla light yellow 251. **C. xanthina** Bornm.
- + Stem sparsely glandular above; leaves white-tomentose beneath; capitula rusty arachnoid-hairy; involucral bracts densely glandular; corolla whitish 252. **C. trachyphylla** Juz.

192. Capitula entirely glabrous; involucrel bracts bright green, outer and middle bracts ciliate along margin 250. *C. splendida* Winkl.
 + Capitula finely arachnoid-hairy; outer and middle involucrel bracts always entire 193.
193. Stem appressed arachnoid-hairy; leaves usually with fine and appressed pubescence above, less often glabrous, but always without glands 254. *C. stephanophora* Winkl.
 + Stem glabrous or sparsely glandular above; leaves glabrous, smooth or less often sparsely glandular, with fine sessile glandular hairs 253. *C. chrysantha* Kult.
194. Most involucrel bracts (except outer) broadened in upper part forming wide membranous appendage or with wide membranous border 195.
 + Involucrel bracts without membranous appendage (excluding inner bracts) 196.
195. Corolla yellow 260. *C. sororia* Juz.
 + Corolla pink 255. *C. semilacera* Juz.
196. Capitula more or less densely arachnoid-hairy 197.
 134 + Capitula without arachnoid-hairy pubescence, glabrous or glandular-scabrous 209.
197. Corolla yellow 198.
 + Corolla whitish or purple 204.
198. Capitula 8–10 mm wide (excluding cusps) 199.
 + Capitula 12–18 mm wide (excluding cusps) 200.
199. Stem profusely branched; branches spreading, usually longer than main stem, and in turn divided into slender twigs, forming widely spreading, almost corymbose inflorescence; inner involucrel bracts coriaceous, densely scabrous due to abundant spinules 262. *C. ramulosa* Rech. f.
 + Stem sparingly branched into few, short, one headed branches; inner involucrel bracts scarious above 261. *C. abbreviata* Tschern.
200. Involucrel bracts few, about 35; capitula with curly, yellowish glandular hairs 256. *C. allopepis* Tschern. and Vved.
 + Involucrel bracts more numerous, about 50–80; capitula arachnoid-hairy, without glands 201.
201. Plants pubescent; leaves sericeous beneath 202.
 + Pubescence of plants not sericeous 203.
202. Leaves appressed-pubescent above, without glands or appressed-glandular 257. *C. newesskiana* Winkl.
 + Leaves covered with papillate glandular hairs above alternating with long, silky, simple hairs 258. *C. trichophora* Kult.

203. Stem erect, simple, strong; inner involucre bracts with membranous appendage, irregularly incised along margin 263. *C. acrodroma* Tschern.
 + Stem relatively weak, usually branched; inner involucre bracts without membranous appendage 259. *C. schugnanica* Juz.
204. Outer involucre bracts sharply distinct from others, usually divergent or almost horizontal, longer than middle bracts, as long as or longer than width of capitulum 267. *C. laetevirens* Winkl.
 + Outer involucre bracts shorter than or as long as middle, usually not distinct from latter 205.
205. Leaves glandular above; capitula 20 mm wide, densely ferruginous 264. *C. rubiginosa* Kult.
 + Leaves without glands above, if with scattered glandular hairs, then capitula always 8–(12) mm wide 206.
- 135 206. Leaves on both sides covered with very long, silky, entangled, divergent hairs; all involucre bracts erect spreading 266. *C. eriotricha* Juz.
 + Leaves glabrous above or with appressed pubescence; involucre bracts, especially outer and middle, divergent or sometimes even horizontal 207.
207. Stem densely white-tomentose; capitula densely white arachnoid-hairy; achenes longitudinally narrow-ribbed 265. *C. multiloba* DC.
 + Stem finely tomentose, pubescent or arachnoid-hairy; capitula finely arachnoid-hairy; achenes glabrous, smooth 208.
208. Capitula (8)12 mm wide; involucre bracts about 40 269. *C. bonvalotii* Franch.
 + Capitula 15–22 mm wide; involucre bracts more numerous, up to 60 268. *C. verticillaris* Bge.
209. Outer and middle involucre bracts 5–10 mm wide near base, glabrous, smooth, all except outer scabrous above dorsally 270. *C. ceratophora* Kult.
 + Outer and middle involucre bracts narrower, all glandular-scabrous 210.
210. Achenes more or less 3-angled, narrowly winged along ribs; outer involucre bracts erectspreading, usually nearly half as long as middle 249. *C. adenophora* Juz.
 + Achenes smooth; outer involucre bracts horizontal, usually longer than middle 271. *C. seravschanica* Winkl.
211. Leaves soft, undivided without or with three to five scarcely visible teeth along margin, less often pinnatifid, or cauline leaves finely spinose-toothed 212.

- + Leaves usually more or less coriaceous, usually incised or lobate, always spinose 215.
- 212. Leaves tomentose on both sides, more densely beneath, cauline leaves sessile; capitula scabrous, 12–13 mm wide (excluding cusps), ferruginous 142. **C. baranovii** Juz.
- + Leaves usually finely arachnoid-hairy above, tomentose or densely arachnoid-hairy beneath; cauline leaves decurrent; capitula ovoid or cylindrical-ovoid, 7–13 mm wide (excluding cusps) 213.
- 213. Stems numerous; cauline leaves short-decurrent; capitula 7–8 mm wide (excluding cusps); inner involucre bracts usually pinkish above 214.
- + Stems usually solitary or few; cauline leaves rather long-decurrent; capitula 9–13 mm wide (excluding cusps); inner involucre bracts not pigmented 138. **C. leucantha** Bornm. and Sint.
- 136 214. Involucre bracts 7–22 mm long, with long, subulate-deltoid, almost horizontal cusps; achenes 4 mm long
..... 137. **C. stenophylla** Kult.
- + Involucre bracts 5–14 mm long, with deltoid, erect spreading cusps; achenes 4.5–5 mm long 136. **C. komarowii** (O. Ktze.) Winkl.
- 215. Root usually many-headed, with thick caudices, usually covered with woody remains of old petioles 216.
- + Root many-headed, often with thick caudices, but without woody remains of old petioles, sometimes with scarious remains ... 236.
- 216. Receptacular bristles smooth 217.
- + Receptacular bristles scabrous 232.
- 217. Plants (40)45–100 cm high; petioles of old leaves woody, usually falcately decurved or divergent, almost horizontal 218.
- + Plants 10–40(60) cm high; petioles of old leaves short, usually erect 221.
- 218. Common inflorescence broad, lax corymbose; leaves nearly glabrous and green above, white-tomentose beneath; capitula numerous, globose-ovoid, 6–8(10) mm wide and 15–18 mm long (with erect florets); involucre bracts about 35
..... 3. **C. linczewskii** Juz.
- + Common inflorescence more or less spicate or paniculate; leaves on both sides grayish-green, glandular and arachnoid-hairy or gray-tomentose; capitula flat-globose, globose or cylindrical, 10–30 mm wide (excluding cusps); involucre bracts numerous, sometimes more than 100 219.
- 219. Lower cauline leaves oblong-ovate; capitula flat-globose, 20–30 mm wide (excluding cusps); middle involucre bracts 26–30 mm long, more or less horizontal 39. **C. glochidiata** Kult.
- + Lower cauline leaves oblong-lanceolate or oblong; capitula globose

- or cylindrical, 10–20 mm wide (excluding cusps); middle involucrel bracts erect spreading or divergent..... 220.
220. Inflorescence almost spicate; upper cauline leaves short-decurrent; capitula cylindrical, 10–40 mm wide (excluding cusps); inner involucrel bracts lanceolate, long acuminate, 20–25 mm long..... 37. *C. oreodoxa* Bornm. and Sint.
- + Inflorescence paniculate; upper cauline leaves sessile, not decurrent; capitula globose, 18–20 mm wide (excluding cusps); inner involucrel bracts somewhat broadened above, short-acuminate, about 20 mm long..... 38. *C. apiculata* Tschern.
- 137 221. Involucrel bracts appressed, with erect cusp 222.
- + Involucrel bracts with falcate or divergent, sometimes almost horizontal cusps 225.
222. Capitula 4–5 mm wide, with fewer florets 64. *C. microcephala* C.A.M.
- + Capitula 7–10 mm wide, with many florets 223.
223. Capitula aggregated in groups of two to five at tips of branches, somewhat enclosed by apical leaves; basal leaves oblong, pinnatilobate 63. *C. orientalis* (Adams) C. Koch
- + Capitula solitary terminal on branches, not enclosed by apical leaves; basal leaves pinnatisect 224.
224. Capitula oblong-ovoid, 7–8 mm wide (excluding cusps); stem moderately leafy, corymbosely branched; achenes five-ribbed 53. *C. chlorocephala* C.A.M.
- + Capitula ovoid, 10 mm wide (excluding cusps); stems densely leafy, with spreading branches; achenes usually 10-ribbed 54. *C. daralaghezica* Takht.
225. Leaves, at least basal, pinnatipartite or pinnatifid 226.
- + Leaves pinnatilobate 229.
226. Corolla purple; capitula 12–13 mm wide (excluding cusps)..... 57. *C. brachyptera* DC.
- + Corolla yellow, capitula 9–10 mm wide 227.
227. Involucrel bracts with straight, divergent cusps; capitula sparsely arachnoid-hairy 56. *C. fedorovii* Takht.
- + Involucrel bracts with falcate or arcuately divergent cusps; capitula weakly pubescent or sparsely arachnoid-hairy 228.
228. Cauline leaves very short-decurrent, or almost not decurrent; capitula sparsely arachnoid-hairy; involucrel bracts with falcate cusps 62. *C. hohenackeri* Fisch. and Mey.
- + Cauline leaves narrowly short-decurrent; capitula subglabrous; involucrel bracts with arcuate cusps..... 55. *C. armena* Takht.
229. Capitula 15–17 mm wide (excluding cusps); leaves grayish-green, with network of prominent veins, gray arachnoid hairy-tomentose on both sides, less often glabrous 59. *C. erivanensis* Bornm.

- + Capitula 7–10 mm wide (excluding cusps); leaves glabrous on both sides, sometimes finely glandular or finely arachnoid-hairy above, and gray-tomentose beneath 230.
- 230. Involucral bracts with cusps falcately decurved; leaves finely glandular above 61. **C. lomakinii** Winkl.
- 138 + Involucral bracts with divergent cusps; leaves always eglandular above 231.
- 231. Leaves glabrous on both sides; capitula glabrous 58. **C. araxena** Takht.
- + Leaves finely arachnoid-hairy above, gray-tomentose beneath; capitula pubescent 60. **C. iljinii** Takht.
- 232. Common inflorescence, almost spicate or partially spicate, less often compound spike 233.
- + Common inflorescence, at least in upper part, with well-developed lateral branches, i.e., racemose or paniculate 234.
- 233. Leaves green, very finely glandular or finely arachnoid-hairy above, white-tomentose beneath; capitula oblong-cylindrical; achenes about 5 mm long; lower and middle involucral bracts with cusps far exceeding (sometimes two times as long) capitulum 31. **C. albertoregelia** Winkl.
- + Leaves green and finely glandular on both sides, finely arachnoid-hairy beneath; capitula broad ovoid; achenes 3.5 mm long; lower and middle involucral bracts with cusps not exceeding capitulum 32. **C. bobrovii** Juz.
- 234. Leaves glabrous above, white or gray-tomentose beneath; capitula more or less globose, roundish at base 235.
- + Leaves green on both sides, with sessile glandular hairs above; capitula oblong-cylindrical, narrowed at base 35. **C. stricta** Tschern.
- 235. Root collar very strongly thickened, almost ovoid; involucral bracts with cusps not exceeding capitulum 33. **C. oopoda** Juz.
- + Root collar weakly thickened; involucral bracts with cusps usually one and one-half times as long as capitulum 34. **C. gontscharovii** Juz.
- 236. Leaves more or less densely arachnoid-hairy or tomentose on both sides, concolorous (white, grayish-green or glaucous) 237.
- + Leaves glabrous above or only weakly arachnoid-hairy, finely arachnoid-hairy or densely white-tomentose beneath 254.
- 237. Receptacular bristles smooth 238.
- + Receptacular bristles scabrous 251.
- 238. Capitula 10–15 mm wide (excluding cusps); middle involucral bracts two or three times as long as width of capitulum; less numerous (about 40) 239.

- + Capitula (12)15–25 mm wide (excluding cusps); middle involucre bracts shorter, usually not exceeding or only one and one-half times as long as width of capitulum, numerous (about 60) 241.
- 139 239. Basal leaves narrow lanceolate or oblong-lanceolate, pinnatipartite, strongly spinose; lobes numerous, narrow-deltoid, each with long and stiff spine, closely placed, petioles one-sixth to one-fifth as long as lamina; capitula oblong-ovoid, 10–12 mm wide (excluding cusp) 240.
- + Basal leaves petiolate, oblong-obovate or oblong-elliptical, lobed, lobes broad; petiole one-fourth to one-third as long as lamina; capitula larger, 12–15 mm wide (excluding cusp) 113. *C. gnezdilloi* Tschern.
240. Basal leaves narrow and oblong-obovate (4.5 cm wide including cusps), pinnatipartite into numerous narrow-deltoid, strongly spinose lateral lobes 114. *C. leptoclada* Kult.
- + Basal leaves oblong-lanceolate (8.5 cm wide including spines), pinnatipartite into deltoid, weakly spinose lobes 112. *C. leptocladoides* Tschern.
241. Middle involucre bracts 10–12(15) mm long, wider, with short, up to 3 mm long, strong spine; lower cauline leaves lanceolate 242.
- + Middle involucre bracts 15–25 mm long, comparatively narrow, with long, 5–12 mm long, fine spine; lower cauline leaves oblanceolate, oblong-obovate, narrow-elliptical, oblong-elliptical or broad-elliptical 243.
242. Terminal branches (floriferous) long, 4–6 cm long; leaves finely arachnoid-hairy, grayish-green above, finely gray-tomentose beneath; basal leaves minutely lobed with remote lobes; capitula globose; middle involucre bracts up to 10 mm long 108. *C. proxima* Juz.
- + Terminal branches (floriferous) short, 2–2.5 cm long; leaves white-tomentose on both surfaces; basal leaves with large approximate lobes; capitula broadly ovoid; middle involucre bracts longer, up to 15 mm long 105. *C. litvinovii* Kult.
243. Capitula ovoid or oblong-cylindrical, 12–18 mm wide (excluding cusp) 244.
- + Capitula globose or ovoid-globose, larger, 15–25 mm wide (excluding cusp) 247.
244. Terminal branches (floriferous) short, about 15 mm long; capitula oblong-cylindrical, 12–15 mm wide (excluding cusp), aggregated into heads; involucre bracts deltoid, acicular, erect 104. *C. leptacma* Tschern.
- + Terminal branches (floriferous) long, 3–12 cm long; capitula

- oblong-ovoid, 12–20 mm wide (excluding cusps); inflorescence lax; involucre bracts deltoid, subulate, weakly arcuate 245.
- 140 245. Basal leaves short-petiolate or sessile, oblong-lanceolate, oblanceolate or oblong-elliptical 246.
- + Basal leaves long-petiolate (petioles half to two-thirds as long as lamina), broad-elliptical 111. *C. podophylla* Tschern.
246. Basal leaves sessile, oblong-oblanceolate; capitula 17–20 mm wide (excluding cusp) 110. *C. candicans* Juz.
- + Basal leaves short-petiolate, oblanceolate or oblong-elliptical; capitula 12–15 mm wide (excluding cusp) 109. *C. subcandicans* Tschern.
247. Basal leaves very weakly spinose, boldly large toothed or minutely lobed; teeth or lobes with very short, up to 2 mm long, thin spine 117. *C. coerulea* Kult.
- + Basal leaves strongly spinose, boldly toothed or lobed; lobes and teeth with strong, 7–15 mm long spine 248.
248. Capitula ovoid-globose or broadly ovoid; involucre bracts squarrose or decurved, mucronate 249.
- + Capitula globose; involucre bracts horizontal, abruptly acuminate 250.
249. Basal leaves oblanceolate; capitula 18–25 mm wide (excluding cusp); involucre bracts stiff; erect-spreading, spinescent with short 5 mm long spine 106. *C. amoena* Winkl.
- + Basal leaves oblong-elliptical; capitula 15–17(20) mm wide (excluding cusp); involucre bracts weak, falcate, spinescent with 7 mm long spine 107. *C. campyloraphis* Tschern.
250. Lower and middle cauline leaves broad-elliptical, spinose-lobed, 10–12 cm wide (including spine) 116. *C. corymbosa* Winkl.
- + Lower and middle cauline leaves oblanceolate, 5–6 cm wide (including spine), pinnatifid into long spinescent lobes 115. *C. hoplophylla* Tschern.
251. Cauline leaves long-decurrent; stem simple or sparingly branched; capitula one to fewer 99. *C. semidecurrens* Winkl.
- + Cauline leaves short-decurrent or almost nondecurrent; stem simple, always one-headed 252.
252. Plants 25.60 cm high; capitula very densely ferruginous or white-tomentose, almost globose; outer and middle involucre bracts horizontal or slightly decurved, (15)20–25 mm long 96. *C. pannosa* Winkl.
- 141 + Plants 15–40 cm high; capitula sparsely ferruginous or white arachnoid-hairy, cylindrical or ovoid; involucre bracts usually erect, (or (outer ones) horizontal, or slightly decurved, 10–15 mm long 253.

253. Stem sparsely leafy; capitula ovoid, white arachnoid-hairy, 10–15 mm wide (excluding cusp); involucre bracts reduced, outer and middle bracts 10–12 mm long; achenes glabrous, smooth, about 7 mm long..... 98. **C. pannosiformis** Tschern.
 + Stem densely leafy; capitula cylindrical, sparsely ferruginous-arachnoid hairy, 15–18 mm wide (excluding cusp); involucre bracts about 15 mm long; achenes indistinctly ribbed longitudinally, about 6 mm long 97. **C. franchetii** Winkl.
254. Achenes obpyramidal, three or four-ribbed, along ribs thickly narrow-winged or narrow-winged, sharply toothed above..... 255.
 + Achenes obovate, glabrous, smooth or with scarcely visible longitudinal filiform ribs, roundish above or with two or three indistinct teeth 263.
255. Leaves green and glandular above, grayish-green beneath; capitula strongly foveate at base, involucre bracts sparsely glandular dorsally..... 19. **C. glandulosa** Kult.
 + Leaves green above, glabrous, glaucous or finely arachnoid-hairy, eglandular; capitula roundish or somewhat foveate at base; involucre bracts eglandular, arachnoid-hairy or glabrous, smooth or scabrous 256.
256. All involucre bracts scabrous dorsally, arachnoid-hairy, inner involucre bracts membranous, dark colored, unevenly incised; achenes 6–6.5 mm long..... 36. **C. sclerophylla** Juz.
 + Involucre bracts usually smooth, glabrous or arachnoid-hairy, membranous, scabrous along margin, usually light colored; inner involucre bracts membranous, sometimes dorsally scabrous, achenes 3–5 mm long..... 257.
257. Capitula cylindrical or narrow-cylindrical, 4–6.5 mm wide (excluding cusp), slightly extended at base 258.
 + Capitula ovoid or globose, larger, 12–20 mm wide (excluding cusp), somewhat foveate or roundish at base 259.
258. Inflorescence lax panicle; capitula 4 mm wide (excluding cusp) and 15 mm long (excluding corolla); corolla yellow; receptacular bristles almost smooth or weakly scabrous; basal leaves pinnatipartite; cauline leaves broadly short-decurrent 17. **C. cryptadena** Juz.
- 142 + Inflorescence usually raceme; capitula 5–6.5 mm wide and 18 mm long; corolla whitish; receptacular bristles scabrous; basal leaves crenate-spinose-toothed; cauline leaves sessile
 16. **C. xanthiocephala** Tschern.
259. Receptacular bristles smooth or with one or two crenations; involucre bracts with falcate cusps 260.
 + Receptacular bristles scabrous or weakly scabrous; involucre bracts with squarrose cusps 262.

260. Stem strongly divaricately branched in upper half; basal leaves oblong-ovate, in well-developed many-leaved rosette; receptacular bristles with one or two crenations; achenes 4–5 mm long 13 *C. talassica* (Kult.) Juz.
 + Stem weakly branched; basal leaves lanceolate, fewer in rosette; receptacular bristles always smooth; achenes 3 mm long 261.
261. Plants tall, 20–60 cm high; capitula 18–20 mm wide (excluding cusp), globose 12. *C. affinis* Schrenk
 + Plants shorter, 10–30 cm high; capitula smaller, 10–12 mm wide, ovoid 11. *C. astracanica* (Spreng.) Tamamsch.
262. Basal leaves oblong-lanceolate, crenate-lobed; capitula ovoid, 12 mm wide (excluding cusp); involucre bracts with divergent cusps, middle bracts 12–15 mm long; achenes 5 mm long; receptacular bristles scabrous 14. *C. pseudoaffinis* Kult.
 + Basal leaves oblong-ovate or cuneately narrowed toward base, oblong-obovate, large spinose-toothed; capitula oblong-ovoid or flat-globose, 10–14 mm wide; involucre bracts with squarrose cusps, middle bracts 10–12 mm long; achenes 4–4.5 mm long; receptacular bristles weakly scabrous 15. *C. hamadae* Juz.
- 263 Receptacular bristles scabrous 187. *C. rava* Winkl.
 + Receptacular bristles smooth 264.
264. Basal leaves ovate, undivided, crenate-lobed or with two or three lobes near base, or more or less lyrate 265.
 + Basal leaves pinnatisect or pinnatipartite 266.
265. Basal leaves more or less lyrate, very large, about 40 cm long and 25 cm wide, green above, glabrous and lustrous; capitula 12–13 mm wide and 18–20 mm long (excluding projecting florets); involucre bracts with membranous border, inner bracts without membranous appendage; all bracts yellow 135. *C. grandifolia* Kult.
 + Basal leaves entire, crenate-lobed or with two or three lobes only near base, 15–20 cm long and 5–6 cm wide, very finely arachnoid-hairy; capitula 8 mm wide and 20–22 mm long; involucre bracts with narrow membranous border; inner bracts with membranous, unevenly incised, usually somewhat purple appendages; corolla whitish 134. *C. vavilovii* Kult.
266. Involucre bracts without appendages 267.
 + All or at least inner involucre bracts with membranous or coriaceous (and then case ciliate-toothed) appendages 268.
267. Basal and lower cauline leaves 30 cm long and 12 cm wide (with spines), long-petiolate; capitula aggregated at tips of branches and stems in dense racemose inflorescence; outer involucre bracts falcate 93. *C. abolini* Kult.

- + Basal and lower cauline leaves 15–20 cm long and 2–3 cm wide, short-petiolate; capitula solitary terminal on stem and branches; outer involucre bracts divergent 103. *C. macilenta* Winkl.
268. Capitula in lax, usually paniculate, inflorescence, 10–17 mm wide (excluding cusp), ovoid or narrow-ovoid; basal and lower cauline leaves oblong-lanceolate, 25–30 cm long and 5–11 cm wide 269.
- + Capitula solitary terminal on branches and stem, sometimes in more or less corymbose inflorescence, 18–28 mm wide (excluding cusp), globose; broadly ovoid or somewhat cylindrical; basal and lower cauline leaves 14–60 cm long and 3.5–6 cm wide 270.
269. Capitula glabrous, lustrous, 13–17 mm wide (excluding cusp); inner involucre bracts almost roundish above, entire; leaves finely arachnoid-hairy above 94. *C. egregia* Juz.
- + Capitula arachnoid-hairy, matty, 10–12 mm wide; inner involucre bracts spatulate, small-toothed, usually incised in middle into two halves 95. *C. dolichophylla* Kult.
270. Plants 100–120 cm high; inflorescence corymbose; leaves glabrous above, green; basal and lower cauline leaves about 40–60 cm long and 6 cm wide 101. *C. korshinskyi* Winkl.
- + Plants 35–60 cm high; stem one-headed or seldom with two or three one-headed branches; leaves finely arachnoid-hairy above; basal and lower cauline leaves about 14–25 cm long and 3.5–5 cm wide 271.
271. Lateral lobes of basal leaves with one or two pairs of spinescent lobes at base; cauline leaves sessile, semiamplexicaul; all involucre bracts (except inner) with coriaceous appendages; appendages ciliate-toothed 100. *C. fedtschenkoana* Bormm.
- + Lateral lobes of basal leaves deltoid, along margin spiny-lobed; cauline leaves sessile, short and broadly decurrent; all involucre bracts (except outermost) with membranous, almost transparent appendages; appendages irregularly toothed along margin 102. *C. pterolepida* Kult.

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Section 1. Badghysia Tschern. in Bot. Mat. Gerb., Inst. Bot. Akad. Nauk UzSSR, XVII (1962) 77.—Capitula solitary terminal on one-year-old stems; involucre bracts gradually narrowed into thin, usually strongly falcate cusp; corolla yellow; receptacular bristles more or less smooth; achenes three or four-angled, toothed above. Semishrubs with thick, strongly flexuously branched woody stems; one-year old stems whitish, with short branches.

Type of section: *C. badghysi* Kult.

1. **C. badghysi** Kult. in Pochv. i Bot.-Geogr. Issl. Bass. rr. Amu- i Syr-Dari, 2 (1916) 76; Kult. in Fl. Turkm. VII, 189.—**Ic.:** Kult. op. cit. (1916), Plates 23a, 23b.

Cultivated. Stem thick, short, strongly flexuously branched, covered below with gray, shredded dead bark; one-year old floriferous shoots numerous, short-branched above, covered with smooth whitish bark, densely white-tomentose when young, glabrescent. Leaves of woody branches sessile, in whorls of three to six; leaves of floriferous shoots alternate, one or two, oblong-lanceolate, 3–8 cm long and 3–5 mm wide, with small, narrow-lanceolate, short acuminate, remote lobes, all leaves coriaceous, recurved, grayish-green, sparsely pubescent, glabrescent above, densely white-tomentose beneath, gradually reduced upward on stem and branches. Capitula narrow-ovoid, 7–9 mm wide (excluding cusp), 15–16 mm long (excluding florets), finely arachnoid-hairy. Involucral bracts 75, deltoidly broadened in lower part, closely appressed, scabrous along margin, gradually attenuate toward apex into thin, subulate, strongly falcate cusp; inner bracts coriaceous, linear-lanceolate, acuminate into thin cusp, scabrous along margin; receptacular bristles unequal, longest slightly broadened above, very conspicuously serrate, almost smooth. Corolla yellow; anther tubes yellow. Achenes 4 mm long and 2 mm wide, three or four-angled, three or four-toothed above, rugose, light gray, lustrous, with black spots. Flowering VI.

Loamy-gravelly mountain slopes.—*Soviet Central Asia*: mountainous Turkmenia (Badkhyz). Endemic. Described from the vicinity of Lake Er-Oilan. Type in Tashkent, isotype in Leningrad.

Section 2. Leucocaulon Tschern. in Bot. Mat. Gerb., Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 77.—*Orthacanthae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 214 p. p.—Capitula numerous, in lax corymbose inflorescence or solitary, terminal on slender branches. Involucral bracts few, flat, short or very short and sharp-acuminate. Corolla pale yellowish
145 or whitish. Receptacular bristles smooth. Achenes tetraquetrous, obpyramidal, with small teeth above. Perennials with thick root collar, covered with remains of old petioles and coriaceous, sessile, cauline leaves or semishrubs with woody, basally warped and glabrous, whitish one-year old stems.

Type of section: *C. turcomanica* Winkl.

2. **C. turcomanica** Winkl. in Tr. Peterb. Bot. Sada, XI (1889) 133; Winkl. Ibid. XII, 217; Kult. in Fl. Turkm. VII, 182.—*Serratula microcephala* Trautv. in Tr. Peterb. Bot. Sada, IX (1886) 458.—*Arctium turcomanicum* O. Ktze. Rev. Gen. 1 (1891) 308.—**Ic.:** Winkl. op. cit. (1889), Plate 2, Fig. 1.

Cultivated. Semishrub with woody, basally warped stems; one-year old stems numerous, finely arachnoid-hairy, glabrescent, white, glossy, leafy, weakly branched in upper half, with long, slender, usually one-headed branches. Leaves hard, coriaceous, with network of prominent veins, green, punctate with fine glandular hairs above, finely arachnoid-hairy beneath, entire or minutely prickly-toothed, narrow-lanceolate or more or less lanceolate, narrowed toward both ends into short petiole below, and short cusp above; lower leaves 4–5 cm long, petiolate (petioles 8–12 mm long), other leaves gradually reduced upward, with shorter petioles; uppermost leaves sessile, strongly reduced. Capitula 5 mm wide and 20 mm long with projecting florets, almost glabrous. Involucral bracts closely appressed, with short erect cusp, weakly scabrous in upper part or dorsally due to fine glandular hairs, very finely arachnoid-hairy, ovate-lanceolate or somewhat lanceolate; inner involucral bracts membranous, brownish, linear-lanceolate, scabrous along margin, mucronate. Receptacular bristles smooth. Corolla whitish; anther tubes purple. Achenes narrow-pyramidal, 3.5 mm long and 1–1.5 mm wide, narrowly ribbed, with three small teeth above. Flowering VI; fruiting VII–VIII.

Clayey and stony debris foothill slopes.—*Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran. Described from Kopetdag, near Germab and Geoktepe. Type in Leningrad.

Note. Two localities were reported in the description of this species; a plant with the following label is proposed as the lectotype: “Montes Kopetdagh prope Germab et Geok-Tepe. Antonow.”

3. **C. linczewskii** Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 304.

146 Perennials. Roots woody, black-fibrous. Stem erect, 60–90 cm high, with numerous remains of old petioles near base, whitish, glossy, cylindrical, sparsely branched in upper half; branches and twigs long, slender, forming wide lax corymbose inflorescence. Leaves coriaceous, green above, almost glabrous, densely white-tomentose beneath; basal leaves petiolate, with 3 cm long whitish petioles deltoidly broadened at base, oblong or elliptical, slightly narrowed towards both ends; lamina 16–25 cm long and 5.6–9 cm wide, crispate-lobed along margin; lobes seven or eight on each side, broadly lanceolate or almost semicircular, prickly-toothed and prickly-acuminate; cauline leaves abruptly reduced, lower cauline leaves similar to basal leaves, other sessile, prickly-toothed, uppermost cauline leaves strongly reduced. Capitula numerous, globose-ovoid, 6–8(10) mm wide, 15–18 mm long (with projecting florets), sparsely glandular and very weakly arachnoid-hairy. Involucral bracts about 35, flat, ovate to lanceolate-ovate, closely appressed, with short, thin, weakly

protruding cusp; inner bracts roundish-obtuse, broadened above, cuspidate, weakly scabrous along margin. Receptacular bristles smooth, whitish. Corolla pale yellow, tube glandular. Achenes obpyramidal, with narrow longitudinal ribs, with small teeth above, dark brown with blackish spots, 4–4.5 cm long. Flowering VI; fruiting VII–VIII.

Stony slopes.—*Soviet Central Asia*: mountainous Turkmenia (Badkhyz, southeastern Kopetdag). Endemic. Described from Badkhyz in the Pul-i-Khatum District. Type in Leningrad.

Section 3. *Leptocephalae* Tschern. in Bot. Mat. Gerb., Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 77.—*Stenocephalae* Bge. in Mém. Acad. Pétersb. 7 sér., 9, 2 (1865) 24 p. p.—*Squarrosae* Boiss. Fl. or. III (1875) 460 p. p.—*Brachyacanthae* Winkl. in Tr. Peterb. Bot. Sada. XII (1892) 204 p. p.—Capitula solitary terminal on branches or aggregated, ovoid or narrow cylindrical. Involucral bracts gradually acuminate in long or short, falcate or erect thin cusp. Receptacular bristles smooth, less often scabrous. Corolla pink, whitish, yellow or flesh-red; anther tubes glabrous. Achenes obovoid or obpyramidal, almost triquetrous, narrowly winged along margin.

Semishrubs, usually with sessile or narrow or broadly decurrent cauline leaves.

Type of section: *C. leptocephala* Fisch. and Mey.

Series 1. *Leptocephalae* Tschern.—Capitula small, aggregated; receptacular bristles unequal, longest bristles scabrous. Cauline leaves narrowly long-decurrent.

4. ***C. leptocephala*** Fisch. and Mey. in Bull. Soc. Nat. Mosc. XII (1839) 159 (nomen) and ex Bge. in Mém. Acad. Pétersb. 7 sér., 9, 2, 25; Boiss. Fl. or. III, 487; Winkl. in Tr. Peterb. Bot. Sada, XI, 135; XII, 147 205; XIV, 220; Kult. in Fl. Turkm. VII, 203.—**Exs.**: H.F.A.M. No. 46.

Cultivated. Short, many-stemmed, densely leafy semishrub, caespitose. Stem white-tomentose, 10–15 cm high, cymosely branched above, with short branches. Leaves hard coriaceous, grayish-green above due to finely arachnoid-hairy pubescence, finely gray-tomentose beneath; lower cauline leaves petiolate, narrow oblong-lanceolate, 8–9 cm long, 8 mm (at notches), 15–17 mm (with lobes) wide, narrowed toward both ends, crenate-lobed, with narrow deltoid and spinescent lobes; other cauline leaves similar, but gradually somewhat reduced; middle leaves short-petiolate; upper sessile, narrowly long-decurrent, 2–2.5 cm long. Capitula aggregated, on short peduncles, narrow-cylindrical, 4–5 mm wide (excluding cusps) and 10–12 mm long (excluding florets), arachnoid-hairy. Involucral bracts about 50, imbricate, closely appressed,

apically narrowed in thin, falcate cusp; inner bracts membranous, narrow-lanceolate, short-pointed into thin, erect cusp, scabrous along margin dorsally; receptacular bristles unequal, longest slightly broadened above, scabrous, shorter, smooth. Corolla pink or purple; anther tube purple. Achenes obovoid, 3–3.5 mm long, denticulate above. Flowering VII–VIII; fruiting VIII–IX.

Mountain slopes.—*Soviet Central Asia*: mountainous Turkmenia (Bolshie Balkhany). Endemic. Described from Bolshie Balkhany. Type in Leningrad.

Series 2. Hypopoliae Tschern.—Capitula aggregated or solitary terminal on branches. Receptacular bristles smooth. Cauline leaves broadly long-decurrent.

5. *C. albiflora* (Bornm. and Sint.) Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 285; Kult. in Fl. Turkm. VII, 201.—*C. hypopolia* β . *albiflora* Bornm. and Sint. in Bull. Herb. Boiss. 2 sér. 7 (1907) 215.—*C. lepida* auct. non Bge.: Winkl. in Tr. Peterb. Bot. Sada, XI (1890) 136; Fedtsch. Perech. Rast. Turk. IV, 249.— *Ic.*: Bornm. and Sint. op. cit. tab. 7, Fig. 2.

Cultivated. Short many-stemmed semishrub. Stems erect, almost tetraquetrous, white arachnoid-hairy, leafy, usually branched from middle. Capitula aggregated at stem and branch tips. Leaves coriaceous, greenish above, usually finely arachnoid-hairy, with fine network of somewhat prominent veins, white-tomentose beneath; lower cauline leaves usually appearing rosulate, petiolate, 10–15 cm long, 4–4.5 cm wide, crenate-toothed, with prickly-acuminate teeth, broad lanceolate, narrowed toward both ends, spinescent; other leaves gradually reduced, sessile, decurrent, otherwise similar to lower leaves. Capitula on short peduncles, 8–9 mm long (excluding florets) and 3.5–4 mm wide (excluding cusp), very finely arachnoid-hairy, ovoid-oval. Involucral bracts 60, all except inner closely appressed, ovate to oblong-ovate, apically narrowed in very short, slightly divergent cusp; inner involucral bracts membranous, narrow lanceolate, shortly spinescent, scabrous along margin; receptacular bristles smooth, whitish. Corolla whitish; anther tube pink. Achenes obovoid, 3–4 mm long, ribbed, with small teeth above. Flowering VI–VII; fruiting VII–VIII. (Plate VIII, Fig. 1).

Gravelly slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from Kara-Kal, Sundzodag Mountain. Type in Weimar.

Note. Plants from Syunt are transitional to *C. hypopolia* Bornm., although in their characters they are closer to *C. albiflora* and need to be examined in nature.

6. *C. hypopolia* Bornm. and Sint. in Bull. Herb. Boiss. II sér. 7 (1907) 214; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 285; Kult. in Fl. Turkm. VII, 202.—*lc.*: Bornm. and Sint. op. cit. tab. 7, fig. 4; Kult. op. cit. Plate 28, Fig. 2.

Cultivated. Short many-stemmed semishrubs. Stems erect, white-arachnoid, densely leafy, cymosely branched above. Leaves coriaceous, green, glabrous, glossy or finely arachnoid-hairy above, gray-tomentose beneath with prominent veins; lower leaves petiolate, usually smaller than middle, 8–10 cm long, 2–3 cm wide, broad-lanceolate, somewhat narrowed toward both ends, with shallow and wide, acute crenation along margin; middle leaves ovate-lanceolate, 12–14 cm long, 5 cm wide, sessile, broadly relatively short-decurrent (over 2–2.5 cm), with roundish auricles; upper leaves like middle, but shorter, 4–5 cm long; uppermost leaves reduced. Capitula one to three, terminal on each branch and stem, on peduncles, 5–6 mm wide (excluding cusp), 12 mm long (excluding florets), finely arachnoid-hairy. Involucral bracts about 60, all except inner imbricate, ovate to oblong-ovate, 2–7 mm long, closely appressed, acuminate into somewhat short, thin, almost horizontal or weakly falcate cusp; inner involucral bracts narrow-lanceolate, erect, short spinescent, scabrous dorsally and along margin, 12–12.5 mm long. Receptacular bristles unequal, smooth. Corolla yellow; anther tubes purple or pink. Achenes obpyramidal, 5 mm long and 2 mm wide, tetraquetrous, narrow-winged along angles, toothed above. Flowering VII–VIII; fruiting VIII.

Debris, slopes in middle mountain zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). *General distribution*: Northern Iran. Described from Kopetdag. Sulyuklyu (Saratovka). Isotype in Leningrad.

150 7. *C. mucida* Kult. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR XVII (1962) 97.

Cultivated. Short many-headed semishrub. Stems erect, almost tetraquetrous, white arachnoid-hairy, leafy, usually simple, one-headed. Leaves coriaceous, finely gray-tomentose on both sides, more dense beneath, with fine network of weakly prominent veins, all leaves ovate or oblong-ovate, narrowed toward both ends, almost entire or very inconspicuously and finely spinose-toothed, with short apical spine; basal and lower cauline leaves petiolate, others sessile, decurrent on stem. Capitula 7–8 mm wide (excluding cusps), finely arachnoid-hairy, ovoid. Involucral bracts ovate to oblong-ovate, all closely appressed, apically narrowed in thin, falcate cusp; inner involucral bracts membranous, narrow lanceolate, finely prickly-acuminate, scabrous along margin. Receptacular bristles smooth. Corolla yellow. Achenes obovoid, ribbed, toothed above, 4 mm long. Flowering VII.

Debris slopes.—*Soviet Central Asia*: mountainous Turkmenia



(Kopetdag). Endemic. Described from the Misinev Range. Type in Leningrad.

8. **C. stahlia** Bornm. and Gauba in Mitt. Thür. Bot. Ver. 47 (1941) 117.—*C. chejrabadensis* Kult. in Fl. Turkm. VII (1960) 380.—*C. hypopolia* auct. non Bornm. and Sint.: Kult. in Herb. Fl. As. Med. No. 45.—**Exs.**: H.F.A.M. No. 45.—**lc.**: Bornm. and Gauba, op. cit. tab. 13.

Cultivated, short many-stemmed semishrub, 20–30 cm high. Stems erect, finely white arachnoid-hairy, densely leafy, sparingly short-branched above; branches short one-headed, less often two or three-headed, usually entirely enclosed by apical leaves. Leaves strongly coriaceous, gray arachnoid-hairy on both sides, more densely beneath, with prominent veins; basal leaves petiolate, broad oblong, crenate-prickly-toothed acuminate in strong divergent cusp at apex; cauline leaves very insignificantly reduced toward stem apex; upper leaves sessile, decurrent. Capitula ovoid, 8–9 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts, except inner, narrow-lanceolate, closely appressed at base, free in middle part, somewhat arcuately decurved, short acuminate; inner bracts narrow-lanceolate, erect. Receptacular bristles smooth. Corolla yellow; anther tube pale yellow or light pink. Achenes about 4 mm long, obpyramidal, ribbed, toothed above. Flowering VI–VII; fruiting VII–VIII.

Dry slopes in upper mountain zone.—*Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Northern Iran. Described from region between Shirvan and Ashkhabad. Type in Weimar.

9. **C. oreoxerophila** Kult. Fl. Turkm. VII (1960) 380.

151 Cultivated, many-stemmed semishrub, 20–30 cm high, with numerous caudices at base. Stems numerous, leafy, with few short branches above, 2–8 cm long lateral branches appressed white arachnoid-hairy, pubescence sparse above and dense below; bark pinkish. Leaves light grayish-green, coriaceous, dense, with thin remote spines along margin and very prominent veins on both sides; basal leaves about 10 cm long, 1.5–2.5 cm wide, long-petiolate, with 5 cm long petiole, ovate-lanceolate, cuspidate, sparsely and finely spinose along margin, with 3–4 mm long spines; middle cauline leaves like basal leaves, but short-petiolate or sessile, with larger lamina; upper cauline leaves ovate-oblong, sessile with broad base, weakly decurrent, broadly crenate-prickly-toothed along margin; uppermost leaves 2.5 cm long and 1.5 cm wide, reaching almost up to capitulum base, like upper. Capitula ovoid, 12 mm wide (excluding cusps) and 20 mm (including cusps), solitary terminal on short or long branches, arachnoid-hairy, pale green. Involucral bracts numerous (more

than 60), closely appressed at base, with almost horizontal cusp; outer bracts 4×2 , in upper part about 5 mm long; middle bracts 8 mm long, 3 mm wide, in upper part 6 mm long; inner bracts 15 mm long, 2 mm wide, linear, coriaceous, scabrous along margin, gradually narrowed toward apex. Receptacular bristles 10 mm long, smooth. Corolla 13 mm long, flesh-red (?); anther tube pink. Achenes 4 mm long, 1.5 mm wide, dark brown, obpyramidal, with unequal teeth above. Flowering VI–VIII.

Upper mountain zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from the Dogri-Dere Ravine. Type in Ashkhabad.

Note. A very doubtful species. It is described here for the first time, as no material for this species could be found. The type, as indicated by the author, should be in Ashkhabad.

Series 3. Chaetocephalae Tschern.—Capitula solitary terminal on branches; receptacular bristles smooth. Cauline leaves sessile, short-decurrent.

10. *C. chaetocephala* Kult. in Tr. Sredneaz. Gos. Univ., Ser. VIIIc, 7(1929) 3.—*lc.*: Kult. *Ibid.*, Plate 3.

Cultivated, short many-stemmed semishrub. Stems 35–40 high, erect, arachnoid-hairy, moderately leafy, branched above, branches short, one-headed. Leaves coriaceous, grayish-green on both sides, finely arachnoid-hairy (more densely beneath), with prominent veins, oblong-lanceolate, crenate-prickly-toothed; lower leaves petiolate, with petioles almost as long as lamina, narrowed towards both ends, spinescent, 7.5–8.5 cm long including petiole, 2 cm wide including spines; middle leaves sessile, semiamplexicaul, short-decurrent somewhat shorter than lower; upper leaves reduced, narrow-lanceolate, sessile, short-decurrent. Capitula ovoid or ovoid-oblong, finely arachnoid-hairy, 8–10 mm wide (excluding cusps), 18 mm long (excluding florets). Involucral bracts about 60, all except inner closely appressed at base, with thin, subulate, deltoid, falcately recurved cusp; ovate to oblong-lanceolate; inner bracts flat, membranous, linear, 15–17 mm long, short and thin acuminate, scabrous above and along margin. Receptacular bristles somewhat broadened above, smooth, creamish. Corolla yellow; anther tube purple. Achenes obpyramidal, triquetrous, with weakly thickened ribs, toothed above, 5 mm long and 2 mm wide. Flowering VII–VIII; fruiting VIII.

Stony slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). *General distribution*: Northern Iran. Described from Khorassan. Type in Tashkent.

Section 4. Leiocaulis Bge. in Mém. Acad. Pétersb. 7 sér., 9, 2 (1865) 42 p. max. p.—*Sphaerocephalae* Beg. *Ibid.* (1865) 35 p. p.—*Squarrosae*

Boiss. Fl. or. III (1875) 460 p. p.—*Hamatae* Boiss. Ibid. (1875) 461.—*Drepanophorae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 206 p. p.; Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8 (1940) 550 p. p.—*Nudicaules* Winkl. op. cit. (1892) 191 p. p.—*Heteracanthae* Winkl. op. cit. 225 p. p.—Capitula solitary terminal on branches, numerous or few; involucre bracts ovate, with strong, arcuate or almost erect, long or short cusp; corolla yellow or whitish; receptacular bristles smooth or scabrous; achenes obovoid or obpyramidal, three or four-angled, toothed above. Perennial herbs with woody many-headed root, thick collar, and sessile cauline leaves, or semishrubs.

Lectotype of section: *C. boissieri* Buhse.

11. *C. astracanic* (Spreng.) Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 468.—*Carduus astracanicus* Spreng. Fl. Hal. Mant. Prim. (1807) 49.—*Carduus wolgensis* MB. in Willd. Enum. 2 (1809) 839; Spreng. Syst.-veg. 3 (1826) 385.—*Cousinia wolgensis* C.A.M. in DC. Prodr. VI (1837) 555; Ldb. Fl. Ross. II, 678; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 36; Fl. Yugo-Vost. VI, 384; Pavlov, Fl. Tsent. Kazakhst. III, 297.—*C. transcaspica* Juz. ex Kult. in Fl. Turkm. VII (1960) 210 (descr. ross.).—*Arctium wolgensis* O. Ktze. in Tr. Peterb. Bot. Sada, X (1887) 198.—*Īc.*: MB. Cent. Pl. Rar. 2 (1810) tab. 44; Fl. Yugo-Vost. 697.

Perennial. Roots woody, blackish-fibrous, with thick, densely white-tomentose collar, covered with remains of old leaves. Stem erect, 153 arachnoid hairy-tomentose, with somewhat floccose tomentum, more or less cymosely branched, 10–30 cm high. Leaves green above, glabrous, white-tomentose beneath; basal and lower cauline leaves oblong, petiolate, crenate-toothed, teeth finely prickly-acuminate; other cauline leaves gradually reduced upward, sessile, semiamplexicaul, oblong-ovate, or ovate, or uppermost leaves more or less orbicular, shallow crenate-toothed. Capitula fewer, solitary terminal on short branches, ovoid, 10–12 mm wide (excluding cusps), arachnoid-hairy. Involucre bracts numerous, ovate to oblong, with strong, subulate, relatively long, arcuately recurved cusp; inner involucre bracts thin-coriaceous, with short and thin cusp, scabrous along margin, usually whitish. Receptacular bristles smooth, helical below. Corolla whitish or yellowish. Achenes obpyramidal, more or less tetraquetrous, with narrow wings along ribs and short toothed above. Flowering VI; fruiting VI–VII.

Clayey-stony slopes.—*European Part*: Lower Volga; *Soviet Central Asia*: Aralo-Caspian, Kara-Kum. Endemic. Described from Sarepta. Type in Berlin?

12. *C. affinis* Schrenk, Enum. pl. I (1841) 41; Ldb. Fl. Ross. II, 678; Bge. in Mém Acad. Pétersb., 7 sér. 9, 2, 36; Boiss. Fl. or. III, 488;

Winkl. in Tr. Peterb. Bot. Sada, XII, 212; XIV, 221; Pavlov, Fl. Tsentr. Kazakhst. III, 297; Kryl. Fl. Zap. Sib. XI, 2883; Grubov, Konsp. Fl. Mong. 273.—*C. wolgensis* var. *affinis* Rgl. in Tr. Peterb. Bot. Sada, VI (1879) 317.—*Arctium affine* O. Ktze. Rev. Gen. 1 (1891) 307.

Perennial. Root fusiform, blackish-fibrous, woody, with usually thick whitish-fibrous collar. Stem 20–60 cm high, erect, arachnoid-hairy, glabrescent, light colored, almost smooth, usually solitary, weakly branched above, branches one-headed. Leaves very finely arachnoid-hairy, green above, gray-tomentose beneath, large prickly-toothed or lobed along margin; basal leaves lanceolate, short-petiolate lobed, lobes remote, spinescent; lower cauline leaves like basal, but sessile; middle cauline leaves oblong, sessile, with roundish auricles, lobed; upper leaves ovate, sessile, large prickly-toothed; uppermost leaves reduced. Capitula globose, 18–20 mm wide (excluding cusps), weakly arachnoid-hairy. Involucral bracts more numerous, imbricate, closely appressed near base, apically narrowed in subulate falcate cusp; outer bracts half as long as middle; middle bracts 1.5–2 cm long; inner bracts membranous, somewhat flat, lanceolate, gradually prickly-acuminate, 2–2.5 cm long. Receptacular bristles smooth. Corolla pale yellow or whitish; anther tube purple. Achenes obovoid, three or four-angled, thickened along angles, grayish, dark spotted, toothed above, 3 mm long. Flowering VI–VII; fruiting VII–VIII. (Plate VIII, Fig. 2).

Along clayey and sandy knolls, at the outcrops of bedrocks in deserts and semideserts.—*Soviet Central Asia*: Balkhash Region, Aralo-Caspian, Kyzyl-Kum, Tien Shan (Trans-Ili Alatau, Chu-Ili mountains). *General distribution*: Dzhungaria, Mongolia. Described from the Lepsa District. Type in Leningrad.

Note. The two northernmost species of the genus, *C. astracanica* (Spreng.) Tamamsch. and *C. affinis* Schrenk, with quite wide and contiguous ranges, are well distinguished only in extreme forms. An examination of quite large collections of these species shows that most of the characters used to distinguish them are extremely variable. A detailed study of the abundant material collected from different sites in the distribution areas is essential to determine the constancy of one character or another; the material of these species in herbaria does not make it possible to determine the stability of the characters.

It is quite possible that we are dealing with a single, widespread species that, depending on the conditions of growth, varies slightly in its appearance. It has been found that the plants growing in the northern deserts on gravelly slopes of knolls are shorter, with smaller leaves, while the plants on sands in the river valleys are more robust, with larger, usually densely pubescent leaves. It is also possible that we are dealing with several, sometimes strictly local species.

Following tradition, I accept for the present both species until a detailed study of all the forms can be made.

13. *C. talassica* (Kult.) Juz. comb. n. in sched.—*C. affinis* var. *talassica* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 13.

Perennial. Root woody, blackish-fibrous, with thick, usually white-tomentose collar. Stem erect, solitary, finely arachnoid-hairy or subglabrous, strongly divergately branched in upper half, with one-headed branches forming corymbose inflorescence. Leaves coriaceous, green, glabrous or finely arachnoid-hairy above, white-tomentose beneath; basal leaves in conspicuous rosettes of many leaves, very short-petiolate, with thickened petioles, crenate-prickly-toothed, oblong-ovate or ovate; cauline leaves shorter upward, sessile, semiamplexicaul, with roundish auricles, orbicular or broad-ovate, crenate-prickly-toothed fewer. Capitula globose, 11–16 mm wide (excluding cusps), densely arachnoid-hairy, somewhat foveate at base. Involucral bracts numerous, appressed at base, narrowed in subulate, strong, usually arcuate cusp; inner bracts membranous, lanceolate, somewhat flat, with short and thin cusp, scabrous along margin and dorsally. Recetpacular bristles smooth, only some with one to three crenations. Corolla yellowish. Achenes obovoid, 4–5 mm long, three or four-angled, with sharp, winged thickened angles, with three or four teeth above, light gray, with dark transverse bands. Flowering VI–VII; fruiting VIII.

Loamy and conglomerate slopes in the foothills.—*Soviet Central Asia*: Tien Shan (west). Endemic. Described from the Talass River Basin, Ur-Maral River. Type in Tashkent.

14. *C. pseudoaffinis* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 10.—*lc.*: Kult. *Ibid.*, Plate 11.

Perennial. Root woody, with thick collar covered by remains of old leaves. Stem 25–80 cm high, erect, almost glabrous, whitish, glossy, almost smooth, profusely branched above. Leaves glabrous, green above, white-tomentose beneath, boldly crenate-prickly-toothed or crenate-lobed; basal leaves rosulate, usually falling by anthesis, short-petiolate, oblong-lanceolate, crenate-lobed, lobes spinescent; lower cauline leaves sessile, like basal; middle and upper cauline leaves ovate, sessile, auriculate, prickly-toothed, gradually reduced upward, sparse; uppermost leaves strongly reduced. Capitula ovoid, 12 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts few, remote, imbricate, somewhat flat, appressed at base, squarrose; outer bracts one-third to half as long as middle; middle 12–15 mm long, oblong-ovate, 3 mm wide at base, abruptly narrowed in upper one-third into thin, deltoid, divergent spine, adjacent bracts not exceeding middle; inner bracts membranous,

lanceolate, with 17–20 mm long terminal spine. Receptacular bristles scabrous. Corolla white; anther tube purple. Achenes obovoid, 5 mm long, tetraquetrous, with wing-shaped thick angles, three or four-angled, above. Flowering VI–VII; fruiting VII–VIII.

Outcrops of varicolored rocks in the foothills.—*Soviet Central Asia*: Syr-Darya. Endemic. Described from Kaplanbek. Type in Tashkent.

Note. The type is not designated in the description of the species; I propose to consider the plants with the label “Kaplanbek. Popov. 1920 VII 19, Nos. 780, 787” as the lectotype.

15. *C. hamadae* Juz. in Tr. Tadzh. Bazy. Akad. Nauk SSSR, 8 (1940) 523, 550.—*C. pseudaffinis* var. *bucharica* Kult. in Sched. Herb. Fl. As. Med. 20 (1928) No. 485; Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI, 11.—*Exs.*: H.F.A.M. No. 485.

Perennial. Roots woody, many-headed. Stems fewer, erect, 25–50 cm high, finely arachnoid-hairy, glabrescent and then glossy, light colored, smooth, weakly branched above or from base, sparsely
156 arachnoid-hairy, green above, white-tomentose or finely gray-tomentose beneath, boldly spinose-toothed or lobed with spinescent lobes or teeth, sessile; basal leaves forming dense rosette, oblong-ovate or cuneately narrowed toward base, oblong-ob lanceolate; lower cauline leaves like basal; middle and upper leaves fewer, sparse, ovate or oblong-ovate, auriculate, almost half as long as basal; uppermost leaves reduced. Capitula oblong-ovoid or flat-globose, 10–14 mm wide (excluding cusps), arachnoid-hairy, subglabrous. Involucral bracts less numerous, sparse, somewhat flat, appressed near base, broad-ovate, abruptly narrowed upward in three-angled divaricate, strong spine; outer bracts decurved, almost half as long as middle; middle bracts 10–12 mm long; inner membranous, lanceolate, spinescent, scabrous along margin and dorsally, 12–20 mm long and 2.5 mm wide. Receptacular bristles weakly scabrous above. Corolla creamish or whitish; anther tube light purple. Achenes obovoid, almost tetraquetrous, with sharp, wing-like thickened angles, with four teeth above, 4–4.5 mm long. Flowering V–VI; fruiting VII–VIII.

Submountainous stony deserts, on the outcrops of varicolored rocks in foothills and on bare mountains.—*Soviet Central Asia*: Kyzyl-Kum, Pamiro-Alai. Endemic. Described from region between Kyzyl-Tepe and Malik. Type in Tashkent.

Note. This species has a quite wide range and its characters vary somewhat. At present, I do not have sufficient material to determine the range of character variation. I have tried to separate the plants from the northwestern part of the range (Kuldzhuktau Region, Tamdytau) as a separate species, naming them *C. victoris* Tschern.; these plants differ

from *C. hamadae* proper by larger, almost glabrous capitula and less pubescent leaves and stem. However, we consider it essential to verify carefully the constancy of these characters in populations, before resolving the question of segregating the species.

The northeastern locality, disjunct from the main range, also requires a special study: the Turkestan Range, ascending from Aksu to Zambar. Only very young plants with still undeveloped capitula were collected from this region.

In establishing *C. hamadae*, S.V. Juzepczuk qualifies it as a nom. nov., and includes in the synonyms *pseudaffinus* var. *bucharica* Kult., which was described by M.V. Kultiasow on the basis of specimens from the area between Kyzyl-Tepe and Malik, issued in H.F.A.M. (No. 485). These specimens, and not the specimens from Kugitang, as assumed by S.V. Juzepczuk, should be considered as the type of the species.

16. *C. xanthiocephala* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 107.

- 157 Perennial. Root vertical, woody, with thick somewhat pubescent collar, usually covered with remains of old petioles. Stem erect, whitish, glabrous, glossy, with short branches in upper half; branches one-headed, sometimes very short, and capitula almost sessile, in racemose inflorescence. Leaves coriaceous, pale yellow above, glabrous, with network of prominent veins, densely white-tomentose beneath; basal leaves oblong-obovoid, petiolate, crenate-prickly-toothed; cauline leaves gradually reduced, sessile, semiamplexicaul; lower cauline leaves like basal; middle and upper cauline leaves orbicular-ovate, or orbicular more or less obtuse, spinose-dentate. Capitula cylindrical, 5–6.5 mm wide (excluding cusps) and 18 mm long (excluding corollas), almost glabrous or very finely appressed arachnoid-hairy; all involucre bracts closely appressed, ovate to oblong-ovate, free in upper half or one-fourth, narrowed in strong, almost horizontal, 3–4 mm long, yellowish cusp; inner bracts flat, lanceolate, acuminate, dorsally scabrous, erect. Receptacular bristles white, somewhat broadened above, scabrous. Corolla whitish; anther tube creamish. Young achenes obpyramidal, tetraquetrous, toothed above, 4–4.5 mm long. Flowering VII.

Outcrops of red clays.—*Soviet Central Asia*: Syr-Darya. Endemic. Described from the Alymtau Mountains, Sarypaya-Sai Ravine. Type in Leningrad.

17. *C. cryptadena* Juz. in Bot. Mat. Gerb. Glavn. Bot. Sada, V (1924) 111; Kult. in Fl. Turkm. VII, 201.—*C. leucocitrina* Kult. in Bot. Mat. Gerb. Glavn. Bot. Sada, V (1924) 143.

Perennial. Root woody, many-headed. Stem erect, with remains of old petioles near base, sparsely arachnoid-hairy below, usually subglabrous above, paniculately branched, branches divergent, bearing numerous capitula, aggregated in lax panicles. Leaves coriaceous, green, almost glabrous above, white-tomentose beneath, with prominent veins; basal leaves petiolate, pinnatipartite, with broadly deltoid, spinescent, 15 cm long and 5 cm wide lateral lobes; lower cauline leaves like basal, but with shorter petioles, 12 cm long, 5 cm wide; middle and upper cauline leaves sessile, broad-lanceolate or almost ovate, broadly short-decurrent, with roundish auricles, crenate-prickly-toothed, gradually reduced upward, strongly reduced in inflorescence. Capitula on short peduncles, numerous, oblong-cylindrical, 15 mm long and 4 mm wide (excluding cusps), finely arachnoid-hairy, weakly divergent at base, with fewer florets. Involucral bracts about 30; outer bracts 6 mm long, 2 mm wide, oblong-ovate, short-acuminate; middle bracts oblong, appressed at base, gradually acuminate in carinate weakly recurved cusp, 12–15 mm long, 2–3 mm wide near base; inner bracts linear-lanceolate, membranous, acuminate in thin and short cusp, scabrous along margin. Corolla yellow; anther tube purple; receptacular bristles white, almost smooth or weakly scabrous. Achenes oblong-cylindrical, 5 mm long, 2 mm wide, longitudinally ribbed, narrow-winged along ribs, with sharp teeth above. Flowering V; fruiting VII.

Soviet Central Asia: mountainous Turkmenia (Kopetdag). Endemic. Described from Chuli District. Type in Leningrad.

18. **C. antonowii** Winkl. in Tr. Peterb. Bot. Sada, XI (1889) 135; XII, 227, XIV, 200; Kult. in Fl. Turkm. VII, 212.—*Arctium antonowii* O. Ktze. Rev. Gen. 1 (1891) 307.—**lc.**: Winkl. op. cit. (1889), Plate 2, Fig. 2.—**Exs.**: H.F.A.M. No. 41.

Cultivated. Semishrub with thick woody root. Stem erect, 50–70 cm high, slender, glabrous, glossy, sometimes very finely arachnoid-hairy, usually divaricately branched above, with slender one-headed branches. Leaves coriaceous, glabrous, green above, densely white-tomentose beneath; lower leaves usually petiolate, 15–18 cm long including petiole (petiole 4 cm long), oblong, pinnatilobate, lobes obtuse, with short apical spine, sparsely spinose-toothed; other cauline leaves sessile, semiamplexicaul, auriculate, gradually reduced upward, oblong or ovate-cordate, undivided, with short apical spine indistinctly crenate-prickly-toothed. Capitula ovoid, 8 mm wide and 17–20 mm long (including florets), finely arachnoid-hairy. Involucral bracts about 80, broad-lanceolate, closely appressed, acuminate into short arcuately recurved cusp; inner bracts thin coriaceous, lanceolate, short acuminate,

scabrous along margin, 11–12 mm long, erect. Receptacular bristles smooth. Corolla whitish; anther tube reddish. Achenes obovoid, 4.5–5 mm long, with three or four ribs, very narrowly and discontinuously winged along ribs, blunt-toothed above. Flowering VI–VII; fruiting VII–VIII.

Loamy debris slopes in foothills and lower mountain zone.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Geok-Tepe. Type in Leningrad.

19. *C. glandulosa* Kult. in Tr. Sredneaz Gos. Univ. Ser. VIIIc, VI (1929) 13; Kult. in Fl. Turkm. VII, 192.—*lc.*: Kult. op. cit. (1929), Plate 12.

160 Perennial. Root vertical, woody, many-headed, with thick collar. Stems numerous, somewhat thickened at base, white-tomentose, with fewer remains of old leaves, white, glossy, smooth, sparsely branched in upper half. Leaves green, glandular above, grayish-green, finely arachnoid-hairy beneath; basal and lower cauline leaves petiolate, oblong, pinnatisect into almost undivided lateral segments, gradually reduced downward, lanceolate, more or less obtuse, with very short thin cusp, segments remote on narrow-winged stalk; other cauline leaves less numerous, gradually reduced, sessile, semiamplexicaul; uppermost leaves strongly reduced. Capitula 15 mm long (excluding florets), 9–10 mm wide (excluding cusps); globose-ovoid, strongly foveate at base. Involucral bracts deltoidly broadened at base, appressed, attenuate above into weakly falcate cusp, sparsely glandular dorsally; inner bracts membranous, short acuminate, scabrous along margin and dorsally, arachnoid-hairy. Receptacular bristles smooth, somewhat flattened. Corolla whitish, anther tube purple. Achenes obpyramidal, 5 mm long, three or four-angled, toothed above. Flowering VI; fruiting VII.

Clayey and stony slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from Kyurendag, Aishem Mountains. Type in Tashkent.

Section 5. Chrysoptera Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 78.—*Recurvatae* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 19 p. p.—*Squarrosae* Boiss. Fl. or. III (1875) 460 p. p.—*Drepanophorae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 206 p. p.; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 550 p. p.—*Heteracanthae* Winkl. op. cit. (1892) 225 p. p.—Capitula solitary terminal on branches or numerous, more or less aggregated; involucral bracts acuminate into long or short, thin, falcate, less often erect cusp; corolla yellow, often with purple anther tubes; receptacular bristles smooth; achenes obovoid, three or four-angled, toothed above. Biennial



herbs with winged stem and sessile cauline leaves having excurrent wings.

Type of section: *C. alata* Schrenk.

Series. 1. **Dissectae** Juz.—Capitula comparatively large, solitary, terminal on branches; stem narrow-winged, prickly-toothed or almost smooth.

20. *C. dissecta* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 391; Ldb. Fl. Ross. II, 679; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 23; Boiss. Fl. or. III, 477; Winkl. in Tr. Peterb. Bot. Sada, XII, 209; Juz. in Bot. Mat. Gerb. Glavn. Bot. Sada, II, 54; Pavlov, Fl. Tsentr. Kazakhst. III, 296.—*C. dissecta* var. *genuina* Trautv. in Tr. Peterb. Bot. Sada, IX (1886) 456.—*Arctium dissectum* O. Ktze. Rev. Gen. 1 (1891) 307.

161 Biennial. Stem erect, 25–35 cm high, white arachnoid-hairy, narrow-winged throughout, corymbosely branched above, branches spreading upward, one-headed, narrow-winged; wings of stem 2–4 mm wide, grayish-green, densely arachnoid-hairy, crenate-prickly-toothed. Leaves densely arachnoid-hairy above, white-tomentose beneath; basal and lower cauline leaves short-petiolate, pinnatisect in unequal, narrow-lanceolate segments, in turn pinnatifid in spinescent lobes on winged leaf stalk; cauline leaves like lower, but sessile, decurrent into wings; uppermost leaves narrow-lanceolate, spinose-toothed, short, reaching almost to capitula. Capitula globose-ovoid, 12–15 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts numerous, all, except inner, appressed at base, falcate in middle, carinate dorsally, subulate-acuminate with thin, usually yellow, 3 mm long cusp; inner bracts erect, narrow-lanceolate, scabrous along margin, gradually acuminate upward into short and thin cusp. Receptacular bristles smooth. Corolla pale-yellow. Achenes almost tetraquetrous, narrow-winged along ribs, with four teeth above, 5 mm long and 1.5–2 mm wide, dark gray. Flowering V–VI; fruiting VI–VIII. (Plate IX, Fig. 1).

Along borders of hummocky sands, in sandy steppes, sandy and pebbled valleys of steppe rivers.—*Soviet Central Asia*: Balkhash Region. *General distribution*: Dzhungaria-Kashgaria. Described from the Arganaty Mountains. Type in Leningrad.

21. *C. perovskiensis* (Bornm.) Juz. comb. n. in sched.—*C. dissecta* var. *perovskiensis* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 153.

Biennial. Plants morphologically much resembling *C. dissecta* Kar. and Kir., but differing by more dense, loose, white tomentum on stem

and leaves, 11–12 mm wide, oblong-ovoid capitula (excluding cusps), and numerous involucre bracts with long, subulate, usually yellowish 6–7 mm long, deflexed cusp, otherwise like *C. dissecta* Kar. and Kir. Flowering VI–VII; fruiting VIII. (Plate IX, Fig. 2).

On saline plains, wormwood steppes, sometimes at the foot of sandy hillocks.—*Soviet Central Asia*: Balkhash, Aralo-Caspian, Syr-Darya, Kyzyl-Kum. Endemic. Described from Kyzyl-Dzhar. Type in Leningrad.

22. *C. sogdiana* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 154; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 551.—*C. dissecta* var. *macrocephala* Rgl. and Schm. in Izv. Obshch. Lyubit Estestv. Antrop. Etnogr. 34, 2 (1882) 49.—*C. subinermiceps* Juz. in Bot. Mat. Gerb. Glavn. Bot. Sada, II (1921) 55.

162 Biennial. Stem 30–70 cm high, erect, floccose-tomentose, narrow-winged, sparsely branched from middle, branches long, one-headed, wings 2–3 mm wide, crenate-prickly-toothed, arachnoid-hairy. Leaves gray-tomentose beneath, finely arachnoid-hairy, grayish-green above; basal leaves petiolate, linear-lanceolate, pinnatifid, often remote, prickly-toothed, terminal part long, lanceolate, acuminate, finely spinose-toothed, lower cauline leaves sessile, decurrent to stem wings, like basal leaves; middle cauline leaves lanceolate, sessile, decurrent; uppermost leaves reduced to spines. Capitula 15 mm wide (excluding cusps), globose-cylindrical, densely pubescent. Involucre bracts imbricate, densely pubescent with simple hairs, appressed at base, attenuate in upper one-third into falcate, 2–3 mm long, stiff, thin spine; outer bracts half as long as middle; middle bracts 12 mm long; next row flat, long-lanceolate, 15 mm long, with long and thin terminal spine; inner bracts linear, with thin, erect spine. Receptacular bristles smooth. Corolla yellowish. Achenes ovoid, tetraquetrous, angles narrow scariously-winged, forming fringe of small teeth at apex. Flowering V–VII.

On stabilized and hummocky sands in deserts.—*Soviet Central Asia*: Kyzyl-Kum, Pamiro-Alai (Zeravshan River Valley). Endemic. Described from the Dzhizhanskii Ravine. Type in Leningrad; cotype in Tashkent.

23. *C. dolichoclada* Juz. in Bot. Mat. Gerb. Glavn. Bot. Sada, II (1921) 57.

Biennial. Stem 30–80 cm high, erect, grayish arachnoid-hairy-tomentose, with sparsely spinose-toothed narrow wings, branched in upper half; branches one-headed, wingless below capitulum. Leaves grayish-green, finely arachnoid-hairy with white-tomentose veins above, gray-tomentose beneath; basal leaves petiolate, deeply pinnatifid, almost pinnatisect below, with linear, crenate-prickly-toothed lateral segments; cauline leaves sessile, decurrent on wings, like basal leaves; uppermost

leaves strongly reduced. Capitula 12–14 mm wide, almost ovoid, tomentose. Involucral bracts numerous, densely woolly dorsally, closely appressed, narrowed in upper half into thin, falcate, 4–4.5 mm long cusp; innermost bracts lanceolate, terminating in thin, slightly curved cusp. Receptacular bristles smooth. Corolla pale yellow. Achenes obovoid, tetraquetrous, narrow-winged along angles, with four teeth above, whitish, about 5 mm long. Flowering V–VI.

On sands.—*Soviet Central Asia*: Kyzyl-Kum. Endemic. Described from the Amu-Darya Basin, between Tyuya-Muyun and Mesheklin-Kala fortress. Type in Leningrad.

Note. The species was described without designating the type. As the lectotype, I recommend the plants with the label "Near Amu-Darya, between Tyuya-Muyun and Mesheklin-Kala fortress. Sands. 19 V 1915. Krascheninnikov, No. 179a."

163 *Series 2. Alatae* Juz.—Capitula in wide, relatively compact inflorescences; stem wings narrow or often in many rows more or less wide, usually deeply incised.

24. *C. alata* Schrenk. Enum. pl. nov. I (1841) 40; Ldb. Fl. Ross. II, 678; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 22; Boiss. Fl. or. III, 178; Winkl. in Tr. Peterb. Bot. Sada, XII, 209; XIV, 220; Pavlov, Fl. Tsentr. Kazakhst. III, 296; Kult. in Fl. Turkm. VII, 196.

Biennial. Stem erect, 30–80 cm high, smooth, finely arachnoid-hairy or almost glabrous, with wings in many rows throughout, wings crenate-prickly-toothed 4–5 mm wide, branched in upper half; common inflorescence paniculate, sometimes hemicorymbose. Leaves gray-arachnoid on both sides; basal leaves petiolate, bipinnatisect, with lateral segments narrow-lanceolate, almost entire; lower cauline leaves like basal, but sessile, decurrent; middle and upper leaves pinnatipartite into narrow-lanceolate lateral lobes, sessile, decurrent to stem wings. Capitula on peduncles, numerous, 16 mm long and 9–10 mm wide (excluding cusps), ovoid, weakly arachnoid-hairy. Involucral bracts numerous (about 70), all except inner lanceolate, 5–10 mm long, gradually acuminate in thin, about 5 mm long, deflexed cusp; inner bracts narrow-lanceolate, 16 mm long, erect, membranous above, gradually narrowed in thin, erect cusp. Corolla yellowish; anther tube pink. Receptacular bristles smooth. Achenes obovoid, almost triquetrous, weakly curved, with three teeth above, 3.5 mm long and 1.5 mm wide. Flowering VII–VIII.

Semi-stabilized, small-hummocky sands.—*Soviet Central Asia*: Balkhash Region, Aralo-Caspian Region, Syr-Darya, Kyzyl-Kum, Kara-Kum. *General distribution*: Northern Iran. Described from the Arganat Mountains. Type in Leningrad.

25. *C. oxiana* Tschern. in Bot. Mag. Gerb. Inst. Bot. Akad. Nauk UzSSR, XVII (1962) 100.—*C. kuschkensis* Kult. in Fl. Turkm. VII (1960) 197, nomen.—*C. bipinnata* auct. Fl. As. Med. p. p.—*C. alata* auct. non Schrenk; Bornm. in Oest. Bot. Zeitschr. (1912) 9.—**lc.**: Fl. Turkm. VII, Plate 30, 2.

Biennial. Stem erect, 20–40 cm high, floccose-tomentose, winged throughout, with pinnatisect, spinescent, arachnoid-hairy wings, branched in upper half; branches divaricate, branched further into numerous, short, usually one-headed secondary branches. Leaves grayish-green, arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, pinnatisect, lateral segments acuminate, entire or with one pair of small lobes at base, less often pinnatilobate; lower cauline leaves like basal, but very short-petiolate; middle and upper leaves sessile, small, decurrent to stem wings, pinnatilobate, lobes narrow-deltoid, spinescent. Capitula numerous, 164 4–5 mm wide, oblong-globose, arachnoid-hairy, roundish at base. Involucral bracts numerous, imbricate, terminating in weakly curved 1–1.5 mm long cusp, ovate to lanceolate. Receptacular bristles smooth. Corolla yellow; anther tube pink. Achenes obovoid, three or four-angled, toothed above, brown, 3 mm long. Flowering V–VI; fruiting VI–VII.

On stabilized hummocky sands and loamy slopes in foothills and deserts.—*Soviet Central Asia*: mountainous Turkmenia (central Kopetdag, Badkhyz, Amu-Darya, Kyzyl-Kum, Pamiro-Alai). Endemic. Described from the vicinity of Kushka. Type in Tashkent.

Note. It is a very widely distributed species, similar to *C. bipinnata*. The characters vary somewhat. Apparently, *C. oxiana* Tschern. and *C. turkmenorum* Bornm. also grow in central Kopetdag; forms intermediate between these species are found here. It is essential to study large collections from this region to determine the precise range boundaries of these two species.

26. *C. psammophila* Kult. in Tr. Sredneaz. Gos. Univ., Ser. VIII, VI (1929) 15; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 551.

Biennial. Stem 40–70 cm high, slender, erect, glabrous, glossy, discontinuously narrow-winged, paniculately-branched from middle, branches slender, short, one-headed; wings of stem narrow, 2–3(5) mm wide, crenate-prickly-toothed, glabrous, finely arachnoid-hairy only at base. Basal leaves sparsely gray-tomentose on both sides (more densely beneath), petiolate, ovate-lanceolate, deeply bipinnatifid, with linear-lanceolate, entire, terminal lobe and deeply pinnatifid lateral lobes, weakly spinose-toothed; leaf axes usually narrow-winged, weakly spinose-toothed; lower cauline leaves like basal, but sessile, decurrent to stem wings; middle cauline leaves deeply bipinnatifid, glabrous, sessile, decurrent to narrow spinose-toothed wings; upper cauline leaves greatly

reduced, sessile, long-decurrent, glabrous; uppermost leaves reduced in subulate scales. Capitula 5–7 mm wide with approximately 20-florets, oblong-cylindrical, globose or weakly truncate at base, more or less arachnoid-hairy. Involucral bracts numerous (about 50), appressed, imbricate, linear-lanceolate, acuminate in thin, short, 2–3 mm long erect spine; inner bracts coriaceous, green, long, lanceolate, 1–1.2 cm long, acuminate above in thin spine. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, light brown, tetraquetrous, very narrow-winged along margin. Flowering V–VI; fruiting VII–VIII. (Plate X, Fig. 3).

Sandy loam hillocks and desert sands.—*Soviet Central Asia*: Kyzyl-Kum, Amu-Darya, southern Pamiro-Alai. Endemic. Described from the Saman Mountain. Type in Tashkent.

- 165 27. *C. schistoptera* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 301; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 551.—*C. bipinnata* auct. Fl. As. Med. p.p.

Biennial. Stem erect, 20–65 cm high, weakly arachnoid-hairy tomentose or glabrous above, winged throughout; wings in many rows, narrow or rather wide (3–15 mm), deeply (almost up to stem) incised into frequent, oblong or narrow-deltoid segments, abruptly acuminate above in stiff and rather long spine, larger segments crenate, prickly toothed; stem branched from base or often from middle with long, winged, three to five headed branches, peduncles often wingless. Basal leaves few (one to three) by anthesis, 10–25 cm long, coriaceous, oblong-lanceolate, pinnatifid, usually with narrow-winged petiole, lateral lobes large-pinnatifid, spinescent. Leaves green and glabrous above, grayish-green, finely tomentose beneath; cauline leaves decurrent to wings, gradually reduced, usually like basal, but uppermost leaves almost undivided, greatly reduced. Capitula numerous, 20–150, oblong-ovoid, 13–20 mm long, 5–8 mm wide (excluding cusps), finely arachnoid-hairy with nearly 20 florets. Involucral bracts bright green; outer bracts rather short, narrow-lanceolate, appressed at base, attenuate above into divergent spine, almost as long as appressed part; middle bracts oblong, lanceolate, attenuate above into erect squarrose cusp; inner bracts thin-coriaceous, acuminate, scabrous along margin. Receptacular bristles smooth. Corolla yellow; anther tube pink. Achenes obpyramidal, three to five ribbed, sharp toothed above, light-gray, about 4 mm long. Flowering V–VI; fruiting VI–VII.

Sands and in the foothills.—*Soviet Central Asia*: Kyzyl-Kum, Kara-Kum, mountainous Turkmenia (foothills of Kopetdag and Badkhyz). *General distribution*: Afghanistan. Described from Repetek. Type in Leningrad.

28. **C. turkmenorum** Bornm. in Beih. bot. Centralbl. XXXIV, II (1916) 153.—*C. dissecta* var. *microcephala* Tautv. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 456; Winkl. Ibid., XI, 135; XII, 209.—*C. dissecta* var. *simplicior* Trautv. op. cit. IX, 2 (1886) 456; Winkl. Ibid., XI, 135; XII 209.—*C. stenoptera* Juz. in Bot. Mat. Gerb. Glavn. Bot. Sada, II (1921) 59; Kult. in Fl. Turkm. VII, 198.—*C. simplicior* Juz. op. cit. IV (1923) 77; Kult. op. cit. 196.

Biennial. Root vertical, 8–12 mm thick at root collar. Stem erect, 25–32 cm high, arachnoid hairy-tomentose, narrow-winged throughout, wings in many rows, 1–2 mm wide, crenate-prickly-toothed, stem usually corymbosely branched in upper half, with long, very narrowly winged branches, almost wingless below capitula, forming broad corymbose inflorescence. Leaves grayish-green, finely arachnoid-hairy above; basal 166 leaves few (two to four), petiolate, 12–20 cm long, comparatively soft, oblong-lanceolate, pinnatisect, with narrow-winged petiole, lateral lobes, in turn, pinnatilobate or pinnatipartite, abruptly short-spinescent-acuminate; cauline leaves decurrent to wings, gradually reduced upward; lower cauline leaves like basal; middle leaves less incised; upper leaves almost undivided, linear, sparsely-toothed, spinescent. Capitula numerous, 20–40, ovoid, 10–18 mm long and 7–10 mm wide, arachnoid, with approximately 30-florets, truncate at base. Involucral bracts sparsely glandular, broad-lanceolate, broadened at base, appressed, narrowed above into short, falcate cusp; inner involucral bracts thin-coriaceous, lanceolate, erect, acuminate above in short recurved cusp, scabrous along margin and dorsally. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, 3 mm long and 1.5 mm wide, almost three-angled, irregularly toothed above, light gray. Flowering V–VI; fruiting VI–VII.

Loamy and clayey slopes in the foothills.—*Soviet Central Asia*: mountainous Turkmenia (western Kopetdag, Bolshie Balkhany). Endemic. Described from Kara-Kala. Type in Leningrad.

Section 6. Olgaeanthae Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzSSR, XVII (1962) 78.—*Drepanophorae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 206 p. p.; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 550 p. p.—Capitula globose, terminal on branches; involucral bracts numerous, gradually narrowed into three-angled falcate cusp; corolla yellow; receptacular bristles smooth; achenes obovoid, obtuse.

Biennial herbs with soft, sessile, almost entire cauline leaves.

Type of species: *C. olgae* Rgl. and Schmalh.

29. **C. olgae** Rgl. and Schm. in Izv. Obsch. Lyubit Estestv. Antrop. Etnogr. 34. 2 (1882) 48; Winkl. in Tr. Peterb. Bot. Sada, XII, 212;

XIV, 221; Bornm. Beih. bot. Centralbl. XXXIV, 2, 155; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, VIII, 550; Kult. in Fl. Turkm. VII, 210.—*C. olgae* var. *cordata* Winkl. op. cit. XII (1892) 212; XIV, 221.—*C. capusii* Franch. in Ann. Sc. Nat. Bot. 7 sér. 16 (1883) 313; Winkl. op. cit. XII, 230.—*C. aptera* auct. non Aitch. and Hemsl.; Winkl. op. cit. XIV (1897) 224 p. p.—*Arctium capusi* O. Ktze. Rev. Gen. 1 (1891) 307.—*A. olgae* O. Ktze. Ibid., 308.

167 Biennial. Stem 10–70 cm high, erect, almost smooth, more or less branched from base. Leaves very finely arachnoid-hairy above, gray-tomentose beneath, almost undivided spinescent with short, thin spine; basal leaves short-petiolate, oblong-linear-lanceolate, pinnatisect, lateral segments sessile, alternate, linear-lanceolate, with two teeth at base; lower cauline leaves like basal, but sessile; middle and upper leaves sessile, short, closely placed, oblong, with one or two pairs of teeth at base, short acuminate; uppermost leaves reduced. Capitula globose, 13–15 mm wide (excluding cusps), weakly arachnoid-hairy. Involucral bracts numerous, squarrose, imbricate, almost all equal, carinate, acuminate into thin, three-angled falcate spine; outermost bracts somewhat decurved, 7–10 mm long; outer and middle bracts 15–17 mm long; inner bracts membranous, narrow linear, up to 20 mm long, acuminate into thin cusp. Receptacular bristles smooth. Corolla yellow. Achenes obovoid, obtuse, grayish, with dark spots. Flowering V–VIII; fruiting VII–VIII. (Plate IX, Fig. 3).

Loamy-stony slopes in the foothills.—*Soviet Central Asia*: Pamiro-Alai (west), mountainous Turkmenia (Badkhyz). *General distribution*: Afghanistan. Described from the Zeravshan River Valley, Oalyk Ravine. Type in Tashkent.

Section 7. Chrysantha Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk. UzSSR, XVII (1962) 79.—*Inermes* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 196 p. p.—Series *Pygmaeae* Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8 (1940) 544.—Capitula solitary on short branches, with many florates, with four floral leaves; involucral bracts acuminate in thin, arcuate and scabrous cusp; corolla grayish-yellow; receptacular bristles scabrous; achenes obpyramidal, almost tetraquetrous, narrow-winged, finely toothed above. An annual plant with soft leaves, attenuate at both ends, and spinose-toothed along margin.

Type of section: *C. pygmaea* Winkl.

30. *C. pygmaea* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 467; XII, 198; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 145; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, (1940) 544.—*Arctium pygmaeum* O. Ktze. Rev. Gen. 1 (1891) 308.

Annual. Stem erect, 6–8 cm high, almost four-angled, arachnoid-hairy, leafy, branched in upper half; branches spreading, slender, shorter, usually leafless (except four floral leaves), one-headed. Leaves sessile, soft, gray-tomentose on both sides, lanceolate, attenuate at both ends, spinescent with short and thin spine; spinose-toothed. Capitula 6 mm wide (excluding cusps), with many florets, ovoid, arachnoid-hairy, surrounded by four floral leaves; floral leaves like others, but somewhat smaller. Involucral bracts numerous, narrow, linear-subulate, attenuate into thin arcuate, scabrous spine; inner bracts erect, linear, acuminate
 168 into thin scabrous cusp. Receptacular bristles unequal, longest bristles scabrous. Corolla grayish-yellow. Achenes obpyramidal, almost four-angled, narrow-winged, 2 mm long, finely toothed above. Flowering IV–V; fruiting V. (Plate X, Fig. 2).

Varicolored foothills.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Tashbulak Mountains, near the village of Akmechet along the Kafirnigan River. Type in Leningrad.

Section 8. Actinia Bge. in Mém. Acad. Pétersb. 7 sér 9, 2 (1865) 44; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 561.—*Imbricatae* Boiss. Fl. or. III (1875) 461.—*Spicatae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 237 p. max. p.—*Heteracanthae* auct. non Winkl.: Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 551 p. p.—Capitula less numerous, solitary on long peduncles, or numerous in racemose, discontinuously racemose or lax paniculate inflorescence. Involucral bracts gradually acuminate; receptacular bristles scabrous; corolla yellow. Achenes obpyramidal or obovoid, ribbed, narrow-winged along ribs, sharply toothed above. Perennial herbs with strongly thickened woody root collar, often covered with remains of old petioles, leaves sessile at base, orbicular or cordate, petiolate.

Type of section: *C. actinia* Boiss.

Series 1. Albertoregeliae Tschern.—Capitula numerous, usually aggregated in inflorescence; root collars with numerous remains of old petioles.

31. *C. albertoregelia* Winkl. in Tr. Peterb. Bot. Sada, X (1887) 91; XII, 239; XIV, 205; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 561.

Perennial. Roots woody, thick, many-headed; root collars long, thickened, with remains of old petioles, erect, usually white-tomentose. Stem 55–150(200) cm high, erect, finely arachnoid-hairy or minutely glandular, leafy, branched above, branches short, bearing few capitula each, aggregated in more or less racemose or paniculate inflorescence. Leaves coriaceous, green, very finely glandular or arachnoid-hairy above

white-tomentose beneath with prominent veins; basal leaves petiolate with petioles thickened at base, pinnatilobate with deltoid lateral long-spinescent lobe; cauline leaves like basal but short-petiolate; other leaves sessile, semiamplexicaul, gradually reduced upward, like basal leaves. Capitula oblong-cylindrical, 8–10 mm wide and about 20 mm long (excluding cusps), finely arachnoid-hairy. Involucral bracts numerous, 169 outer and middle bracts narrow linear, subulately acuminate, outer about 15 mm and middle 30 mm long; inner bracts narrow lanceolate, about 20 mm long, somewhat flat, membranous, mucronate. Corolla yellow. Receptacular bristles weakly scabrous. Achenes obovoid, ribbed, narrow-winged along ribs, with two teeth above, about 5 mm long. Flowering VII–VIII; fruiting VIII–IX.

Stony-clayey slopes in middle mountain zone.—*Soviet Central Asia: Pamiro-Alai (Vakhsh Valley)*. Endemic. Described from the vicinity of the village of Tutkaul. Type in Leningrad.

32. *C. bobrovii* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 308; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 561.

Perennial. Root woody, with fibrous-gray bark, many-headed, root collars globose, 2–3.5 cm wide, with numerous stiff remains of old petioles, spreading on all sides, densely arachnoid hairy-tomentose. Stem erect, 50–90 cm high, densely leafy, arachnoid hairy-tomentose near base, very finely glandular in upper half, almost glabrous, sulcate, sparsely branched; short branches with one to five densely aggregated capitula in lax spicate inflorescence. Leaves coriaceous, very finely glandular on both sides, green, very finely arachnoid-hairy beneath, with prominent veins; basal leaves petiolate, petioles flattened at base, semiamplexicaul, arachnoid-hairy and thickened; lamina broad oblong-lanceolate, 15–20–24 cm long and about 10 cm wide (including lobes); pinnatilobate, with five or six lateral lobes, lobes broadly deltoid, with two lateral short spinescent teeth near base; lower cauline leaves like basal but sessile or short-petiolate, slightly smaller than basal, 8–20 mm long; middle leaves sessile, auriculate, smaller, otherwise like basal leaves; upper leaves small sessile, narrow-lanceolate, spinose-toothed, acuminate in very long and stiff spine. Capitula numerous (15–25), on very short peduncles, or more or less sessile, broad ovoid, about 15 mm long, and 8 mm wide (excluding cusps), very finely arachnoid-hairy. Involucral bracts about 45, herbaceous, very finely glandular; outer bracts narrow lanceolate, dorsally ribbed, spinulose; middle and subsequent bracts attenuate from narrow ovate or ovate base into long spine, as long as capitulum, almost horizontal; inner bracts usually membranous, linear, short acuminate. Corolla pink (?). Receptacular bristles scabrous. Achenes compressed-obpyramidal, usually triquetrous, 3.5 mm long and

2 mm wide, dark brown to gray, spotted. Flowering VII–VIII; fruiting VIII.

Outcrops of varicolored rocks in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Kugitang). Endemic. Described from the Kugitang Range, in the vicinity of the village of Kundzhak. Type in Leningrad.

- 170 33. *C. oopoda* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 310; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 561.

Perennial. Root woody; blackish-fibrous; root collars very strongly thickened, almost ovoid, 3.5–5 cm wide, with remains of petioles of previous year's leaves, white-tomentose. Stem erect, 60–120 cm high, smooth, finely floccose-tomentose, especially in lower part, sparsely branched; branches few, short, forming somewhat racemose or narrow paniculate inflorescence. Leaves green, glabrous above, with prominent veins, terminating into more or less short and stiff spine, finely gray-tomentose beneath; basal leaves about 20–25 cm long, short-petiolate, oblong-lanceolate, crenate-lobed, lobes broadly deltoid, sparsely and finely spinose-toothed; lower cauline leaves like basal, but with shorter petioles; middle leaves about 4–10 cm long, sessile, semiamplexicaul, lanceolate, spinose-toothed, somewhat reduced; upper leaves greatly reduced, 1.5–3 cm long, as a result upper half of stem very sparsely covered with small leaves. Capitula small, 7–8 mm wide, almost globose, rusty-arachnoid-hairy. Involucral bracts less numerous; outer bracts 4–5 mm long, carinate, mucronate; middle bracts linear-lanceolate, carinate, attenuate into divergent cusp, usually not exceeding capitulum in length; inner bracts lanceolate, coriaceous, acuminate in thin and short cusp. Receptacular bristles somewhat broadened above, scabrous. Achenes obovoid, about 5 mm long, triquetrous, with narrow wings along ridges. Flowering VII–VIII; fruiting VIII.

Outcrops of varicolored rocks in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south-west). Endemic. Described from the Buryutakht Mountain 30 km south of Baisun. Type in Leningrad.

34. *C. gontscharowii* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 311; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 562.—*C. catenata* Rech. f. in Dan. Biol. Skr. 8, 2 (1955) 82.—*Ic.*: Rech. f. *Ibid.*, fig. 61, 66f.

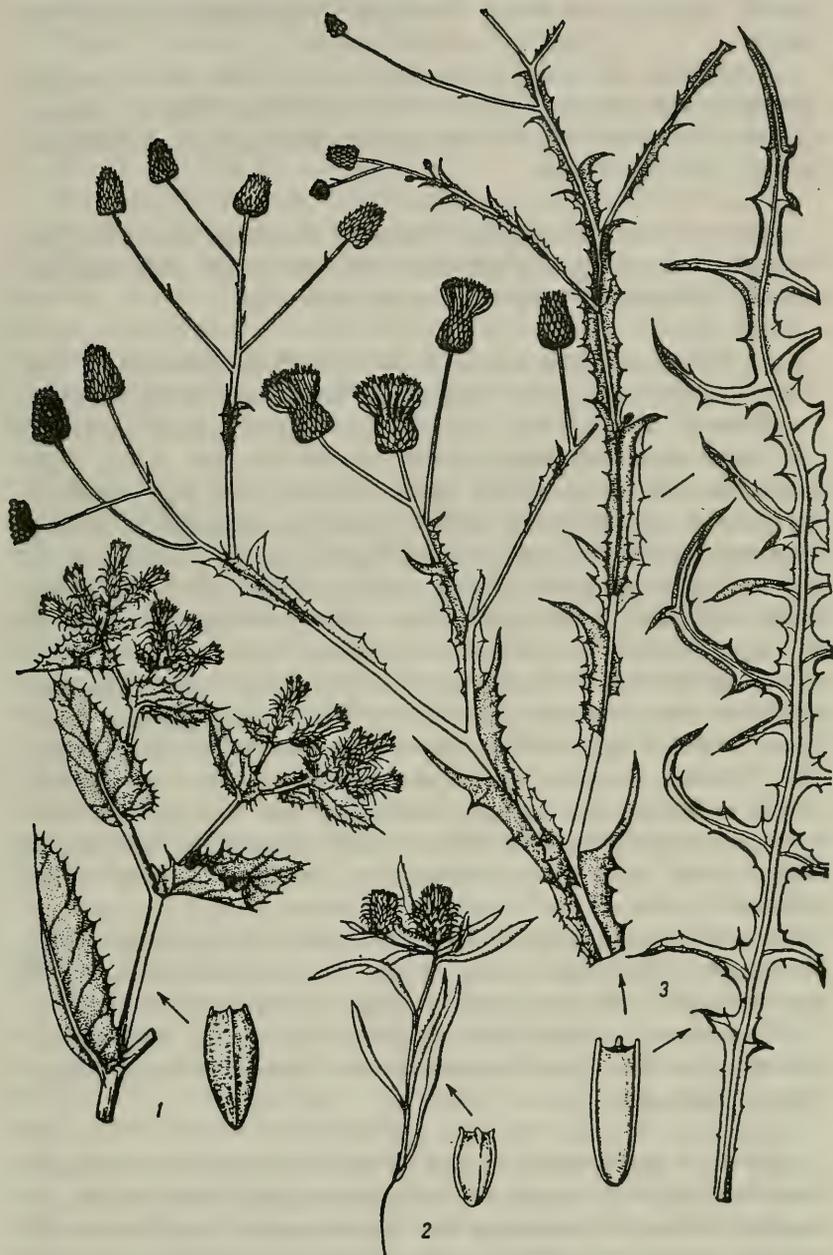
Perennial. Root woody, strongly fibrous, many-headed, root collar thick, covered with remains of petioles of previous year's leaves, arachnoid-hairy. Stem erect, 40–70 cm high, striate-sulcate, arachnoid-hairy, white-tomentose below, repeatedly branched in upper half; branches long, bearing numerous capitula aggregated in broad and lax panicles.

172 Leaves glabrous, green above, gray-tomentose beneath, with prominent veins, terminating into strong spines; basal leaves petiolate, sometimes petioles with one or two pairs of spines, linear-lanceolate, 18–27 cm long, irregularly pinnatifid or lobed, lobes narrowly deltoid or deltoid-spinescent, with two smaller spinescent lobes at base; lower cauline leaves like basal but short-petiolate; middle leaves lanceolate, sessile, semiamplexicaul, spinose-dentate, one-fourth to one-third as long as lower cauline leaves; upper leaves like middle but much smaller; uppermost leaves more or less reduced to spines. Capitula 8–9 mm wide, ovoid-globose, finely arachnoid-hairy. Involucral bracts less numerous; outer bracts carinate, squarrose not exceeding capitulum; middle bracts also carinate, strong, squarrose with cusp one and one-half times as long as capitulum; inner bracts coriaceous, mucronate; innermost bracts linear, membranous. Corolla yellow. Receptacular bristles scabrous. Achenes compressed-pyramidal, almost triquetrous, with narrow wings along angles, about 4 mm long. Flowering VII–VIII; fruiting VIII–IX.

Outcrops of varicolored rocks in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south). *General distribution*: Afghanistan. Described from the Gazimailik Mountains, near the village of Surkhat. Type in Leningrad.

35. *C. stricta* Tschern. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk UzbSSR, 16 (1961) 60.

Perennial. Root woody, blackish-fibrous, many-headed; root collars thick, up to 2.5 cm wide, covered with remains of petioles spreading above. Stem erect, 40–70 cm high, with sessile glandular hairs, sparsely branched in upper half; branches numerous, forming paniculate inflorescence. Leaves coriaceous, green on both sides, with sessile glandular hairs above, sparsely arachnoid-hairy and conspicuously glandular-hairy beneath; basal leaves petiolate, with almost glabrous petioles, oblong-lanceolate, pinnatifid, lateral lobes approximate, deltoid, terminating in strong, 2–2.5 cm long spine, with one or two spinescent lobes on both sides at base; cauline leaves gradually reduced, sessile, with auricles connate with stem, lanceolate, pinnatifid, lobes spinescent; upper leaves reduced to spines. Capitula 22 mm long and 7–8 mm wide (excluding cusps), sparsely rusty-arachnoid-hairy, oblong-cylindrical, narrowed at base. Involucral bracts erect; outer bracts 10 mm long, lanceolate, subulately acuminate; middle bracts flat, broad-lanceolate, 20–22 mm long, subulately acuminate; not exceeding capitulum; inner bracts flat, narrow-lanceolate, terminating in short spine, 18 mm long, somewhat scabrous dorsally. Corolla yellow, prominent. Receptacular bristles scabrous. Achenes oblong-ovoid, about 4.5–5 mm



long, longitudinally ribbed, with narrow-winged ribs, light gray, black-spotted, finely toothed above. Flowering VIII; fruiting IX. (Plate XI, Fig. 1).

- 173 Limestone and gypsum outcrops in the lower part of middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Babatag Range). Endemic. Described from the Babatag Mountains, opposite the Garmaly Spring. Type in Tashkent.

Series 2. Scalerophyllae Tschern.—Capitula relatively less numerous, solitary, on long peduncles; root collars thick, with numerous scars of old leaves, but without remains of petioles.

36. *C. scalerophylla* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 308; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 551.

Perennial. Roots woody, with strongly fibrous blackish bark, and 1–2 cm thick collar. Stem solitary, 25–50 cm high, erect, white arachnoid-hairy, branched in upper one-third with less numerous branches, in turn branched further. Lower leaves petiolate, oblong, narrowed toward both ends; cauline leaves sessile, oblong-ovate or (uppermost) ovate, usually obtuse, usually cordate; all leaves deeply lobed, with lobes broadly deltoid and spinose-toothed, terminating in stiff spine, coriaceous, glabrous and lustrous above, densely white-tomentose beneath, with prominent veins. Capitula solitary, on long peduncles, about 25 mm long and 12 mm wide (excluding cusps), ovoid, finely arachnoid-hairy with roundish or somewhat foveate base, usually with 20-florets. Involucral bracts scabrous dorsally; outer bracts broadly deltoid or broad-ovate, abruptly terminating into short spine; middle bracts ovate, gradually attenuate into narrow-lanceolate, three-angled oblique cusp; inner bracts membranous, oblanceolate, dark brown, acuminate, more or less incised. Receptacular bristles flat, strongly scabrous. Corolla straw-yellow; anther tube purple. Achenes obpyramidal, three-angled, with winged angles, brown, with sharp teeth above, 6–6.5 mm long and 5 mm wide including wings. Flowering VI; fruiting VII.

Outcrops of red sandstones.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the region between Naizabulak and Jidabulak. Type in Leningrad.

Section 9. Pseudactinia Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzSSR, XVII (1962) 79.—Capitula aggregated in panicles or racemes, solitary or in twos on very short branches. Involucral bracts gradually acuminate into subulate cusps. Receptacular bristles smooth. Corolla pink or brownish. Achenes obpyramidal, indistinctly ribbed, obtuse above. Perennial herbs with thick and woody root collars usually

covered with woody remains of old petioles and sessile semiamplexicaul or short-decurrent cauline leaves.

Type of section: *C. oreodoxa* Bornm. and Sint.

- 174 37. *C. oreodoxa* Bornm. and Sint. in Mitt. Thür. Bot. Ver. 23 (1908) 99, nomen in Russk. Bot. Zhurn. 1, 2; Kult. in Fl. Turkm. VII, 205.—
 Ic.: Bornm. and Sint. op. cit. tab. 2.

Perennial. Roots woody, blackish-fibrous, many-headed with caudices covered by numerous woody deflexed petioles of old leaves. Stem erect, 40–70 cm high, densely arachnoid-hairy, leafy, simple or very sparsely branched above in very short one-headed branches, forming almost spicate inflorescence; branches much reduced so that capitula almost sessile in leaf axils on main stems. Leaves coriaceous, grayish-green, finely gray-tomentose on both sides; basal and lower cauline leaves petiolate, oblong, crisped-prickly-toothed, 8–12 cm long, 3–3.5 cm wide; cauline leaves gradually reduced, sessile, semiamplexicaul, somewhat attenuate towards both ends, uppermost leaves more or less orbicular, with roundish auricles, short-decurrent. Capitula cylindrical, 10–14 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts numerous, all, except inner, linear, weakly carinate dorsally, narrowed towards apex, subulately pointed into erect, 5–17 mm long cusp; inner bracts membranous, lanceolate, 20–25 mm long, long acuminate, scabrous along margin. Receptacular bristles smooth. Corolla more or less pink; anther tube pink. Achenes oblong-obpyramidal, 6 mm long, 2 mm wide, inconspicuously ribbed, obtuse. Flowering VII; fruiting VIII. (Plate XI, Fig. 2).

Stony slopes in middle mountain zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from Sulyukli. Type in Leningrad.

38. *C. apiculata* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVIII (1962) 91.

Perennial. Roots woody, blackish-fibrous, many-headed; caudices with numerous deflexed woody remains of old petioles. Stem erect, 80–100 cm high, arachnoid hairy-tomentose, rather densely leafy, racemosely branched above; branches short, one-headed. Leaves coriaceous, grayish-green, glandular and arachnoid-hairy pubescent on both sides, somewhat more densely beneath; basal leaves 10–18 cm long and 4–6 cm wide, oblong-lanceolate, long-petiolate, crenate-prickly-lobed, petioles with one to three spines; cauline leaves gradually reduced, sessile, semiamplexicaul, lower and middle leaves like basal; upper leaves 3 cm long, prickly-toothed. Capitula globose, 18–20 mm wide (excluding cusps), densely arachnoid-hairy. Involucral bracts numerous (more than

100), all, except inner, linear-broadened at base, gradually attenuate into divergent, subulately three-angled cusp; outer bracts decurved, 5–7 mm long; middle bracts 18–20 mm long; inner bracts coriaceous, linear, somewhat flat, scabrous along margin, weakly broadened above, mucronate, about 20 mm long. Receptacular bristles smooth. Corolla pink. Achenes about 5 mm long, obpyramidal, weakly compressed, indistinctly three-angled, obtuse-roundish above, brownish with dark spots. Flowering VII; fruiting VIII.

Stony-gravelly slopes in lower mountain zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from the vicinity between the Kheirabad (meteorological) Station and Germab. Type in Tashkent.

39. **C. glochidiata** Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 3; Kult. in Fl. Turkm. VII, 213.—**lc.**: Fl. Turkm. VII, Plate 33.

Perennial. Roots woody, blackish-fibrous, many-headed; caudices up to 5 cm wide, covered with remains of old petioles, white-tomentose. Stem erect, 45–80 cm high, finely striate-sulcate, sparsely arachnoid-hairy in upper half, floccose-white tomentose below, branched above; branches short, one or two-headed. Leaves coriaceous, glandular on both sides (more densely beneath), sparsely and finely arachnoid-hairy, with prominent veins; lower cauline leaves 12 cm long, 4 cm wide, short-petiolate, oblong-ovate, crenate-lobed with lobes deltoid-prickly-acuminate, often with two prickly-acuminate teeth at base; middle leaves 7 cm long and 4 cm wide, sessile, semiamplexicaul, auriculate, ovate-oblong; upper leaves 5 cm long, 4 cm wide, semiamplexicaul, roundish-auriculate at base, spinose-toothed, spinescent; uppermost leaves smaller, reaching up to capitula. Capitula 4–6 cm wide (including cusps), 2–3 cm (excluding cusps), flat-globose, arachnoid hairy-tomentose. Involucral bracts numerous, all except inner similar, basally appressed, scabrous along margin, gradually narrowed into stiff linear-subulate cusp; outer bracts falcate; middle 26–30 mm long, almost horizontal; inner coriaceous, weakly scabrous along margin, finely and short acuminate, slightly broadened, erect, 22–24 mm long. Receptacular bristles smooth. Corolla brownish (?); anther tube pink. Achenes obovoid, more or less ribbed. Flowering VII; fruiting VIII.

Turfy and stony slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from the Aselma Range. Type in Tashkent.

Section 10. Hoplophylla Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 79.—*Nudicaules* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 191 p. p.—Capitula numerous, in paniculate

176 inflorescence; involucre bracts somewhat flat, closely appressed, short acuminate; receptacular bristles smooth. Corolla straw-yellow; anther tube yellow, glabrous. Achenes obovoid, three-angled, toothed above. Perennial plants with densely leafy stem and stiff coriaceous leaves, usually with white spines scattered throughout (mainly along veins).

Type of section: *C. raddeana* Winkl.

40. *C. raddeana* Winkl. in Tr. Peterb. Bot. Sada, X (1887) 473 in adnot.; XI, 132; XII, 196; Kult. in Fl. Turkm. VII, 200.—*C. nobilis* Rech. f. in Dan. Biol. Skr. 8, 2 (1955) 132.—*Arctium raddeanum* O. Ktze. Rev. Gen. 1 (1891) 308.—**Ic.**: Winkl. op. cit. (1889), Plate 1; Rech. f. op. cit. fig. 90 and 94D.

Perennial. Stem solitary, erect, up to 2 m high, whitish, glabrous, glossy, almost tetraquetrous, paniculately branched in upper half, densely leafy below, leaves greatly reduced in upper part; branches numerous, long, with numerous capitula. Leaves stiff-coriaceous, oblong, green above, glabrous or with isolated multicellular hairs scattered throughout, with sharply raised, white, glossy midrib, terminating in strong whitish spine and less prominent, but also whitish and glossy lateral veins, usually with few whitish spines scattered throughout and terminating into strong white spine, densely white-tomentose beneath; basal leaves 20–40 cm long, with short usually prickly petioles, usually prickly-toothed in lower half, pinnatilobate in upper half with lanceolate finely prickly-toothed lobes; cauline leaves gradually reduced, sessile, semiamplexicaul, sparsely prickly-toothed; uppermost leaves strongly reduced, ovate or lanceolate, prickly acuminate and with two spines at base. Capitula with less numerous florets (12–15), ovoid, 8–9 mm wide, glabrous. Involucre bracts green, closely appressed to each other, ovate to oblong-ovate, somewhat flat, very short acuminate; inner bracts about 10 mm long, lanceolate, weakly broadened above and short acuminate, scabrous dorsally and along margin. Receptacular bristles smooth, slightly flattened above. Corolla straw-yellow; anther tube straw-yellow. Achenes obovoid, 4.5–5 mm long and 3 mm wide, three-angled, indistinctly ribbed, toothed above, grayish. Flowering VI–VII; fruiting VII–VIII.

Loamy and sandy slopes.—*Soviet Central Asia*: Pamiro-Alai (south, Koipitau Range), mountainous Turkmenia (Badkhyz). *General distribution*: Afghanistan. Described from Ak-Rabot. Type in Leningrad.

Section 11. Nanarctium Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 510, in adnot, nomen.; Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 80.—*Lappaceae* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 9 p. p. *Uncinatae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 186 p. p.—Capitula globose, solitary terminal; involucre bracts

numerous, attenuate into long, subulate, uncinat cusp. Corolla whitish or pale-yellow. Receptacular bristles smooth. Achenes narrow-pyramidal, with very short apical corona. Perennial plants with pinnatipartite or pinnatilobate leaves; leaves glandular-hairy above and with glandular hairs and arachnoid-hairy pubescence of long, flexuous flattened hairs.

Type of section: *C. arctioides* Schrenk.

41. *C. arctioides* Schrenk in Bull. phys.-math. Ac. Petrop. 2 (1844) 115; Ldb. Fl. Ross. II, 679; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 10; Winkl. in Tr. Peterb. Bot. Sada, XII, 187; Pavlov. Fl. Tsentr. Kazakh. III, 295.—*Arctium arctioides* O. Ktze. Rev. Gen. 1 (1891) 307.

Perennial, plants with one stem. Stem erect, 35–70 cm high, finely striate-sulcate, densely glandular, arachnoid-hairy pubescent with long, flexuous flattened hairs, leafy, cymosely branched in upper half; branches in turn branched into secondary branches, each bearing single capitulum. Leaves soft, green, sparsely glandular above, densely glandular beneath with arachnoid-hairy pubescence of long, flexuous, flattened hairs; basal leaves short-petiolate, pinnatipartite or pinnatilobate, lobes finely spinose-toothed, with short and thin apical spine; cauline leaves reduced, sessile, semiamplexicaul, attenuate towards base, with two or three pairs of yellowish spines, like basal, leaves on branches reduced, spinose-toothed. Capitula globose, 10–12 mm wide (excluding cusps). Involucral bracts numerous, narrow lanceolate, attenuate into long, subulate uncinat cusp, densely covered with fine glandular divergent hairs along margin; inner bracts erect. Receptacular bristles smooth. Corolla whitish or pale yellow. Achenes narrow pyramidal, 5 mm long and 1.5 mm wide, with short corona above, dark. Flowering VI; fruiting VII. (Plate XII, Fig. 1).

In moist and alkaline meadow depressions in desert steppes, thickets of shrubs and meadows, valleys of steppe rivers, less often in border blow outs of sand dunes.—*Soviet Central Asia*: Aralo-Caspian (between the city of Kyzyl-Orda and lower reaches of the Sarysu River), Balkhash Region (Sarysu River Valley and western Betpakdal). Endemic. Described from the Sarysu River Valley, between the Sarysu and Kara-Kingir rivers. Type in Leningrad.

Section 12. *Pseudarctium* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 512, 545.—*Lappaceae* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 9 p. p.; Boiss. Fl. or. III, 459.—*Uncinatae* Winkl. in Tr. Peterb. Bot. Sada, XII, 186 p. p.—Capitula solitary or aggregated at 178 branch tips; involucral bracts with uncinately incurved cusp. Corolla purple or white. Receptacular bristles smooth. Achenes glabrous, smooth, roundish above. Perennial plants with large, soft, somewhat pubescent leaves.

Lectotype of section: *C. umbrosa* Bge.

Series 1. Umbrosae Juz.—Capitula with 10–12-florets; involucrel bracts with one or two glandular hairs along each margin.

42. *C. umbrosa* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 10; Boiss. Fl. or. III, 463; Winkl. in Tr. Peterb. Bot. Sada, XII, 188; XIV, 217; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 135; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 546.—*C. uncinata* Rgl. in Bull. Soc. Nat. Mosc. XL. 2 (1867) 145; Winkl. op. cit. XI, 132.—*C. umbrosa* β . *virescens* Bornm. l.c.—*Arctium umbrosum* O. Ktze. in Rev. Gen. 1 (1891) 308.—*A. uncinatum* O. Ktze. Ibid.—Exs.: H.F.A.M. No. 489.

Perennial. Stem erect, 60–120 cm high, deeply sulcate, glossy, branched in upper half; branches slender, elongate, with numerous capitula in paniculate inflorescence. Leaves thin-coriaceous, soft, without spines, green, glabrous above, gray-tomentose beneath, petiolate mainly in lower half of stem; basal leaves very large, with thick, sulcate petioles, oblong-ovate, cordate, irregularly toothed; cauline leaves gradually reduced towards stem apex, ovate, almost ovate, otherwise like basal leaves; uppermost leaves greatly reduced. Capitula on very short peduncles, 5–6 mm wide (excluding cusps), with 10–12 florets, ovoid, glabrous, weakly foveate at base. Involucrel bracts oblong, closely appressed at base, gradually acuminate into thin, about 3 mm long, spreading uncinately incurved cusp, with one or two pairs of large glandular hairs at transition of bracts to cusp; inner bracts linear, gradually acuminate into very thin and short cusp. Receptacular bristles smooth. Corolla pink. Achenes 6 mm long and 3 mm wide, obovoid, roundish above, light brown with dark spots. Flowering VI–VII; fruiting VII–VIII. (Plate XII, Fig. 2).

Foothills and lower mountain zone, in shady places, growing as weed.—*Soviet Central Asia*: Tien Shan (central and western), Pamiro-Alai, mountainous Turkmenia. *General distribution*: Northern Iran, Afghanistan. Described from the vicinity of village of Dshegar in the Mashhad Province of northeastern Iran. Type in Leningrad.

Note. The hybrid *Cousinia triflora* Schrenk \times *Cousinia umbrosa* Bge., which goes by the name *C. taschkentica* Juz. in herb., is known from the vicinity of Tashkent. This plant has large, thin-coriaceous, exspinose, petiolate basal leaves that are glabrous on both sides; sessile, coriaceous, finely spinose-toothed cuspidate cauline leaves; and capitula 179 in a corymbose-paniculate inflorescence. In contrast with *C. triflora*, the involucrel bracts of *C. taschkentica* have weakly uncinately incurved cusps.

The hybrid *C. umbrosa* Bge. \times *C. pseudoarctium* Bornm., described as *C. dualis* Juz. (in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 297), is known from the Alai Range (Lyangar, Chigirchik River).

The hybrid *C. alberti* Rgl. and Šchm. × *C. umbrosa* Bge., preserved in the herbarium as *C. triacantha* Kult. (in *Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI* (1929) 2), is reported from the Kelte-Moshat pit.

43. *C. tomentella* Winkl. in *Tr. Peterb. Bot. Sada*, X (1889) 469; XII, 188; XIV, 191; Juz. in *Tr. Tadzh. Bazy Akad. Nauk SSSR*, 8, 546.—*Arctium tomentellum* O. Ktze. *Rev. Gen.* 1 (1891) 308.

Perennial. Species very similar to *C. umbrosa* Bge., from which it differs only by densely arachnoid hairy-tomentose capitula. Distributed only in the southern Pamiro-Alai, where it is sometimes found together with *C. umbrosa*. However, I consider that these two species are distinguishable since, under cultivation in the experimental plots, *C. tomentella* maintained its characters and developed much faster than *C. umbrosa*.

Central Asia: Pamiro-Alai (south—southern slope of the Gissar Range, Aktau Mountains, Gazimailik, Terekli, Sarsarak Range, Khoja-Kazyan). Endemic. Described from the Karatag River Valley, in the vicinity of Khakimi. Type in Leningrad.

Series 2. Spuriae Juz.—Capitula with 20–45-florets; involucre bracts without glandular hairs along margin.

44. *C. pseudarctium* Bornm. in *Beih. bot. Centralbl.* XXXIV, 2 (1916) 135; Juz. in *Tr. Tadzh. Bazy Akad. Nauk SSSR*, 8, 545.—*C. spuria* Juz. in *Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3* (1936) 296; Juz. in *Tr. Tadzh. Bazy Akad. Nauk SSSR*, 8, 545.—*C. pseudarctium* β. *leiocephala* Bornm. *op. cit.* 136.—*C. amplissima* auct. non Boiss.: Franch. in *Ann. Sc. Nat. Bot.* 6 sér. 16 (1883) 92.

Perennial. Stem erect, 80–100 cm high, longitudinally sulcate, floccose-arachnoid hairy, leafy, sparsely branched in upper part; branches elongate, with numerous capitula in paniculate inflorescence. Leaves thin-coriaceous, soft, without spines, green, and glabrous above, finely gray-tomentose beneath, petiolate, basal and lower cauline leaves very large, lamina about 20–40 cm long and petioles thick, striate-sulcate, 20–40 cm long, ovate, crenate-lobed; other cauline leaves abruptly reduced upward, ovate or orbicular-ovate, lobed, lobes roundish with short, thin, apical spine; uppermost leaves greatly reduced. Capitula on short peduncles or sessile, 10–12 mm wide (excluding cusps), with 20–45-florets, oblong-cylindrical or almost ovoid, foveate at base. Involucre bracts numerous, scabrous dorsally, all except inner, narrow lanceolate, densely appressed at base, gradually attenuate into long, divergent uncinately cusp; inner bracts lanceolate, somewhat flat, attenuate, short acuminate. Receptacular bristles smooth. Corolla purple; anther tube pale



yellow. Achenes large, about 8 mm long and about 3 mm wide, obovoid, glabrous, smooth, roundish above, light brown. Flowering VI–VII; fruiting VII.

Turfy slopes.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan Range, Alai Range). Endemic. Described from the Yagnob River Basin, found in the vicinity of the village of Varsout. Type in Leningrad.

Section 13. Lappaceae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 9 p. p.—*Uncinatae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 186 p. p.—*Xeractium* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 510 in adnot. nomen.—Capitula small, numerous, sessile, aggregated in heads, readily falling. Involucral bracts acuminate in short, thin and uncinately incurved cusp; corolla purple, receptacular bristles flat, smooth. Achenes glabrous, smooth, roundish above. Perennial plants, usually with purple branches and soft, usually pubescent, leaves.

Lectotype of section: *C. lappacea* Schrenk.

45. ***C. lappacea*** Schrenk Enum. pl. nov. (1841) 42; Ldb. Fl. Ross. II, 679; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 10; Winkl. in Tr. Peterb. Bot. Sada, XII, 187.—*Arctium lappaceum* O. Ktze. Rev. Gen. 1 (1891) 308.

Perennial. Plants with many stems. Stem erect, strong, 40–70 cm high and 2 cm thick at base, floccose-tomentose, striate-sulcate, somewhat angular, usually pinkish or purple (especially branches and branchlets), spreading, branches short, further branched, secondary branches bearing less numerous sessile capitula aggregated in heads. Leaves soft, finely gray arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, oblong, finely spinose-toothed; cauline leaves gradually reduced, sessile, semiamplexicaul, rather dense, finely prickly-toothed, attenuate toward apex, oblong-lanceolate; leaves on branches greatly reduced. Capitula readily falling, ovoid, glabrous, 5–6 mm wide (excluding cusps) and 12–13 mm long (excluding florets), with four or five florets. Involucral bracts 25–30, all, except inner, sparsely glandular, closely appressed, ovate, weakly carinate, with short glandular hairs along margin, divergent above and acuminate into thin and short uncinately incurved cusp; inner bracts scarious purple in upper half, obtuse, with thin and uncinately spine. Receptacular bristles weakly broadened, flat, smooth. Corolla purple. Achenes obovoid, glabrous, smooth, roundish above, 6 mm long and 4 mm wide. Flowering VI; fruiting VII.

Stony slopes in middle mountain zone, apparently a semi-weed.—*Soviet Central Asia*: Tien Shan (Central Tien Shan, Chu-Ili Mountains, Aleksandrovskaia Range). Endemic. Described from Alatau (Schrenk). Type in Leningrad.

Section 14. *Ctenarctium* Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8 (1940) 512, 546.—*Uncinatae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 186 p. p.—Capitula small, on short peduncles, aggregated at branch tips, readily falling; involucre bracts spinose-toothed, like apical spine uncinately incurved; corolla yellow; receptacular bristles smooth; achenes obovoid, smooth, roundish above. Perennial plants with coriaceous leaves.

Type of section: *C. anomala* Franch.

46. ***C. anomala*** Franch. in Ann. Sc. Nat. Bot. 7 sér. 16 (1883) 93; Winkl. in Tr. Peterb. Bot. Sada, XII, 189; XIV, 218; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 138; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 546.—*Arctium anomalum* O. Ktze. Rev. Gen. 1 (1891) 307.—**Exs.:** H.F.A.M. No. 479.

Perennial. Stems few, with remains of petioles of previous year's leaves at base, erect, 20–40 cm high, slender, shallow-sulcate, arachnoid-hairy, sparsely branched from middle; branches long, branched further in upper part, bearing few capitula on each at tip. Leaves coriaceous, entire, without spines, very finely arachnoid-hairy above, finely tomentose beneath; basal leaves petiolate, oblong-lanceolate, attenuate toward both ends, sometimes lyrate, attenuate into narrow apex; cauline leaves gradually reduced upward, lower leaves short-petiolate, broad-lanceolate, entire; middle leaves short-petiolate, ovate; upper leaves lanceolate, sessile, with one or two pairs of teeth on both sides at base. Capitula on very short peduncles, readily falling, 15 mm long and 6 mm wide (excluding cusps), finely arachnoid-hairy. Involucre bracts somewhat flat; outer bracts oblong-ovate, with membranous border at base, border disrupted in upper one-third, and two or three pairs of horizontal, uncinately spines, like apical spine, on both sides right up to apex, middle bracts like outer, but lanceolate; inner more or less membranous, lanceolate, gradually acuminate into uncinately incurved spine. Corolla yellow. Receptacular bristles smooth. Achenes obovoid, smooth, about 2 mm wide and 4 mm long, roundish above. Flowering VI–VII; fruiting VII–VIII. (Plate XIII, Fig. 2).

183 Clayey and stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (the Zeravshan and Gissar ranges). Endemic. Described from the vicinity of Voru. Type in Paris.

Section 15. *Molles* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 13.—*Inermes* Winkl. in Tr. Peterb. Bot. Sada, XII, 196 p. p.—*Malacoloma* Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8 (1940) 513, 546.—Stem winged. Capitula small, in groups of few at tips of branches, on short peduncles or sessile, with few florets; involucre bracts abruptly attenuate, cusp erect or divergent; corolla yellow with purple anther tube

or yellowish or purple; receptacular bristles smooth. Achenes obovoid, smooth, roundish or almost three-angled above, and then toothed in upper part. Biennial or perennial herbs with soft, sessile cauline leaves.

Type of section: *C. mollis* Schrenk.

Series 1. Pseudomolles Juz.—Capitula with 6–10-florets, like entire plant weakly pubescent, greenish; corolla yellow, anther tubes purple. Perennial plants with almost undivided or pinnatilobate basal and lower cauline leaves.

47. *C. pseudomollis* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 470 (excl. spec. e Karat.); XII, 199; XIV, 219; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 546 p. p.—*C. pseudomollis* var. *platyacantha* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 149.—*C. dilatata* Juz. op. cit. (1940) 547.—Exs.: H.F.A.M. No. 32.

Perennial. Plant with many stems. Stems inclined, 50–60 cm high, arachnoid-hairy, winged throughout, with 2–3 mm wide wings, weakly branched in upper half; branches short with capitula aggregated at tips in heads. Leaves soft, without spines, sparsely pubescent above, gray-tomentose beneath, all leaves lanceolate, gradually reduced upward; basal leaves petiolate, cauline leaves sessile, decurrent to wings, sometimes with two pairs of teeth along margin at base. Capitula on very short peduncles, readily falling, narrow-lanceolate, 15 mm long, 4–6 mm wide (excluding cusps), with 6–10-florets, pubescent. Involucral bracts 25–30, carinate; outer bracts lanceolate, 5 mm long, rather abruptly acuminate in short spine basally, appressed, divergent up to 2 mm in upper half; middle bracts lanceolate, 2 mm wide and 5–7 mm long, appressed at base, divergent above, acuminate in very short spine, divergent part 2–3 mm long; inner bracts scarious, linear, spinescent. Receptacular bristles smooth. Corolla yellow; anther tube violet-purple. Achenes obovoid, almost three-angled, 3–4 mm long, toothed above. Flowering VI–VII; fruiting VII–VIII. (Plate XIII, Fig. 1).

184 Loamy slopes in the foothills and lower mountain zone.—*Soviet Central Asia*: Tien Shan (western), Pamiro-Alai. Endemic. Described from Ganchulag near Tashkent. Type in Leningrad.

48 *C. leptacantha* (Bornm.) Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 547.—*C. pseudomollis* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 470 (quoad sp. e Karatag.).—*C. pseudomollis* β. *leptacantha* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 149.

Perennial. Plants with many stems. Stem inclined, slender, 15–40 cm high, with narrow, 1–2 mm wide wings, weakly branched; branches bearing few capitula at their tips in heads. Leaves soft, without spines,

sparsely pubescent above, gray-tomentose beneath; basal leaves petiolate, lanceolate, undivided or sometimes pinnatipartite into narrow, oblong, lateral lobes; cauline leaves gradually reduced toward stem apex, lanceolate, sessile, decurrent into stem wings. Capitula on very short peduncles, readily falling, narrow-ovoid, 12 mm long and 4 mm wide, with few (up to 10) florets, pubescent. Involucral bracts 30–40, carinate, imbricate, basally appressed, narrow-lanceolate, divergent in upper half, gradually and long acuminate, divergent part 2–3 mm long and 1–1.5 mm wide; inner bracts membranous, linear, spinescent. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, somewhat triquetrous, 3.5–4 mm long, finely toothed above. Flowering VI–VII; fruiting VII–VIII.

Loamy slopes in lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the vicinity of Faizabad. Type in Leningrad.

Series 2. Fasciculares Juz.—Capitula with 8–10-florets, greenish like other plant parts, sparsely pubescent; corolla purple. Perennial plants with pinnatisect basal and lower cauline leaves.

49. *C. fascicularis* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 299; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 547.—*C. gillii* Rech. f. in Dan. Biol. Skr. 8, 2 (1955) 99.—*Ic.*: Rech. f. Ibid. figs. 71 and 78D.

Perennial. Plants with many stems. Stems erect, 30–60 cm high, arachnoid-hairy, narrow-winged throughout, wings entire, 2–3 mm wide, branched in upper one-third; branches long, slender, further branched into short branchlets forming paniculate inflorescence. Leaves soft, without spines, green and sparsely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, oblong, attenuate toward both ends, sometimes pinnatipartite into few oblong lateral lobes, then terminal lobes much larger than laterals; cauline leaves gradually reduced towards stem apex; all leaves lanceolate, attenuate toward both ends, sessile, decurrent into stem wings. Capitula numerous, aggregated in groups of four to seven into compact heads at branch tips, on short peduncles, divergent, 12 mm long and 4 mm wide, ovoid, pubescent, with few (8–10) florets. Involucral bracts about 30, imbricate, closely appressed at base, lanceolate, gradually acuminate into falcate, cusp; inner bracts membranous, often slightly broadened above, purple, spinescent. Receptacular bristles smooth. Corolla pink. Achenes glabrous, smooth, roundish above, 2.5 mm long. Flowering V–VI; fruiting VI–VII.

On the weathering products of varicolored rocks in the foothills.—*Soviet Central Asia*: Pamiro-Alai (south). *General distribution*:

Afghanistan. Described from the Sarsaryak Range, near the village of Margak. Type in Leningrad.

Series 3. Molles Juz.—Capitula with five or six florets, very densely white-tomentose like other plant parts. Biennial plants.

50. *C. mollis* Schrenk in Bull. phys.-math. Ac. Pétersb. 3 (1845) 108; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 13; Winkl. in Tr. Peterb. Bot. Sada, XII, 200; XIV, 219; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 149; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 547; Kult. in Fl. Turkm. VII, 180.—*C. mollis* var. *latifolia* Winkl. op. cit. (1892) 200.—*C. mollis* β. *squarrosa* Bornm. op. cit. (1916) 150.—*Arctium molle* O. Ktze. Rev. Gen. 1 (1891) 308.—Exs.: H.F.A.M. No. 484.

Biennial. Plants with solitary stem. Stem erect, 15–80 cm high, densely tomentose, narrow-winged throughout, with 2–4 mm wide wings, strongly branched; branches white-tomentose, with few (four or five) almost sessile capitula at tips, aggregated in heads; inflorescence corymbose-paniculate. Leaves soft, without spines, sparsely arachnoid-hairy above, white-tomentose beneath; basal leaves petiolate, lanceolate, pinnatisect into narrow lanceolate-linear lateral segments; cauline leaves gradually reduced toward stem apex; lower cauline leaves like basal, but with shorter winged petioles; middle and upper leaves sessile, lanceolate. Capitula 15 mm long and 3–4 mm wide, narrow oblong, sparsely arachnoid-hairy, with five or six florets. Involucral bracts 25, white-tomentose, erect or somewhat divergent, linear, acuminate; inner bracts membranous, deltoidly-broadened at apex, with thin, up to 1 mm long, spine. Receptacular bristles smooth. Corolla yellowish, later pink. Achenes obovoid, glabrous, smooth, roundish above, whitish, 2.5 mm long. Flowering V–VI; fruiting VI–VII.

Debris slopes and loess hillocks in the foothills.—*Soviet Central Asia*: Tien Shan (central and western), Pamiro-Alai, Kyzyl-Kum, Balkhash Region. Endemic. Described from Khantau. Type in Leningrad.

186 *Section 16. Sciadocousinia* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962).—*Congestae* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 11 p. min. p.—*Calcitrapae* Boiss. Fl. or. III (1875) 460 p. min. p.—*Xiphacanthae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 232 p. min. p.—Capitula in more or less unbellate or paniculate inflorescences; involucral bracts with grooved, divergent or acuminate, three-angled cusp; receptacular bristles smooth or weakly scabrous. Corolla pink. Achenes obpyramidal, ribbed, toothed above. Perennial monocarpic plants with large basal and smaller sessile cauline leaves.

Type of section: *C. eryngioides* Boiss.

51. *C. eryngioides* Boiss. in Pl. Kotschy Pers. bor. (1846) No. 623, nomen and Diagn. Pl. or. ser I, X, 101; Bge. in Mém. Acad. Pétersb. 7 sér., 9, 2, 12; Boiss. Fl. or. III, 490; Winkl. in Tr. Peterb. Bot. Sada, XII, 236; XIV, 224; Kult. in Fl. Turkm. VII, 194.—*Arctium eryngioides* O. Ktze. Rev. Gen. 1 (1891) 307.

Monocarpic perennial. Stem erect, 75–120 cm high, with remains of old leaves at base, whitish, glossy, finely arachnoid-hairy pubescent, sometimes glabrous, repeatedly divaricately branched in upper half, terminating in umbellate branching of two to eight short, usually one-headed branches; branching itself with few modified leaves at base. Leaves on both sides, especially beneath, appressed-arachnoid-hairy; basal leaves large, 30 cm long and 6–8 cm wide, petiolate, with thickened petioles bearing spinescent lobes, broad-lanceolate, pinnatisect into unequal broad-lanceolate or almost ovate, uncinatate lateral lobes; cauline leaves abruptly reduced toward stem apex, sessile, sometimes weakly decurrent; lower cauline leaves like basal, but somewhat shorter; middle leaves 10 cm long and 5 cm wide, pinnatipartite into deltoid, spinose-toothed, cuspidate, lateral lobes; upper leaves 3 cm long and 2.5 cm wide, spinose, lobed; leaves at base of branches reduced, sharply divergent, lanceolate, with two to four spinescent teeth at base. Capitula cylindrical, 6–7 mm wide (excluding cusps), glabrous. Involucral bracts few (12–14), stiff, glabrous; outer bracts 5–7–9 mm long, lanceolate, somewhat flat, divergent or decurved; middle bracts broad-lanceolate, somewhat flat below, gradually narrow toward apex, sulcate-deltoid, divergent, 35–40 mm long; inner bracts coriaceous-membranous, lanceolate, 17–20 mm long, terminating in short, thin, cusp, scabrous along margin. Receptacular bristles unequal, longest slightly broadened above, scabrous. Corolla pink. Achenes 4.5–5 mm long, 1.5–2 mm wide, angular, grayish, dull, with three or four teeth above. Flowering VI–VII; fruiting VII–VIII. (Plate XIV, Fig. 2).

Loamy-gravelly slopes in the coachgrass and sheep's fescue vegetation zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). *General distribution*: Northern Iran, Afghanistan. Described from northern Iran, from the Demavend Mountains. Type in Geneva.

52. *C. margiana* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 303.

Monocarpic perennial. Stem erect, 70–75 cm high, with the remains of old petioles, whitish, glabrous, glossy, repeatedly dichotomously branched in upper half; branches spreading, forming lax inflorescence. Leaves arachnoid-hairy on both sides, especially beneath; basal leaves not known, petiolate, with thick, spiny petioles; middle cauline leaves coriaceous, 10 cm long and 4 cm wide, petiolate, with short and slightly

flattened petioles, oblong or ovate, narrowed or roundish toward both ends, with prominent veins, pinnatisect into unequal, broad-ovate, ovate or orbicular, spinose-toothed lobes overlapping each other, as a result leaf margin crisped; upper leaves reduced, decurved; leaves on inflorescence branches strongly reduced, decurved, with one or two pairs of teeth near base. Capitula numerous (about 100), sessile at base of dichasium, terminal capitula on peduncles, narrow ovoid, 14–16 mm long, 4–5 mm wide (excluding cusps), pauciflorate, finely and sparsely arachnoid-hairy. Involucral bracts less numerous, about 25; outer bracts ovate, appressed at base, narrowed in upper half into short, falcate, three-angled spine; middle bracts lanceolate, 15 mm long, appressed in lower part, weakly carinate dorsally, almost horizontal in upper one-third part, subulately three-angled; inner bracts thin-coriaceous, lanceolate, acuminate into short and erect cusp. Receptacular bristles smooth, slightly flattened above. Corolla pink, exserted. Achenes narrow obpyramidal, 4–4.5 mm long, finely ribbed, with sharp teeth above. Flowering VIII; fruiting IX.

Outcrops of white clay.—*Soviet Central Asia*: mountainous Turkmenia (Badkhyz). Endemic. Described from the Kushka area, village of Morgunovskii, near Sinii Spring. Type in Leningrad.

Section 17. Cousinia.—*Congestae* Bge. in Mém. Akad. Pétersb. 7 sér 9, 2 (1865) 11 p. p.—*Carduiformes* Bge. Ibid, 14 p. p.—*Pugioniferae* Bge. ibid, 30 p. p.—*Rectispina* Boiss. Fl. or. III (1875) 459 p. p.—*Orthacanthae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 214 p. p.; Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8, 552.—Capitula solitary terminal on branches or crowded in inflorescences; involucral bracts gradually acuminate into short cusp or slightly constricted in middle; 188 receptacular bristles smooth, weakly scabrous or scabrous. Corolla yellow, less often whitish; anther tube yellow or purple, glabrous. Achenes obpyramidal, obovoid, or ovoid, ribbed, obtusely roundish or with sharp teeth above. Monocarpic perennial plants with strongly thickened, often resinous-sticky root collar, and decurrent, strongly spinose cauline leaves. Type of section: Type species.—*C. orientalis* (Adams) C. Koch.

*Subsection 1. Irano-armeniaca*e Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 179.—Capitula ovoid or globose, solitary; involucral bracts narrow-lanceolate, attenuate into erect or arcuate decurved cusp; receptacular bristles smooth.

Series 1. Chlorocephalae Takht.—Capitula oblong-ovoid or ovoid, truncate at base, with 15–25-florets; involucral bracts green, subulately acuminate, with erect cusp.

53. **C. chlorocephala** C.A.M. in DC. Prodr. VI (1837) 553; Ldb. Fl. Ross. II, 677; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 16; Boiss. Fl. or. III, 474; Winkl. in Tr. Peterb. Bot. Sada, XII, 221; Grossh. Fl. Kavk. IV, 166; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser., 2, 180; Fl. Erev. 319; Fl. Azerb. VIII, 363.—*C. intermedia* C.A.M. in DC. op. cit. VI (1837) 553; Winkl. op. cit. XII, 222.—*Arctium chlorocephalum* O. Ktze. Rev. Gen. 1 (1891) 307.—*A. intermedium* O. Ktze., Ibid, 308.

Perennial (sometimes monocarpic). Root woody, many-headed; root collars white-tomentose, with remains of old petioles. Stem 15–20 cm high, erect, finely arachnoid hairy-tomentose, glabrescent, or almost glabrous and dark, cymosely branched in upper half. Leaves coriaceous, sparsely pubescent and sparsely glandular above, white-tomentose beneath; basal leaves petiolate, pinnatisect, lateral lobes unequal, linear-lanceolate, sparsely prickly-toothed; cauline leaves gradually reduced toward stem apex, sessile, short- or rather long-decurrent, pinnatilobate with narrow lanceolate, spinescent lobes. Capitula oblong-ovoid, solitary 7–8 mm wide (excluding cusps), glabrous. Involucral bracts numerous (70–100), all except inner linear, gradually subulately narrowed in erect, squarrose, cusp, dorsally glabrous, smooth, scabrous along margin; inner bracts narrow-lanceolate, scabrous along margin, short-acuminate. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes 4 mm long, obovoid, usually five-angled, toothed above. Flowering VI–VII; fruiting VII–VIII.

Dry stony slopes in lower and middle mountain zone.—*Caucasus*: Southern Transcaucasia. *General distribution*: Northern Iran. Described from the vicinity of Nakhichevan. Type in Leningrad.

189 54. **C. daralaghezica** Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 181; Fl. Azerb. VIII, 363.

Perennial (or monocarpic). Root woody, many-headed; root collar pubescent, with remains of old petioles. Stem erect, 30–40 cm high, finely arachnoid-hairy, densely leafy, strongly cymosely branched above. Leaves coriaceous, green above, inconspicuously glandular, with fine glandular hairs, scattered throughout, white-tomentose beneath; basal leaves petiolate; pinnatisect, with narrow lanceolate lateral segments with two basal lobes; cauline leaves sessile, short-decurrent, pinnatilobate, with narrow-lanceolate, decurved, spinescent lobes. Capitula solitary terminal on branches, aggregated in corymbose inflorescence, ovoid, 10 mm wide (excluding cusps) and 20 mm long (with florets), glabrous. Involucral bracts numerous, more than 100, all, except inner linear, sparsely scabrous along margin, gradually subulately acuminate into smooth, erect cusp; inner bracts narrow-lanceolate, gradually short-acuminate, dorsally smooth, scabrous along margin. Receptacular bristles

smooth. Corolla yellow; anther tube purple. Achenes obovoid, 3.5–4 mm long, usually 10-ribbed, toothed above. Flowering VII–VIII; fruiting VIII–IX.

Dry slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the Daralegez, in the vicinity of Azizbekov. Type in Erevan.

Note. This species is very similar to *C. chlorocephala*, from which it differs only by larger capitula and a more densely leafy and more sparsely branched stem. However, these differences are well marked only in extreme forms. Possibly, further study of *C. chlorocephala* will permit a critical assessment of the specific significance of the distinguishing characters of these two similar species.

Series 2. Brachypterides Takht.—Capitula ovoid or globose-ovoid, with 30–35-florets; involuclral bracts numerous, carinate, with divergent or arcuately decurved cusp.

55. *C. armena* Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 182; Takht. in Fl. Erev. 318; Fl. Azerb. VIII, 366.—*C. tenuifolia* auct. Fl. cauc. non C.A.M.—*Exs.*: Pl. or. exs. No. 222.

Perennial. Roots woody, blackish-fibrous, many-headed; root collar with remains of old leaves. Stem erect, about 20–30 cm high, finely arachnoid-hairy, usually light purple, divaricate almost right from base, cymosely branched, with almost horizontal one-headed branches. Leaves coriaceous, grayish green and finely arachnoid-hairy above, finely white-tomentose beneath; basal leaves petiolate, pinnatisect, with narrow-lanceolate lobes, at base usually lobed or weakly crenate-toothed throughout; cauline leaves gradually reduced, like basal, but sessile, short- and narrow-decurrent; uppermost cauline leaves usually pinnatilobate, very short-decurrent. Capitula ovoid, about 9–10 mm wide (excluding cusps) and 17–18 mm long (with florets), very slightly pubescent. Involuclral bracts numerous, all, except inner lanceolate to oblong-lanceolate, scabrous along margin, attenuate from middle into almost linear, weakly carinate, 5–6 mm long and arcuately decurved cusp; inner bracts narrow-lanceolate, scabrous mainly along margin, acuminate into thin and slightly divergent cusp. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, about 5 mm long, longitudinally ribbed, with five or six ribs, irregularly toothed above. Flowering VII–VIII; fruiting VIII–IX. (Plate XII, Fig. 1).

Dry stony slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the vicinity of Arzni. Type in Erevan.

Note. The plants from the Alagyoz Region (Aragats) differ somewhat from typical *C. armena* by more pubescent capitula and less divergent cusps of the involuclral bracts. Considering that this is the most



northwestern locality of the species, additional material and further study of plants from this region are essential.

56. *C. fedorovii* Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 183.

Perennial. Root woody, blackish-fibrous, many-headed, root collar with remains of old petioles. Stem erect, 16–25 cm high, finely arachnoid-hairy, somewhat divaricately branched in upper part; branches short, densely leafy, one-headed. Leaves coriaceous, grayish green, finely arachnoid-hairy above, white-tomentose beneath; basal leaves petiolate, 12–15 cm long, pinnatisect, with unequal lateral lobes, usually finely spinose-toothed or pinnatilobate, petiole narrow-winged, spinose-toothed; cauline leaves gradually reduced, sessile, short-decurrent, like basal; uppermost leaves reduced, reaching base of capitulum. Capitula globose-ovoid, 9–10 mm wide (excluding cusps) sparsely arachnoid-hairy. Involucral bracts numerous, ovate, narrowed from middle into linear, sulcate, 4–5 mm long, erect, divergent cusp. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, 4 mm long, narrow-oblong, ribbed. Flowering VII–VIII.

192 Stony dry slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the Novo-Bayazet area between Gilli and Satanakkhach. Type in Erevan, isotype in Tbilisi.

57. *C. brachyptera* DC. Prodr. VI (1837) 554; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 31; Boiss. F. or. III, 488; Winkl. in Tr. Peterb. Bot. Sada, XII, 212; Grossh. Fl. Kavk. IV, 167; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 184.—*C. gundelia* C. Koch in Linnaea, XXVI (1851) 387.—*C. squarrosa* auct. non Boiss.: C. Koch, Ibid, (1851) 387.—*lc.*: Jaub. and Spach. Ill. Pl. or. 2 (1844–1846), tab. 159.—*Exs.*: Pl. or. exs. No. 47.

Perennial. Root woody, blackish-fibrous, many-headed. Stem erect, 15–40 cm high, finely arachnoid-hairy, moderately leafy, branched in upper half; branches short, one-headed. Leaves coriaceous, green and finely arachnoid-hairy above, white-tomentose beneath; basal leaves petiolate, oblong-lanceolate, pinnatisect into lanceolate, acuminate-spinose, recurved lateral lobes; cauline leaves gradually reduced, sessile, very short-decurrent, pinnatipartite; uppermost leaves pinnatilobate. Capitula ovoid, 12–13 mm wide (excluding cusps), sparsely arachnoid-hairy, all involucral bracts except inner broad-lanceolate at base, gradually attenuate in linear, arcuate or somewhat horizontal cusps; inner bracts narrow lanceolate, scabrous dorsally and along margin, usually dark colored in upper part and short acuminate-spinose. Receptacular bristles smooth. Corolla purple; anther tube purple. Achenes

obovoid, 4.5 mm long, with narrow, longitudinal ribs, with sharp fine teeth above. Flowering VII; fruiting VIII.

Dry slopes in middle mountain zone.—*Caucasus*: Eastern and southern Transcaucasia. *General distribution*: Armenia-Kurdistan. Described from the vicinity of Erzerum. Type in Geneva.

Series 3. Decipientes Takht.—Capitula ovoid, with 15–25 florets, glabrous; involucrel bracts terminating in erect cusp.

58. *C. araxena* Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 185; Fl. Azerb. VIII, 363.

193 Perennial. Roots woody, blackish-fibrous, many-headed; root collar with remains of old leaves. Stem erect, whitish, glabrous, moderately leafy, sparsely branched in upper part. Leaves coriaceous, green on both sides; basal leaves petiolate, broad lanceolate, crenate-lobed, with broadly deltoid, acute lobes, green and glabrous above, usually finely white-tomentose beneath; cauline leaves gradually reduced, sessile, broadly short-decurrent lanceolate or ovate-lanceolate, crenate to prickly-toothed along margin; uppermost leaves strongly reduced. Capitula ovoid, 9 mm wide (excluding cusps) and 18–20 mm long (with florets), glabrous. Involucrel bracts numerous, all except inner ovate to oblong-ovate, short-ciliate along margin, distinctly attenuate from middle into narrow-linear, almost subulate, erect cusp; inner bracts narrow-lanceolate, dorsally scabrous, with short and thin apical spine. Receptacular bristles smooth. Corolla yellow; anther tube creamish. Achenes obovoid, 5.5 mm long, transversely rusose, longitudinally ribbed, with three to five ribs, toothed above. Flowering VIII; fruiting IX.

Dry stony slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the Nakhichevan ASSR, outskirts of the village of Vanand. Type in Erevan.

Series 4. Illicifoliae Takht.—Capitula ovoid or globose, glabrous or pubescent; involucrel bracts attenuate into subulately three-angled, arcuately decurved or erect cusp.

59. *C. erivanensis* Bornm. in Vestn. Tifl. Bot. Sada, No. 30 (1913) 16; Grossh. Fl. Kavk. IV, 167; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 187; Fl. Azerb. VIII, 368.—*C. meghrica* Takht. Ibid. 186.—*lc.*: Bornm. op. cit., Plate 1; Fl. Azerb. VIII, Plate 35.

Perennial. Root woody, many-headed. Stem erect, 30–60 cm high, usually gray arachnoid-hairy, leafy, spreadingly branched above; branches and branchlets one-headed, less often stem glabrous. Leaves coriaceous, with network of prominent veins, gray-arachnoid hairy-tomentose on

both sides (more densely beneath), less often glabrous; basal leaves short-petiolate, oblong, pinnatilobate, lobes narrow-deltoid, spinescent; cauline leaves gradually reduced toward stem apex, sessile, short-decurrent, like basal. Capitula globose, 15–17 mm wide (excluding cusps) or 30–35 mm wide (including cusps), densely arachnoid-hairy, narrow-lanceolate, attenuate almost from base into subulate, erect or weakly arcuate cusp; inner bracts narrow-lanceolate, scabrous along margin, short-acuminate. Receptacular bristles smooth. Capitula yellow; anther tube light pink. Achenes 5 mm long, almost tetraquetrous; toothed above. Flowering V–VI; fruiting VII.

Dry stony slopes in the lower mountain zone.—*Caucasus*: Southern and eastern Transcaucasia. *General distribution*: Northern Iran. Described from the vicinity of the village of Karababa (Nakhichevan). Type in Tbilisi.

Note. In the Megri Region, entirely glabrous plants are found together with pubescent ones; their involucrel bracts are usually arcuate. Attempts 194 to split off these non-pubescent plants as a separate species seem to me unsound at present, as both pubescent and non-pubescent forms occur together in a population. The degree of divergence of the involucrel bracts also varies. Moreover, forms intermediate between *C. lomekinii* Winkl., growing here but at a somewhat lower level, and *C. erivanensis* Bornm., whose identification in many cases is difficult, are found in these regions. I believe that this series of forms deserves detailed study in nature.

60. *C. iljinii* Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 187; Fl. Azerb. VIII, 368.

Perennial. Root woody, many-headed; root collar gray-tomentose, with numerous remains of old leaves. Stem erect, finely arachnoid-hairy, cymosely branched from middle. Leaves coriaceous, green, very finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, oblong, 2.5–3 cm wide and 6–7 cm long, crenate-lobed, lobes broadly deltoid, crenate-toothed with spinescent teeth; cauline leaves like basal, but sessile, short-decurrent, gradually reduced; uppermost cauline leaves reaching base of capitulum. Capitula ovoid, 7–8 mm wide (excluding cusps) and 17 mm long (with corolla), finely arachnoid-hairy. Involucrel bracts numerous, narrow-lanceolate, scabrous along margin, gradually attenuate into linear, weakly arcuate and subulate cusp; inner bracts scabrous dorsally, lanceolate, acuminate into short cusp. Receptacular bristles smooth. Corolla yellow; anther tube light purple. Achenes obovoid, 6 mm long (young). Flowering VI.

Gypsic slopes in lower mountain zone.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the vicinity of Ordubad.

Note. The type of the species could not be found; only plants from the Dzhulfa Region are known. These plants actually differ from all known species, but their differences are insignificant; additional material is necessary to understand some of the morphological characters and the range of the species.

61. **C. lomakinii** Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 220; Grossh. Fl. Kavk. IV, 166; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 188; Fl. Azerb. VIII, 369.

Perennial. Root woody, blackish-fibrous, many-headed, root collar white-tomentose, with remains of old petioles. Stem erect, glabrous, somewhat purple, divaricately branched, leafy. Leaves coriaceous, green on both sides, with fine network of prominent veins, finely glandular; basal leaves oblong, petiolate, crenate-lobed, lobes deltoid, sparsely spinose; cauline leaves gradually reduced upward, sessile, decurrent, lanceolate, crenate-toothed, prickly-toothed. Capitula ovoid, 8–10 mm wide (excluding cusps), glabrous. Involucral bracts numerous, basally appressed, gradually attenuate into subulate, usually divergent or almost horizontal cusps, with short and stiff hairs on dorsal surface and along margin, sometimes glandular; inner bracts narrow-lanceolate, densely covered with short and stiff cilia along margin, or with weakly divergent cusps. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, 4 mm long, narrowly longitudinally ribbed, truncate above, finely toothed. Flowering VI–VII; fruiting VIII.

Dry slopes in lower mountain zone.—*Caucasus*: Southern Transcaucasia. Endemic. Described from the Araks Valley. Type in Leningrad.

62. **C. hohenackeri** Fisch. and Mey. Ind. sem. hort. Petrop. 2 (1835) 34; DC. Prodr. VI, 555; Ldb. Fl. Ross. II, 677; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 21; Boiss. Fl. or. III, 481; Winkl. in Tr. Peterb. Bot. Sada, XII, 211; Grossh. Fl. Kavk. IV, 166; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 188; Fl. Azerb. VIII, 369.—*Arctium hohenackeri* O. Ktze. Rev. Gen. 1 (1891) 307.

Perennial. Root woody, blackish-fibrous, many-headed. Stem about 25–30 cm high, finely arachnoid-hairy, usually purple at least in upper part, divaricately branched, moderately leafy. Leaves coriaceous, finely arachnoid-hairy and green above, gray-tomentose beneath; basal leaves petiolate, pinnatisect in narrow-lanceolate, decurved lateral lobes; petiole narrow-winged; cauline leaves sessile, very short-decurrent or almost nondecurrent, semiamplexicaul, almost horizontal, pinnatilobate, or pinnatipartite, gradually reduced toward stem apex. Capitula ovoid, 9–10 mm wide (excluding cusps), sparsely arachnoid-hairy. Involucral bracts

numerous, all except inner lanceolate, weakly carinate, dorsally smooth, scabrous along margin, gradually attenuate in falcate cusps; inner bracts lanceolate, dorsally scabrous, gradually short-acuminate. Receptacular bristles smooth. Corolla yellow; anther tube pink. Achenes obovoid, about 4 mm long, longitudinally ribbed, transversely pitted, and with sharp teeth above. Flowering VI–VII; fruiting VII.

Dry slopes in middle mountain zone.—*Caucasus*: Eastern Transcaucasia, Talysh. *General distribution*: Iran. Described from Talysh. Type in Leningrad.

Subsection 2. Irano-turkestanicae Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 178.—Capitula ovoid or cylindrical, solitary or aggregated on branch apices. Involucral bracts lanceolate; receptacular bristles scabrous or smooth.

Series 5. Carduiformes Takht.—Plants medium high. Capitula 196 ovoid-oblong or oblong-cylindrical, usually aggregated on branch apices, glabrous; involucral bracts narrow-lanceolate, acuminate into erect cusp; receptacular bristles smooth.

63. *C. orientalis* (Adams) C. Koch in Linnaea, XXIV (1851) 386; Fl. Azerb. VIII, 364; Fl. Gruzii, VIII, 444.—*Carduus orientalis* Adams in Weber and Mohr. Beitr. 1 (1805) 63; MB. Fl. taur.-cauc. 2, 270.—*Cousinia carduiformis* Cass. in Dict. sc. nat. XLVII (1826) 503; DC. Prodr. VI, 552; Ldb. Fl. Ross. II, 676; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 18; Boiss. Fl. or. III, 472; Winkl. in Tr. Peterb. Bot. Sada, XII, 224; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 179.—*C. orientalis* Grossh. Fl. Kavk. IV, 166.—*Arctium carduiforme* O. Ktze. Rev. Gen. 1 (1891) 307.—*Exs.*: Pl. or. exs. No. 248.

Perennial. Roots woody, blackish-fibrous. Stem erect, white arachnoid-hairy, 10–25 cm high, usually cymosely branched; branches bearing two to five capitula aggregated at tip, usually slightly enclosed by apical leaves. Leaves coriaceous, green above, glabrous or inconspicuously sparsely glandular, white-tomentose beneath; basal and lower cauline leaves petiolate, oblong, pinnatilobate, lobes broadly deltoid, spinescent; cauline leaves sessile, broadly short-decurrent, slightly reduced toward stem apex. Capitula ovoid-oblong, 9–10 mm wide and 20–25 mm long (with projecting corolla), almost without arachnoid-hairy pubescence. Involucral bracts 40–45, narrow-lanceolate, gradually acuminate into short and stiff, erect, cusp, weakly carinate dorsally, densely scabrous; inner bracts scarious, acuminate in thin cusp. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, about 5 mm long, longitudinally ribbed, transversely rugose, toothed above. Flowering VII–VIII; fruiting VIII–IX.

Dry slopes from lower to middle mountain zone.—*Caucasus*: Ciscaucasia, eastern and southern Transcaucasia. *General distribution*: Turkey. Described from the vicinity of Tbilisi. Type in Leningrad.

64. **C. microcephala** C.A.M. in DC. Prodr. VI (1837) 552; Bge. in Mém. Acad. Pétersb. 7 sér., 9, 2, 16; Boiss. Fl. or. III, 472; Winkl. in Tr. Peterb. Bot. Sada, XII, 219; Grossh. Fl. Kavk. IV, 166; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 179; Fl. Azerb. VIII, 365.—*Arctium microcephalum* O. Ktze. Rev. Gen. 1 (1891) 308.

Perennial. Root woody, blackish-fibrous. Stem numerous, slender, 20–30(40) cm high, finely arachnoid-hairy or almost glabrous. Leaves coriaceous, green, and very finely arachnoid-hairy above, white-tomentose beneath; basal leaves short-petiolate, lanceolate, crenate-pinnatifid or crenate-pinnatifid, with broadly deltoid, spinose-toothed lobes; cauline 197 leaves gradually reduced, sessile, short-decurrent, oblong or lanceolate, shallow crenate-prickly toothed. Capitula oblong-cylindrical, 4–5 mm wide (excluding cusps) and 12–17 mm long, finely arachnoid-hairy, with fewer florets, solitary or in twos on short peduncles; involucre bracts coriaceous, somewhat flat, scabrous along, lanceolate, gradually short-acuminate, with erect cusp; inner bracts thinner, membranous, scabrous dorsally and along margin, acuminate in thin and short cusp. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, 4–4.5 mm long, longitudinally narrow-ribbed, transversely rugose, with sharp teeth above. Flowering VI; fruiting VI–VII.

Dry stony or limestone slopes in lower and middle mountain zone.—*Caucasus*: Eastern and southern Transcaucasia. *General distribution*: Northern Iran. Described from northern Iran. Type in Leningrad.

Series 6. Eudolicholepides Juz.—Short or often medium high plants. Capitula solitary terminal on branches, broadly ovoid; involucre bracts dorsally smooth; receptacular bristles scabrous.

65. **C. dolicholepis** Schrenk in Bull. phys.-math. Ac. sc. Pétersb. 3 (1845) 107; Ldb. Fl. Ross. II, 681; Bge. in Mém. Acad. Pétersb. 7 sér., 9, 2, 18; Winkl. in Tr. Peterb. Bot. Sada, XII, 232 p. p.; XIV, 224; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 158 p. p.; Juz. in Tr. Inst. Kauch. i Gutt. 4, 11.—*C. semenovii* Rgl. in Bull. Soc. Nat. Mosc. XI, 3 (1867) 147; Winkl. op. cit. (1892) 232.—*Arctium dolicholepis* O. Ktze. Rev. Gen. 1 (1891) 307.—*A. semenovii* O. Ktze. Ibid. 308.

Perennial. Roots vertical, with thick, 1–2 cm in diameter, collar covered by remains of old petioles. Stems one to four, erect or weakly divergent, 15–35 cm long, rather densely arachnoid-hairy scabrous, somewhat oblong-sulcate, repeatedly divaricately branched from base or

middle, forming broad corymbose-paniculate inflorescence. Basal leaves short-petiolate, with 1–2 cm long petioles, broad-lanceolate, lamina 6–20 cm long and 1.5–9 cm wide (including lobes), slightly attenuate toward both ends, sinuate, pinnatilobate or pinnatisect with oblique, almost ovate, spinescent-acuminate, almost entire lobes or lobes with one or two teeth at base; lower cauline leaves like basal, but sessile; middle and upper leaves gradually reduced, sessile, short-decurrent; uppermost leaves narrow ovate, with few teeth; all leaves arachnoid hairy-tomentose on both sides, more densely beneath, with prominent veins. Capitula ovoid or broad-ovoid, 15–25 mm long and 6–17 mm wide (excluding cusps), usually with foveate base, arachnoid-hairy or tomentose. Involucral bracts about 40, ciliate, dorsally, except inner bracts, smooth; outer bracts lanceolate, divergent; middle abruptly narrowed from ovate base into long, almost horizontal, deltoid cusp; inner bracts linear-lanceolate, erect, membranous, gradually acuminate with thin and short spine at apex. Receptacular bristles scabrous. Corolla yellow. Achenes 3–6 mm long, 1.5–2.5 mm wide, obpyramidal, four or five-angled, ribbed, rugose-pitted, and with fine teeth above. Flowering V–VI; fruiting VII.

Sands, alkaline valleys, wormwood steppes, wastelands and weedy places.—*Soviet Central Asia*: Balkhash Region, Tien Shan (central), Dzhungaria-Tarbagatai (Dzhungarian Alatau). Endemic. Described from Khantau. Type in Leningrad.

Series 7. Scabridae Juz.—Plants medium high. Capitula solitary terminal on branches, ovoid to almost globose; involucral bracts more or less scabrous dorsally; receptacular bristles smooth.

66. *C. vicaria* Kult. in Tr. Turk. Nauchn. Obshch. 1 (1923) 113; Juz. in Tr. Inst. Kauch. i Gutt. 4, 15.—*C. pskemensis* Juz. nomen Ibid. (1932) 16 and Herb.—*C. decurrens* f. *tshimganica* O. Fedtsch. in Perech. Rast. Turkm. IV (1911) 250.—*C. polycephala* auct. non Rupr.: Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 156.—*lc.*: Kult. op. cit. 115.—*Exs.*: H.F.A.M. No. 50.

Perennial. Root vertical, woody, blackish-fibrous, with thickened collar. Stem solitary, erect, 60–75 cm high, somewhat striate-sulcate, arachnoid-hairy, strongly branched from base, with long, spreading-erect branches, forming corymbose-paniculate inflorescence. Basal leaves coriaceous, long petiolate (with petioles 5–8 cm long), oblong-lanceolate, pinnatilobate, with narrow deltoid, acuminate-spinescent lobes, broadened at base, bearing one or two large, acute prickly teeth along margin on both sides; lower cauline leaves like basal, but sessile, long-decurrent; middle and upper leaves ovate, decurrent. Capitula numerous, 8–13 mm

wide (excluding cusps) and 17–23 mm long, ovoid, arachnoid-hairy. Involucral bracts scabrous dorsally; outer bracts deltoid, acuminate in small spine; middle bracts ovate, 2.5–3 mm wide at base, gradually narrowed into short, almost deltoid, erect cusp; inner bracts membranous, linear-lanceolate, usually dark colored above, mucronate. Receptacular bristles smooth. Corolla yellow. Achenes obpyramidal, almost triquetrous. Flowering VI–VII; fruiting VII–VIII.

Loessic slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from the vicinity of Khumsan. Type in Leningrad.

199 67. *C. angreni* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 17.

Perennial. Root vertical, woody, blackish-fibrous, with thickened, somewhat oblong collar. Stem usually solitary, erect, 30–60 cm high, striate-sulcate, weakly arachnoid-hairy, branched in upper half, with spreading branches bearing solitary capitulum. Basal leaves petiolate, oblong-lanceolate, pinnatisect into unequal, divergent lateral segments, in turn prickly-lobed, lower cauline leaves like basal but sessile; middle leaves oblong, short-decurrent, pinnatipartite into relatively narrow-deltoid, spinescent-acuminate lateral lobes; upper leaves ovate, broadly short-decurrent, prickly-lobed. Capitula less numerous, almost globose, 18–20 mm wide (excluding cusps), 25 mm long, arachnoid-hairy. Involucral bracts somewhat divergent, even somewhat falcate, dorsally carinate, scabrous; outer bracts oblong-ovate, with thin, up to 3 mm long cusp; middle bracts oblong, gradually acuminate into thin up to 6 mm long cusp; inner bracts almost membranous, linear, with thin and short cusp. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes 6 mm long and 4 mm wide, with strongly prominent ribs, narrow-winged along ribs, with four teeth above. Flowering VI–VII; fruiting VII–VIII.

Loamy-gravelly slopes in lower mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from the Angren River Basin between Iertash and Lachenkiya. Type in Leningrad.

68. *C. scabrída* Juz. in Tr. Inst. Kauch. i. Gutt. 4 (1932) 13.—*C. dolicholepis* auct. non Schrenk: Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 232 p.p.

Perennial. Root vertical, fibrous, with thickened collar about 2 cm wide. Stems two, erect, 25–35 cm high, densely arachnoid-hairy, shallow sulcate, branched; branches erect and spreading, in turn branched further. Basal leaves petiolate, with 2–3.5 cm long petioles, oblong-lanceolate, lamina 10–18 cm long, 3–4.5 cm wide, pinnatisect into narrow deltoid lobes, cuspidate, with one or two large teeth at base; lower and middle

cauline leaves like basal but sessile, short and narrow decurrent, gradually reduced toward stem apex; upper leaves narrow-ovate or oblong-ovate, almost undivided, cuspidate, crenate-lobulate or strongly toothed. Capitula less numerous, solitary on peduncle, broadly ovoid or ovoid, 15–25 mm long and 10–15 mm wide, foveate at base, weakly arachnoid-hairy.

200 Involucral bracts about 50, strongly or weakly scabrous in lower part on dorsal surface, outermost bracts narrowed in erect cusp from appressed ovate base; middle bracts with longer, almost three-angled, erect or slightly recurved cusp, not exceeding capitulum; inner bracts slightly shorter than or as long as middle, membranous, slightly broadened toward apex, with almost roundish apex, finely spinescent. Receptacular bristles smooth. Corolla yellow. Achenes 6 mm long and 3 mm wide, obpyramidal, ribbed, ribs usually winged, toothed above. Flowering VI–VII; fruiting VIII–IX.

Dry gravelly slopes in lower and middle mountain zone.—*Soviet Central Asia*: Tien Shan (Talass Alatau, Karatau, Tashkent Alatau). Endemic. Described from the Koktal River Basin. Type in Leningrad.

Note. The type was not designated in the description of the species; therefore, I propose to consider for the lectotype the plant: "Near Koktal Brook. Knorring. 1909, Vol. 26, No. 376."

69. *C. minkwitziae* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 158; Juz in Tr. Inst. Kauch. i Gutt, 4, 14.

Perennial. Root vertical, blackish-fibrous, with thickened collar, 2–2.5 cm wide. Stem erect, 30–60 cm high, finely arachnoid-hairy, striate-sulcate, usually cymosely branched in upper part, branches and branchlets one-headed. Leaves green, finely arachnoid-hairy above, gray-tomentose, with sharply prominent veins beneath; basal leaves petiolate, with 2–5 cm long petioles, oblong-lanceolate, with lamina 18–25 cm long and 4–5.5 cm wide, pinnatisect into narrow-deltoid, spinose lateral lobes, in turn, pinnatilobate; lower cauline leaves like basal but with shorter petioles; middle leaves somewhat reduced, morphologically like basal but sessile, semiamplexicaul and very short-decurrent; upper cauline leaves ovate, cuspidate, spinose-toothed. Capitula pedunculate, broadly cylindrical, 25–35 mm long and (12)17–20 mm wide, weakly foveate at base, very slightly arachnoid-hairy. Involucral bracts about 60, dorsally somewhat scabrous only at base; outer bracts oblong-ovate, acuminate, divergent; middle bracts oblong-lanceolate, flat, dorsally carinate, cuspidate, usually longer than inner bracts and also corolla; inner bracts membranous; somewhat acuminate, scabrous along margin. Corolla yellow anther tube light pink. Receptacular bristles smooth. Achenes 202 5–7 mm long and 3 mm wide, obpyramidal, triquetrous or almost tetraquetrous, usually winged along edges, toothed above. Flowering VI–VII; fruiting VIII.



Loamy-gravelly meadow-steppe slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan (Talass Range; Aksu-Dzhebogly Reserve). Endemic. Described from Aksai. Type in Leningrad.

70. *C. tenuisecta* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 306.

Perennial. Root vertical, blackish-fibrous, with thickened collar. Stem erect, white-pubescent, (18)25–45 cm high, leafy, cymosely branched in upper part. Leaves green, finely arachnoid-hairy above, white-tomentose beneath, basal and lower cauline leaves petiolate, oblong, bipinnatisect, with primary segments narrow-lanceolate, spinescent, on narrow-winged petioles, secondary segments almost linear, spinescent-acuminate, decurved; cauline leaves gradually reduced, sessile, semiamplexicaul, narrow and short-decurrent. Capitula ovoid, 12–15 mm wide (excluding cusps), arachnoid-hairy, with somewhat foveate base. Involucral bracts about 40; outer bracts oblong-ovate, attenuate into divergent strong cusp, very inconspicuously scabrous below on dorsal surface; middle bracts narrow-lanceolate, erect-spreading, dorsally carinate, weakly scabrous below; inner bracts membranous, lanceolate, short-acuminate, scabrous along margin. Receptacular bristles smooth. Corolla yellow; anther tube pink. Achenes three or four-angled, narrow-winged along edges, weakly rugose, 4–5 mm long, toothed above. Flowering VI–VII; fruiting VIII.

Loamy slopes.—*Soviet Central Asia*: Tien Shan (Kirgizian Alatau, Ichkeletau, Karatau). Endemic. Described from the Botomainak Ravine. Type in Leningrad.

Series 8. Turkestanicae Juz.—Plants short or medium high; basal leaves petiolate, without spines in lower part. Capitula more or less aggregated in heads, narrow ovoid; receptacular bristles smooth.

71. *C. syrdariensis* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, III (1928) 106; Juz. in Tr. Inst. Kauch. i Gutt. 4, 32 p. p.—*Exs.*: H.F.A.M. No. 488.

Perennial. Root vertical, slender, with thickened collar. Stem usually solitary, erect, 10–45 cm high, arachnoid-hairy, striate-sulcate, branched from middle; branches forming dense, corymbose-paniculate inflorescence. Basal leaves petiolate, coriaceous, lanceolate, pinnatipartite or sometimes pinnatisect into deltoid prickly-toothed lateral segments, attenuate-spinescent, finely arachnoid-hairy, grayish-green, above, white-tomentose beneath with prominent veins; lower cauline leaves like basal but sessile, short- and broad-decurrent; middle and upper leaves oblong-ovate, sessile, short-decurrent, crenate-lobed, with acuminate-spinescent lobes; uppermost leaves almost deltoid, with less numerous large teeth

on each side. Capitula numerous, compactly aggregated in groups of 4–10 on tips of primary and secondary branches, almost sessile, narrow-ovoid, with roundish or somewhat narrowed base, small, 10–13 mm long and 3–4 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts about 20, squarrose, weakly carinate; outer bracts lanceolate, gradually acuminate into thin short cusp; middle bracts two times as long as outer, narrow-lanceolate, gradually acuminate-spinescent with thin spine; inner bracts membranous, linear, with finely spinescent. Receptacular bristles smooth. Corolla pale yellow; anther tube pink. Achenes flat-obpyramidal, almost three or four-angled, with four teeth above, somewhat truncate, 3 mm long and 1.5 mm wide. Flowering VI–VII; fruiting VII–VIII.

In foothills.—*Soviet Central Asia*: Syr-Darya, Tien Shan (western). Endemic. Described from the vicinity of Tashkent. Type in Tashkent.

72. *C. turkestanica* (Rgl.) Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 35.—*C. decurrens* γ . *turkestanica* Rgl. in Tr. Peterb. Bot. Sada, IV (1880) 316; Winkl. Ibid, XII, 221.

Perennial. Plants very similar to *C. syrdariensis* Kult., from which it differs by larger, 17 mm long and 6 mm wide (excluding cusps) capitula, broader, at base 2.5 mm wide involucral bracts, larger, 4–4.5 mm long, achenes and almost solitary pedunculate capitula. Flowering VI; fruiting VII.

In foothills.—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from Karatau, Turtchi. Type in Leningrad.

Note. Apparently, it hybridizes with *C. scabrida* Juz.; a large number of intermediate forms from the Karatau Range can be found in herbaria.

Series 9. Pungentes Juz.—Plants medium high; basal leaves with unarmed petioles. Capitula solitary, broadly ovoid; involucral bracts smooth; middle bracts acuminate into carinate, strong, divergent cusp; receptacular bristles scabrous.

73. *C. juzepczukii* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 95.

204 Perennial. Root woody, blackish-fibrous, with strongly thickened, almost globose, white-tomentose collar. Stem erect, 40–60 cm high, white-tomentose, divaricately branched almost from base, branches, in turn, further branched, into short one-headed secondary branches. Leaves coriaceous, finely arachnoid-hairy above, finely tomentose beneath, with prominent veins; basal leaves short-petiolate, with unarmed petiole, oblong, pinnatifid, lobes broadly deltoid, spinescent, spinose-toothed, somewhat approximate, as a result leaf margin more or less crisped;

cauline leaves gradually reduced, sessile; lower cauline leaves like basal but somewhat shorter; middle leaves sessile, semiamplexicaul, with broad roundish auricles, spinose-toothed; upper leaves strongly reduced. Capitula globose, 20 mm wide (excluding cusps), slightly foveate at base. Involucral bracts about 50, all densely scabrous dorsally, outer bracts broad-lanceolate, somewhat flat, gradually acuminate in carinate, falcate, and rather broad cusp with thin spine, 22–25 mm long; middle bracts erect, like outer, 25–30 mm long; inner bracts narrow lanceolate, membranous, with thin and short cusp, 20–22 mm long. Receptacular bristles scabrous. Corolla yellow; anther tube pink. Achenes obovoid, usually three or four-angled, narrow-winged along edges, with three or four teeth above, 5 mm long, 2.5–3 mm wide. Fruiting X.

Stony slopes of monadnock mountains.—*Soviet Central Asia*: Kyzyl-Kum. Endemic. Described from Kyzyl-Kum, Aktau Mountains. Type in Leningrad.

74. *C. umbilicata* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 306.

Perennial. Plants rather tall. Stem erect, white-arachnoid-hairy, sparsely branched; branches short, one-headed. Leaves coriaceous, finely arachnoid-hairy, green above, white-tomentose beneath, upper leaves ovate, broadly short-decurrent, crenate-prickly toothed; uppermost leaves strongly reduced, reaching almost to base of capitula. Capitula broad ovoid or almost globose, 25 mm long (with corollas) and 12–15 mm wide (excluding cusps), arachnoid-hairy, with rather distinctly foveate base. Involucral bracts 25–27; outer bracts oblong-ovate, somewhat flat at base, short-acuminate, with erect-deflected cusp; middle bracts broad-lanceolate, somewhat flat in lower half, 5–6 mm wide, narrowed from middle in carinate, acuminate-spinescent, erect-deflected cusp, usually 17–25 mm long; inner bracts membranous, lanceolate, short acuminate into fine cusp, cusp erect, 17–18 mm long. Receptacular bristles unequal, longest slightly broadened above, scabrous. Corolla yellow; anther tube purple. Achenes obovoid, 5 mm long, almost three-angled, with sharp teeth above. Flowering VI; fruiting VII.

205 On sandy compacted slopes.—*Soviet Central Asia*: Kyzyl-Kum. Endemic. Described from the vicinity of Besh-Bulak. Type in Leningrad.

75. *C. pungens* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 19; Juz. in Tr. Tadzh. Bazy Akad Nauk SSSR, 8, 552.—*C. dolicholepis* auct. non Schrenk; Borm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 158 p. p.

Perennial. Root vertical, blackish-fibrous, with globose thickened collar. Stem erect, 20–40 cm high, shallow-sulcate, rather densely arachnoid hairy-lanate, with few weakly branched, erect branches, bearing less numerous solitary capitula. Basal leaves petiolate with unarmed

petioles, coriaceous, lanceolate, lobed, with broadly deltoid acuminate-spinose lobes, finely arachnoid hairy-tomentose, grayish-green above, densely white-tomentose beneath, with prominent veins; lower cauline leaves like basal but somewhat shorter and sessile; middle and upper leaves ovate, short-decurrent, large prickly-toothed; uppermost leaves strongly reduced. Capitula less numerous (about 20), broadly ovoid or almost globose, about 20 mm long and 12 mm wide (excluding cusps), somewhat roundish at base, finely arachnoid-hairy. Involucral bracts less numerous, wide; outer bracts short, gradually acuminate from wide appressed base into short cusp; middle bracts two to three times as long as outer, abruptly acuminate from broad ovate appressed base or almost attenuate into long, almost three-angled, strong, erect or weakly recurved cusp; inner bracts linear, scarious above, with thin cusp. Receptacular bristles broadened above, scabrous. Corolla yellow. Achenes obpyramidal, almost four-angled, with sharp teeth above, about 4 mm long. Flowering VI–VII; fruiting VII–VIII.

In foothills and lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai (northern slope of the Alai Range). Endemic. Described from the Shahimardan River Basin, Ankhor gorge. Type in Leningrad.

76. *C. scleracantha* Kult. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 104.

Perennial. Root vertical, blackish-fibrous, with thickened collar. Stem solitary, erect, 30–60 cm high, densely white-tomentose, branched from base, branches convergent, bearing capitula at tips in semicorymbose inflorescence. Cauline leaves sessile, broadly long-decurrent, broad oblong-ovate to ovate and even orbicular, large-spinose-toothed or even prickly-lobed, very finely arachnoid-hairy above, white-tomentose beneath with prominent veins. Capitula large, 13–14 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts carinate; outer bracts lanceolate, short-acuminate; middle bracts 35 mm long, lanceolate, somewhat carinate, gradually broadly acuminate into grooved, almost falcate cusp; inner bracts finely coriaceous, almost membranous, gradually acuminate. Receptacular bristles scabrous. Corolla yellow, not exerted from involucre. Achenes obovoid, 5 mm long, indistinctly ribbed. Flowering VII; fruiting VIII.

In varicolored lower hills.—*Soviet Central Asia*: Tien Shan (foothills of the Fergana Range). Endemic. Described from the vicinity of Turpak-Bel Pass. Type in Leningrad.

Series 10. Polycephalae Juz.—Plants tall; petioles of basal leaves spinose along sides throughout. Two or three capitula aggregated on branch tips, others solitary, usually ovoid; receptacular bristles usually smooth.

77. **C. polycephala** Rupr. in Mém. Acad. Pétersb. 7 sér. 14, 4 (1869) 54; Winkl. in Tr. Peterb. Bot. Sada, XII, 219; XIV, 199; Juz. in Tr. Inst. Kauch. i Gutt. 4, 21; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR 8, 552.—*Arctium polycephalum* O. Ktze. Rev. Gen. 1 (1891) 308.—*C. decurrens* auct. Winkl. op. cit. (1892) 220 p. p.; XIV, 222 p. p.—*C. decurrens* var. *congesta* auct. non Rgl.: O. and B. Fedtsch. Perech. Rast. Turkm. IV (1911) 249.—*C. decurrens* β. *oligocephala* auct. non Rgl.: Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 157 p. p.

Perennial. Root vertical, woody, fibrous, with thickened collar 25–40 mm wide. Stem solitary, erect, up to 100 cm high, more or less arachnoid-hairy, branched from middle or above with long, erect branches, in turn branched forming a rather wide inflorescence, usually wider than height of secondary branches. Basal leaves usually withering by anthesis and fruiting, 7–20 in sterile rosette, 15–50 cm long and 5–11 cm wide (with spines), coriaceous, oblong-lanceolate, slightly crisped along margin, pinnatisect, lobes not approximate, deltoid, large toothed, attenuate into strong spine, green and sparsely arachnoid-hairy above, more densely along midrib, densely and finely white-tomentose beneath, petiolate, with petioles thickened at base, bearing erect spreading spines on sides; cauline leaves reduced towards stem apex; lower cauline leaves like basal but sessile; middle and upper cauline leaves narrow-ovate or broad-lanceolate, sessile, narrowly long-decurrent, prickly-toothed, attenuate into strong cusp. Capitula numerous; lower capitula solitary, upper in groups of two to four on branch tips, short- or rather long-pedunculate, ovoid or narrowly ovoid, with roundish base, 18–22 mm long and 6–9 mm wide, pubescent. Involucral bracts about 25, herbaceous or almost coriaceous; outer bracts ovate, dorsally carinate, acuminate in short cusp; adjacent bracts gradually transitional into middle bracts in shape and size, three times or more exceeding outer bracts, narrowed from narrow ovate base in rather long, green, strong, almost three-angled cusp, erect or weakly curved, as long as or shorter than florets; inner bracts herbaceous, lanceolate; innermost membranous, straw-yellow, linear, slightly broadened toward apex, acuminate into long and thin spine. Receptacular bristles whitish, almost smooth or with one or two serrations. Corolla yellow; anther tube purple. Achenes 4–5 mm long, obpyramidal, flattened three or four-angled, sinuate-ribbed, with somewhat sharp three or four teeth above. Flowering VII–VIII; fruiting VIII.

In foothills and lower mountain zone, on stony and clayey-stony slopes, in wormwood and grass-wormwood steppes and on wastelands.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai (Alai Range, southern Tadzhikistan). *General distribution*: Dzhungaria-Kashgaria. Described from the Chu River Basin. Type in Leningrad.

78. *C. finitima* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 24; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 552.—*C. decurrens* β . *oligocephala* auct. non Rgl.: Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 157 p. p.

Perennial. In all respects plants similar or *C. polycephala* Rupr., differing from the latter by slightly flexuous inflorescence branches; longer, somewhat curved cusps of middle involucre bracts, exceeding florets by 5 mm; and almost spatulate inner involucre bracts. Flowering VII; fruiting VII–VIII.

Valleys of mountain rivers.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the middle reaches of the Kshtut River Valley (“Vorukh”). Type in Leningrad.

79. *C. sporadocephala* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 307.

Perennial. Roots vertical, woody, grayish-fibrous, with globose, thickened collar. Stem solitary, erect, striate-sulcate, tomentose, 40–60 cm high, with less numerous long branches, in turn, branched forming lax paniculate inflorescence; basal leaves petiolate, with unarmed petioles, oblong-lanceolate, coriaceous, unequally narrow lobed, with acuminate-spinose, spinose-toothed lobes, weakly arachnoid-hairy above, gray-tomentose beneath, with prominent veins; lower cauline leaves like basal but somewhat shorter, sessile and long-decurrent; middle and upper leaves ovate, broadly decurrent, crenate-prickly toothed, pubescent like basal leaves. Capitula comparatively less numerous, with distinct peduncles, broadly ovoid, pubescent, roundish or somewhat narrowed at base, 20 mm long and 10 mm wide (excluding cusps). Involucre bracts 20, squarrose; outer bracts broad-ovate, appressed, with short divergent cusp; middle bracts oblong-ovate, appressed, attenuate in somewhat carinate, strong and divergent cusp, almost as long as appressed base; inner bracts linear, membranous above, with thin short cusp. Receptacular bristles weakly flattened above, almost smooth. Corolla yellow. Achenes obpyramidal, with four teeth above, 4 mm long. Flowering VII–VIII; fruiting VIII–IX.

Loamy slopes in foothills.—*Soviet Central Asia*: Tien Shan. Endemic. Described from Maili-Sai. Type in Leningrad.

Series 11. Resinosae Juz.—Plants mostly medium tall; basal leaves with petioles without spines in lower part. Capitula more or less clustered, ovoid, narrow-ovoid or almost cylindrical; receptacular bristles scabrous, weakly scabrous or smooth.

80. *C. spiridonovii* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 29;

Juz. in Tr. Tadzh. Bazy Akad Nauk SSSR, 8, 552.—*C. decurrens* γ. *oocephala* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 157.

Perennial. Root vertical, woody, blackish-fibrous, thickened into globose resinous-sticky collar. Stem usually solitary, erect, 30–40 cm high, densely white-tomentose, branched in upper half, with branches forming corymbose-paniculate inflorescence. Basal leaves petiolate, oblong-lanceolate, lobed, with broadly deltoid lobes acuminate into small spine, coriaceous, densely white-tomentose beneath, finely arachnoid-hairy above; lower cauline leaves sessile, otherwise like basal leaves; middle and upper leaves ovate or almost orbicular, sessile, broadly short-decurrent, large crenate-prickly-toothed, white-tomentose beneath, finely arachnoid-hairy above. Capitula numerous, broadly ovoid or ovoid, 8–10 mm wide (excluding cusps) and 17–22 mm long, densely arachnoid hairy-lanate. Involucral bracts erect-spreading, carinate, with thin and rather strong short cusp; outer bracts oblong-ovate, with short thin cusp, sometimes with two pairs of acicular spines along margin; middle bracts oblong, gradually acuminate into stronger, up to 3 mm long cusp; inner bracts lanceolate, with thin and very short cusp. Receptacular bristles weakly flattened above, scabrous. Corolla yellow; anther tube purple. Achenes obovoid, 5 mm long and 3 mm wide. Flowering VI–VII; fruiting VII–VIII.

Clayey deserts.—*Soviet Central Asia*: Syr-Darya, Pamiro-Alai? Endemic. Described from the vicinity of the village of Nikolskii. Type in Leningrad.

81. *C. transoxana* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 105.

209 Perennial. Root vertical, woody, blackish-fibrous with globose, resinous-sticky, weakly pubescent collar. Stem solitary, erect, 20–50 cm high, densely arachnoid hairy-tomentose, branched in upper half; branches short, bearing one or two capitula at tips of very short peduncles, forming almost corymbose-paniculate inflorescence. Basal leaves short-petiolate, oblong-lanceolate, prickly-lobed, with narrow deltoid strongly acuminate-spinescent lobes, coriaceous, finely arachnoid-hairy above, white-tomentose beneath; lower cauline leaves like basal but sessile, excurrent over stem; middle and upper cauline leaves oblong-ovate or almost orbicular, large spinose-toothed with cuspidate teeth, broadly decurrent. Capitula relatively less numerous, broadly ovoid, 7–9 mm wide (excluding cusps) and 15–18 mm long, arachnoid hairy-lanate. Involucral bracts erect-spreading or slightly recurved, somewhat flat at base, narrowed toward apex in strong, carinate cusp; outer and middle bracts 6–17 mm long; inner bracts membranous, lanceolate, short-acuminate. Receptacular bristles almost smooth. Corolla yellow; anther tube purple.

Achenes obovoid, longitudinally ribbed, almost three-angled. Flowering VI–VII; fruiting VII.

Clayey deserts and foothills.—*Soviet Central Asia*: Amu-Darya, Kyzyl-Kum, Pamiro-Alai. Endemic. Described from the vicinity of the village of Talimardzhan. Type in Tashkent.

82. *C. ambigans* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 17.

Perennial. Root vertical, woody with globose collar. Stem erect, 30–60 cm high, white arachnoid-hairy, divaricately branched almost from base. Basal leaves 25–30 cm long, oblong, petiolate, with unarmed petioles, pinnatifid, with unequal, acuminate-spinescent lateral lobes, green, finely arachnoid-hairy above, finely tomentose beneath with prominent veins; cauline leaves gradually reduced, oblong-ovate to almost orbicular, sessile, broadly short-decurrent, crenate-prickly-toothed. Capitula broadly ovoid or almost globose, 17 mm long and 12 mm wide (excluding cusps), arachnoid-hairy, pedunculate. Involucral bracts somewhat flat, dorsally smooth; outer bracts about 10 mm long, squarrose, acuminate; middle bracts 17 mm long, lanceolate, slightly attenuate in middle, terminating into carinate, deltoid, erect cusp; inner bracts lanceolate, 15 mm long, membranous, mucronate. Receptacular bristles unequal, longest slightly flattened above, scabrous. Corolla yellow; anther tube pink. Achenes obovoid, 4.5–5 mm long and 2 mm wide, almost three-angled, with sharp teeth above. Flowering VI–VII; fruiting VII–VIII.

In foothills.—*Soviet Central Asia*: Tien Shan (foothills of the Kuraminskii and Chatkal ranges). Endemic. Described from Dzhambulak. Type in Leningrad.

- 210 83. *C. resinosa* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 26; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 552.—*C. decurrens* auct. non Rgl.: Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 220 p. p.: XIV, 222.—*C. decurrens* var. *congesta* auct. non Rgl.: Winkl. op. cit. (1892) 220 p. p., Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 156 p. max p.—**lc.**: Sornye Rast. SSSR, 4, Fig. 472.

Perennial. Root vertical, woody, blackish-fibrous, with globose, resinous-sticky, weakly arachnoid-hairy collar. Stem solitary, 15–60 cm high, erect, densely white-tomentose, branched in upper half or sometimes almost from base, with erect-spreading branches, forming corymbose-paniculate inflorescence. Basal leaves petiolate, oblong-lanceolate, coriaceous, grayish green above due to thin, appressed, white tomentum, densely white-tomentose beneath with strongly raised midrib and lateral veins, lobed with deltoid spinescent lobes, lobes somewhat approximate, as a result leaf margin appearing crisped; lower cauline leaves like basal

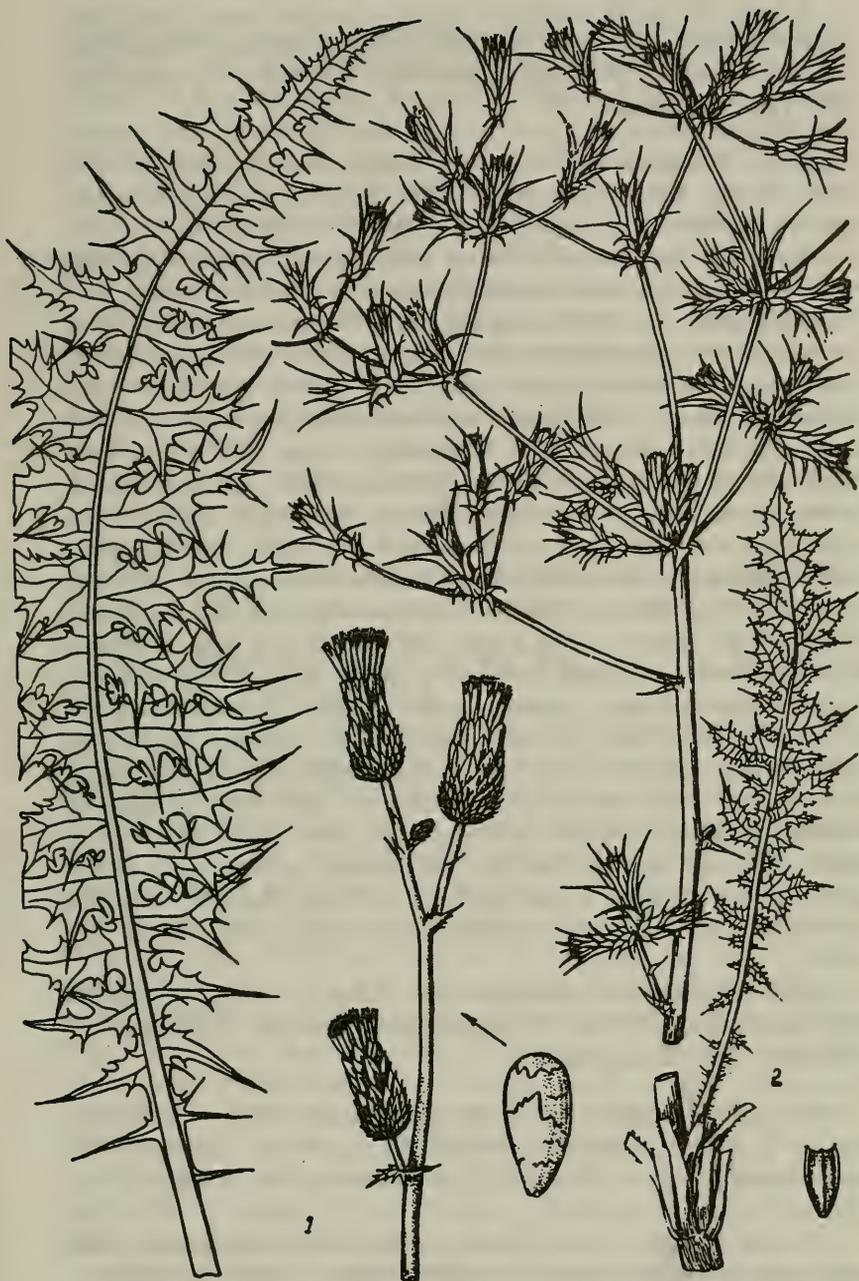
but sessile, decurrent; middle and upper leaves ovate or broad-ovate, sessile, broadly long-decurrent, large and prickly-crenate-toothed, pubescent like basal leaves. Capitula numerous, almost sessile or on very short peduncles, in groups of two or three at branch tips, ovoid, medium-sized, 18–23 mm long and 7–8 mm wide (excluding cusps), densely pubescent. Involucral bracts about 25, herbaceous, squarrose; outer bracts oblong-ovate, with short, up to 1 mm long, strong cusp; middle bracts two times as long as outer, lanceolate, with strong, up to 10 mm long cusp; inner bracts linear, membranous above, with thin and short cusp. Receptacular bristles unequal, at least some scabrous above. Corolla yellow; anther tube purple. Achenes obovoid, dorsally compressed, finely pitted, with sharp teeth above, 4.5 mm long and 2 mm wide. Flowering VII–VIII; fruiting VIII–IX. (Plate XV, Fig. 2).

Loamy slopes in foothills and lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai, Tien Shan (foothills of western Tien Shan). Endemic. Described from the vicinity of the village of Kuropatkino. Type in Leningrad.

Note. A highly polymorphic species, whose range apparently is being extended by human activity. Further study of this complex of species on extensive material is essential. Undoubtedly, numerous hybrids of these species are present in the belt of contact with *C. maracandica* Juz.

- 212 84. *C. kazachorum* Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 96.

Perennial. Root vertical, woody, with globose, arachnoid-hairy collar. Stem usually solitary, erect, 25–40 cm high, flocculose-tomentose, cymosely branched from middle with short branches bearing two or three capitula at tips, usually short peduncles. Leaves coriaceous, green, sparsely arachnoid-hairy above, white-tomentose beneath, with prominent veins; basal leaves short-petiolate, with thick and unarmed petioles, oblong-lanceolate, pinnatilobate, with somewhat approximate broadly deltoid, spinescent lobes; cauline leaves gradually reduced, lower leaves like basal but sessile; middle and upper cauline leaves oblong-ovate or broad lanceolate, sessile, broadly long-decurrent along stem, prickly-toothed; uppermost leaves strongly reduced. Capitula broadly ovoid, 8–10 mm wide (excluding cusps), densely arachnoid-hairy. Involucral bracts about 25–30; outer and middle bracts ovate or oblong-ovate, somewhat flat, from middle attenuate into slightly carinate, divergent cusp, from 7–20 mm long; inner bracts scarious, narrow-lanceolate, gradually acuminate into short and thin cusp, 17 mm long. Receptacular bristles somewhat scabrous. Corolla yellow; anther tube pink. Achenes obovoid, 5.5–6 mm long, longitudinally ribbed, almost three-angled, with sharp teeth above, rugose-pitted. Flowering VI–VII; fruiting VIII–IX.



Loamy slopes in foothills.—*Soviet Central Asia*: Tien Shan (Kirgizian Alatau, Ichkeletau, Karatau), Balkhash Region (Muyunkums). Endemic. Described from the Muyunkums, region of the Dyuksembai well. Type in Tashkent.

85. *C. horridula* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 30; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 553.—*C. decurrens* var. *scabriseta* Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 222.

Perennial. Root vertical, fibrous, with somewhat thickened collar. Stem solitary, erect, shallow-sulcate, tomentose-woolly, branched from base; branches erect-spreading, in turn, branched forming broad corymbose-paniculate inflorescence. Basal leaves petiolate, oblong-lanceolate, coriaceous, light green above, with scarcely visible pubescence, densely white-tomentose beneath, deeply crenate-lobed, with numerous narrow deltoid lobes, terminating in long, stiff spine; lower cauline leaves like basal but sessile, decurrent; middle and upper cauline leaves oblong-ovate or broad-ovate, broadly and rather long-decurrent, with large teeth and narrow deltoid teeth terminating in long spine; 213 leaves light green above, very finely arachnoid-hairy, almost glabrous, white-tomentose beneath. Capitula numerous, almost sessile, aggregated at branch tips, narrow ovoid, 6 mm wide and 20 mm long. Involucral bracts somewhat squarrose, herbaceous, except outer, weakly and very sparsely arachnoid-hairy, gradually narrowed from ovate appressed base to rather wide, dorsally carinate, smooth cusp; outermost bracts with two or three pairs of acicular spines along margin, with strong, almost three-angled cusp; middle bracts lanceolate, somewhat attenuate in middle, gradually acuminate in strong cusp; inner bracts membranous, linear, with very short and thin cusp. Receptacular bristles weakly serrate above. Corolla yellow, anther tube pink. Achenes obovoid, somewhat three-angled, toothed above, 4 mm long. Flowering VI–VII; fruiting VII–VIII.

In foothills and lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai (northern slope of the Turkestan Range). Endemic. Described from Uratyube. Type in Leningrad.

86. *C. maracandica* Juz. in Tr. Inst. Kauch. i Gutt. 4 (1932) 30; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 9, 553.—*C. decurrens* var. *subcabriseta* Winkl. ex. O. and B. Fedtsch. Perech. Rast. Turk. V (1911) 250.

Perennial. Root vertical, woody, covered with fibrous-black bark, with thickened resinous-sticky, weakly pubescent collar. Stem solitary, 25–80 mm high, erect, densely white-tomentose, branched in upper half with branches forming corymbose-paniculate inflorescence. Basal leaves petiolate, oblong-lanceolate, light green above, very finely pubescent,

white-tomentose beneath with prominent veins, irregularly large spinose-toothed or lobed, with acuminate-spinescent deltoid lobes; lower cauline leaves like basal but sessile, decurrent; middle and upper cauline leaves oblong-ovate, long-decurrent, large toothed with acuminate-spinescent teeth. Capitula numerous, on very short peduncles, densely aggregated at branch tips, narrow cylindrical, 5 mm wide and 17 mm long, pubescent. Involucral bracts about 25, herbaceous, somewhat flat, closely appressed, with erect cusp; outer bracts half as long as middle, ovate, with thin glabrous cusp; middle bracts oblong-ovate, gradually acuminate-spinescent; inner bracts linear, membranous, finely cuspidate. Receptacular bristles smooth, sometimes with only one or two pairs of serrations above. Corolla yellow; anther tube purple. Achenes cylindrical, almost three-angled, toothed above, 4 mm long. Flowering VI–VII; fruiting VII–VIII.

Outcrops of varicolored rocks in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Zeravshan Valley. Type in Leningrad.

214 *Note.* Numerous hybrids of *C. maracandica* and *C. resinosa* Juz. are known from the regions where they grow together.

87 *C. platystegia* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 103.

Perennial. Root vertical, woody, with thick collar. Stem few, erect, 20–25 cm high, arachnoid-hairy, leafy, slightly branched at apex, with short branches bearing two to five capitula at tips. Basal leaves usually petiolate, with broad bases; cauline leaves sessile, broadly long-decurrent, oblong or lanceolate, spinose-toothed, with short-acuminate teeth, finely pubescent above, white-tomentose beneath, gradually reduced upwards. Capitula cylindrical, 6 mm wide (excluding cusps), very finely arachnoid-hairy. Involucral bracts less numerous (10–15); outer and middle bracts broad lanceolate, 3–3.5 mm wide at base, somewhat boat-shaped, carinate, broadly acuminate, strongly divergent in upper half, 15–23 mm long; inner bracts linear-lanceolate, membranous, short-acuminate, 15–17 mm long. Receptacular bristles entirely smooth. Corolla yellow, not exerted from capitulum. Achenes obovoid, almost three-angled, shallow pitted-rugose, 5 mm long. Flowering VI–VII; fruiting VII.

Outcrops of varicolored rocks in lower hills.—*Soviet Central Asia*: Pamiro-Alai (Shirabad Valley). Endemic. Described from the Shirabad Valley, Boz-Rabat-Zagon. Type in Tashkent.

Note. An entirely isolated species of the section, known only from a single specimen.

Series 12. Egentes Juz.—Plants short or medium high. Capitula ovoid or cylindrical, aggregated at tips of branches; involucral bracts

somewhat flat, smooth, short and finely acuminate; receptacular bristles smooth.

88. *C. dichromata* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 14; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 553.—*C. cisdarvasica* V. Nikit. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 385.—*lc.*: Kult. op. cit. Fig. 13.

Perennial (Monocarpic). Root vertical, woody, covered with blackish-fibrous bark; collar thickened. Stem usually solitary, erect, 30–80 cm high, white-tomentose, leafy throughout, branched in upper half; branches with closely aggregated capitula at tips (10 each). Leaves coriaceous, white-tomentose beneath, green and glossy above, pubescent only along veins; basal leaves petiolate, oblong-ovate, broadly deltoid-lobed, lobes spinose-toothed, acuminate-spinose; all cauline leaves sessile, broadly
215 long-decurrent, ovate or almost orbicular, deltoid-spinose-toothed. Capitula numerous, 18–25 mm long and 4–6 mm wide, almost sessile, cylindrical, gray-tomentose, with fewer florets (four or five). Involucral bracts coriaceous, imbricate, closely appressed at base, with short, recurved stiff cusp; inner bracts membranous, linear, distinctly broadened at apex, with very thin and short cusp. Receptacular bristles smooth. Corolla whitish; anther tube purple. Achenes ovoid, indistinctly ribbed, roundish above, with two teeth, whitish, 4 mm long and 2 mm wide. Flowering VI–VII; fruiting VII–VIII. (Plate XV, Fig. 2).

Clayey and gravelly slopes, on outcrops of varicolored rocks in foothills.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from Baisuntau, between Vakhshur and Denau. Type in Tashkent.

89. *C. egens* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 304; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 553.

Perennial (Monocarpic). Roots vertical, woody, blackish-fibrous; root collar thick, up to 2 cm in diameter; stem usually solitary, erect, 30–35 cm high, finely sulcate, densely arachnoid-hairy, discontinuously winged with long-decurrent leaves, repeatedly branched in upper half; branches spreading with capitula aggregated at tips, forming rather wide, semicorymbose inflorescence. Leaves coriaceous, green and lustrous above with floccose pubescence mainly along veins, white-tomentose beneath; basal leaves petiolate, with 3–4 cm long somewhat thick petioles, white arachnoid-hairy, oblong-lanceolate, with 16–20 cm long and 5–8 cm wide lamina, narrowed toward both ends, prickly lobed, lobes deltoid, spinose-toothed; cauline leaves like basal but sessile, broadly long-decurrent on stem, gradually reduced towards apex. Capitula on short peduncles, ovoid, somewhat truncate at base, strongly narrowed at apex, with fewer florets (three to five) with 20 mm long and about 6

mm wide florets, densely arachnoid-hairy. Involucral bracts about 20, all except inner closely appressed, ovate to oblong-ovate, acuminate into short erect spine; inner bracts membranous, linear-lanceolate or linear, erect, short-acuminate, scabrous along margin. Receptacular bristles smooth. Corolla yellow; anther tube purple. Achenes obovoid, slightly flattened, 5 mm long, 2 mm wide, indistinctly ribbed, toothed above, forming very small corona. Flowering VI–VII; fruiting VII.

Clayey dry slopes in foothills.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the vicinity of the Shagaon Post. Type in Leningrad.

216 *Series 13. Congestae* Tschern.—Plants high; basal leaves with almost unarmed petioles. Capitula narrow cylindrical, numerous, aggregated in heads; involucral bracts somewhat flat, short and finely acuminate; receptacular bristles smooth; achenes without pappus.

90. *C. congesta* Bge. in *Mém. Acad. Pétersb.* 7 sér. 9, 2 (1865) 12; Boiss. *Fl. or.* III, 469; Winkl. in *Tr. Peterb. Bot. Sada*, XI, 132; XII, 221; XIV, 222; *Kult in Fl. Turkm.* VII, 203.

Perennial. Roots vertical, woody, blackish-fibrous, with globose collars, often with many stems from base or stem solitary, floccose-finely arachnoid-hairy, longitudinally-sulcate, 80–100 cm high. Leaves coriaceous, almost glabrous and green above, densely white-tomentose beneath with prominent veins; basal leaves about 40 cm long, 10 cm wide, oblong-lanceolate, crenate-lobed, lobes broadly deltoid or almost orbicular, spinose-toothed, somewhat approximate, short-petiolate, with thick unarmed petioles; lower cauline leaves like basal but smaller; other cauline leaves gradually reduced, sessile, broadly short-decurrent, oblong or almost ovate, crenate-prickly-toothed, sparsely glandular; uppermost leaves strongly reduced, reaching up to capitula, but not enclosing them. Capitula terminal on branches in groups of 15–40, sessile, 20 mm long and 4–5 mm wide, oblong-cylindrical, usually with five florets, very finely arachnoid-hairy or almost glabrous. Involucral bracts green, flat, all erect; outer bracts oblong-ovate, somewhat acuminate, scabrous along margin, closely appressed; middle bracts oblong-lanceolate, about 18 mm long, gradually and short acuminate, about 3 mm wide at base, scabrous along margin; inner bracts coriaceous, whitish, lustrous, 18–19 mm long, linear, acuminate-spinescent. Receptacular bristles white, smooth. Corolla yellow; anther tube glabrous, pink. Achenes obpyramidal, 5–6 mm long, 2–2.5 mm wide, with three or four ribs, narrowly winged along ribs, with small toothed corona above, white, without pappus. Flowering V–VI; fruiting VII.

Loamy slopes in foothills and plains at the foot of mountains, often as a ruderal weed.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag, Badkhyz, Bolshie [Great] Balkhany). *General distribution*: Iran. Described from northern Iran. Type in Leningrad.

91. *C. agelocephala* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 89.

Perennial. Root vertical, woody, blackish-fibrous, with strongly thickened, 3–6 cm wide, usually tomentose collar. Stems several, often solitary, erect, white-tomentose, 30–80 cm high, divaricately branched from middle; branches short, bearing numerous (up to 40) capitula at tips aggregated in heads. Leaves coriaceous, green and finely arachnoid-hairy above, white-tomentose beneath; basal leaves petiolate, with almost unarmed petioles, oblong-lanceolate, pinnatilobate, with unequal, acuminate-spinescent lobes; lower cauline leaves like basal, but with shorter petioles or almost sessile; middle leaves broad-lanceolate, sessile, very short-decurrent or not decurrent, semiamplexicaul, crenate-prickly toothed, upper leaves almost orbicular, sessile, semiamplexicaul, with broad roundish auricles, spinescent, crenate-prickly-toothed, reaching up to head, appearing as common involucre, slightly exceeding heads in length. Capitula narrow-cylindrical, 20–22 mm long and 5–6 mm wide, usually with 10–11 florets, sessile, finely arachnoid-hairy, usually with floral leaves modified into coriaceous, lanceolate toothed leaflets. Involucral bracts green, flat, erect; outer bracts oblong, somewhat acuminate, scabrous along margin, closely appressed; middle bracts oblong-lanceolate, 17–20 mm long, gradually and short-acuminate, scabrous along margin; inner bracts coriaceous, whitish, glossy, roundish above, with thin short cusp, 17 mm long. Receptacular bristles white, smooth. Corolla yellow; anther tube glabrous, pink. Achenes obpyramidal, 4–5 mm long, ribbed, narrow-winged along ribs, with small toothed corona, without pappus. Flowering VI; fruiting VII.

Sandy and gravelly stony slopes.—*Soviet Central Asia*: Pamiro-Alai (Buryutau Plateau). Endemic. Described from Buryutau. Type in Leningrad.

92. *C. androssovii* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 305.

Perennial (Monocarpic?). Apparently very tall plant, with thick, almost 2 cm thick, striate-sulcate, floccose-arachnoid hairy, sparsely branched stem; branches long, further branched and bearing numerous capitula aggregated in lax paniculate inflorescence. Leaves coriaceous, green above, white-tomentose beneath, with prominent veins; cauline leaves large, 20–50 cm long, 12–13 cm wide, pinnatilobate, with broadly

deltoid, short-acuminate lateral lobes, sessile, broadly short-decurrent; upper cauline leaves reduced. Capitula ovoid, in groups of five to seven at tips of secondary branches, pedunculate, glabrous, 7–8 mm wide, slightly attenuate at base or roundish; involucre bracts ovate to oblong-ovate, closely appressed with each other, with only slightly divergent short cusp; all bracts flat, green, scabrous along margin, sparsely glandular dorsally; inner bracts membranous, white above with short cusp. Receptacular bristles smooth, white. Corolla yellow, anther tube purple. Achenes obovoid, ribbed, narrowly winged along ribs. Flowering VI.

On the slopes of hills.—*Soviet Central Asia*: mountainous Turkmenia (Badkhyz). Endemic. Described from the vicinity of Kushka. Type in Leningrad.

218 *Note.* A very unique species, known only from a single location.

Section 18. Abolinia Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 81.—Capitula aggregated at branch tips; involucre bracts gradually acuminate into stiff, falcate or thin, erect cusp, and then inner bracts with membranous appendages; receptacular bristles smooth; corolla whitish or pale yellow; achenes obovoid, smooth, roundish above. Perennial plants with large pinnatisect or pinnatipartite basal leaves.

Type of section: *C. abolinii* Kult.

93. *C. abolinii* Kult. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 88.

Perennial. Roots vertical, woody, with thickened woody collar. Stem erect, apparently tall, striate-sulcate, white arachnoid-hairy, up to 15 mm thick at base, branched almost from base. Capitula terminal on stem and branches aggregated into compact racemose inflorescence. Leaves finely arachnoid-hairy above, white-tomentose beneath with prominent veins; basal leaves long-petiolate, with thick and weakly sulcate 12–15 cm long petioles, oblong, about 30 cm long and 12 cm wide (including spines), pinnatisect into oblong, prickly-lobed lateral segments; lower leaves like basal; middle leaves gradually reduced, sessile; upper leaves strongly reduced. Capitula ovoid, sessile, with slightly narrowed base, 12–15 mm wide and 25 mm long (excluding projecting corollas), with many florets, glabrous. Involucre bracts numerous, all except inner coriaceous; outer bracts narrow-lanceolate, closely appressed at base, gradually attenuate toward apex into thin, almost falcate cusp, scabrous along margin; middle bracts cuspidate, somewhat erect-spreading, scabrous along margin; inner bracts in many rows, membranous, broad-lanceolate, acuminate in fine cusp. Receptacular bristles short, white, smooth. Corolla whitish or pale yellow,

exserted. Achenes large, obovoid, roundish above, 7 mm long. Flowering VI.

Stony slopes.—*Soviet Central Asia*: Tien Shan (Naryn Basin). Endemic. Described from the Nizhnii Naryn Basin, from Garpsai. Type in Tashkent.

94. *C. egregia* Juz. in Bot. Mat. Gerb. Glavn. Bot. Sada, V (1924) 110.

Perennial. Root vertical, woody, stem erect, 1–1.20 m high, striate-sulcate, floccose-tomentose, up to 15 mm thick at base, weakly branched; branches weakly divergent from main stem, each with two or three capitula forming narrow paniculate inflorescence in upper half of stem.

219 Basal leaves long-petiolate, with triquetrous, floccose-tomentose, 10–15 cm long petioles, oblong-lanceolate, 27 cm long and 11 cm wide (including spines), coriaceous, with sharply prominent midrib, pinnatipartite, sometimes even pinnatisect on lower side into oblong, prickly-toothed lateral lobes, white-tomentose beneath, finely arachnoid-hairy above; lower and middle cauline leaves like basal, but slightly shorter, middle leaves also sessile and gradually reduced upward; upper leaves sparse, oblong, sessile, prickly-lobed. Capitula 15–25, ovoid, somewhat foveate at base, 13–17 mm wide (excluding cusps) and 30 mm long, with many florets, on rather long peduncles, sometimes almost sessile, glabrous. Involucral bracts numerous, except inner coriaceous, oblong-lanceolate, gradually acuminate; all bracts erect, imbricate, closely appressed to each other, acuminate into short, thin, and weakly squarrose cusp, glabrous, glossy, scabrous along margin; inner bracts membranous, exceeding middle and appearing to form collar, lanceolate, almost roundish above, with very thin and short cusp. Receptacular bristles short, smooth. Corolla white, exserted from involucre. Achenes obovoid, dorsally compressed, roundish above, dark brown, 8–9 mm long. Flowering VI; fruiting VII. (Plate XIV, Fig. 1).

Stony slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan (Angren River Valley). Endemic. Described from Nurek-Ata in the Chirchik River Basin. Type in Leningrad.

95. *C. dolichophylla* Kult. in Tr. Turk. Nauchn. Obshch. 1 (1923) 112.—*lc.*: Kult. *Ibid.*, tab. (2).

Perennial. Root vertical, woody, many-headed. Stem erect, 60–90 cm tall, indistinctly striate-sulcate, arachnoid-hairy, almost tomentose above, sparsely branched; branches erect-spreading, slender, with several terminal capitula forming lax inflorescence. Basal leaves long-petiolate, with triquetrous, floccose-tomentose, up to 10 cm long, petioles, oblong-lanceolate, usually 25–30 cm long and 5–8 cm wide, coriaceous, very

indistinctly arachnoid-hairy above, green, white-tomentose beneath, pinnatipartite, almost pinnatisect in lower half into lanceolate, prickly-toothed, sometimes prickly-lobed, lateral lobes short acuminate in thin spine; lower cauline leaves like basal, but slightly shorter; middle leaves like lower, but sessile gradually reduced towards stem apex; uppermost leaves sparse, sessile, prickly-lobed, small. Capitula numerous, narrow ovoid, sometimes with somewhat foveate base, 10–12 mm wide (excluding cusps) and 25 mm long, with many florets, on short peduncles, sometimes sessile, arachnoid-hairy. Involucral bracts numerous, all except inner coriaceous, narrow lanceolate, slightly carinate, short-acuminate, 220 all bracts erect; middle bracts narrowly scarious-fimbriate, scabrous along margin; inner bracts with membranous, finely toothed, lobed, spatulate, their appendages usually divided in two halves in middle and slightly recurved, forming small collar. Receptacular bristles smooth. Corolla exerted from involucre, whitish (?). Achenes obpyramidal, compressed, roundish above, 6–7 mm long and 3 mm wide. Flowering VII–VIII; fruiting VIII–IX.

Slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from Korzhantau, vicinity of Khumsan. Type in Tashkent.

Section 19. Eriocousinia Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 82.—*Odontocarpae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 253 p. p.; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 562.—*Heteracanthae* auct. non Winkl.: Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 551 p. p.—Capitula solitary terminal on stem or branches; involucral bracts gradually acuminate in stiff subulate cusp, or somewhat flat with membranous appendages, irregularly toothed or coriaceous ciliate-toothed; receptacular bristles smooth or scabrous. Corolla pink or purple. Achenes obovoid, glabrous, smooth, roundish above, or with scarcely visible filiform longitudinal ribs and in that case with scarcely visible teeth. Perennial herbs with many-headed woody root and coriaceous, pinnatisect or pinnatipartite basal leaves.

Type of section: *C. pannosa* Winkl.

Series 1. Pannosae Juz.—Involucral bracts lanceolate, acuminate into stiff cusp, without appendages; receptacular bristles scabrous. Cauline leaves short-decurrent.

96. *C. pannosa* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 578; XII, 257; XIV, 229; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 562.—*C. franchetii* auct. non Winkl.: Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 184 p. p.—*C. resupinata* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 318; Juz. op. cit. 562.—*C. pannosa* var. *microcephala*

Winkl. op. cit. (1897) 229.—*C. franchetii* β . *drepanophora* Bornm. op. cit. (1916) 184.

Perennial. Root woody, many-headed; caudices with less numerous remains of previous year's leaves at base. Stem numerous, white-tomentose, one-headed, leafy, erect, 25–60 cm high. Leaves oblong, white or gray-tomentose on both sides, sometimes with thinner tomentum above; basal leaves petiolate, irregularly pinnatifid in deltoid, usually approximate, acuminate-spinescent lateral lobes, with two lanceolate acuminate-spinescent lobes at base, lobes 15–18 mm long in middle part of leaf and 10–15 mm wide near base (broadest place); cauline leaves gradually reduced, like basal, but sessile, short-decurrent, auriculate. Capitula almost globose, 15–20 mm wide (excluding cusps), very densely rusty- or white-tomentose. Involucral bracts about 70–80; outer bracts horizontal or decurved, 15–25 mm long, lanceolate; acuminate in stiff spine; middle bracts (15)20 mm long, erect or divergent, acuminate; inner bracts membranous, 18–20 mm long, narrow-linear, with very thin and short apical spine. Corolla purple. Receptacular bristles scabrous. Achenes obovoid, about 6 mm long and 3 mm wide, indistinctly longitudinally ribbed. Flowering VIII–IX; fruiting IX.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Gissar Range, Peter the First Range, Darvaz, Shugnan, southern slopes of the Alai Range, western part of the Trans-Alai Range). Endemic. Described from Sagyrdasht Ravine. Type in Leningrad.

Note. The plant from the Alai Range has smaller capitula and is more sparsely pubescent; it is necessary to study additional material.

97. *C. franchetii* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 578; XII, 257; XIV, 208; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 184 p. p.; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 562.—*C. canescens* auct. non DC.; Franch. in Ann. Sc. Nat. Bot. 6 sér. 16 (1883) 323.—*C. pannosa* var. *subviridis* Winkl. op. cit. (1897) 229.—*Arctium franchetianum* O. Ktze. Rev. Gen. 1 (1891) 307.

Perennial. Root woody, many-headed; caudices with remains of previous year's leaves at base. Stems numerous, white-tomentose, one-headed, leafy, erect, 15–30 cm high. Leaves oblong, grayish-green above due to appressed-arachnoid-hairy pubescence, gray-tomentose beneath; basal leaves short-petiolate, irregularly pinnatifid into narrow-lanceolate, often sparse attenuate-spinescent lateral lobes, usually with two lateral spines at base, about 4–5 mm wide at base (broadest place) and about 15 mm long (in middle part of leaf); cauline leaves gradually reduced towards apex, like basal but sessile, short-decurrent. Capitula cylindrical, 15–18 mm wide (excluding cusps), sparsely rusty-arachnoid-hairy. Involucral bracts 50–60, erect, sometimes outermost bracts

horizontal; outer and middle bracts lanceolate, about 15 mm long, acuminate-spinescent; inner bracts membranous, linear, with thin apical spine, usually dark colored on dorsal surface, 16–17 mm long. Corolla purple. Receptacular bristles scabrous. Achenes obovoid, about 6 mm long, 3 mm wide, indistinctly longitudinally ribbed. Flowering VI–VII; fruiting VII–VIII.

Stony-gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan Range, northern slopes of the Gissar Range). Endemic. Described from the Zeravshan Valley “Kirschlak” (Capus). Type in Paris.

- 222 *Note*. A species with a rather narrow range extending from Lake Iskander-Kul to the upper reaches of the Yagnob and seemingly penetrating the range of the closely related species *C. pannosa* Winkl., with which it apparently forms hybrids especially in the western part of the range. This species differs from *C. pannosa* mainly by the much more sparsely pubescent capitula, erect involucrel bracts, and lateral lobes of the leaves that approach narrowly lanceolate. However, this species varies slightly in its own characters within the limits of its range.

98. *C. pannosiformis* Tschern. in Bot. Mat. Gêrb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 101.

Perennial. Root woody, many-headed; caudices with numerous remains of previous year's leaves. Stems erect, erect-spreading upward, one-headed, white arachnoid-hairy, 15–40 cm high, sparsely leafy. Leaves gray-arachnoid-hairy on both sides, more densely beneath; basal leaves petiolate, irregularly pinnatifid in deltoid, acuminate-spinescent lateral lobes with two small spines at base; cauline leaves like basal but sessile, short-decurrent, gradually reduced towards stem apex. Capitula ovoid, 10–15 mm wide (excluding cusps), white arachnoid-hairy. Involucrel bracts about 60–70; outer and middle bracts broad-lanceolate, flat, short-acuminate, divergent, 10–12 mm long; inner bracts membranous, linear, very short acuminate, 15–18 mm long, erect. Corolla pink. Receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, about 7 mm long. Flowering VII–VIII; fruiting VIII.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (the Alai and Turkestan ranges). Endemic. Described from the Shauvali Pass. Type in Tashkent.

Series 2. Auriculatae Juz.—Involucrel bracts lanceolate, short acuminate-spinescent, without appendages; receptacular bristles scabrous. Cauline leaves broadly long-decurrent.

99. *C. semidecurrens* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 574; XII, 259; XIV, 209; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8,

562.—*C. pamirica* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 182.—*C. chionophila* Rech. f. and Koie in Dan. Biol. Skr. 8, 2 (1955) 84.—*C. auriculata* auct. non Boiss.: O. and B. Fedtsch. Perech. Rast. Turkm. IV (1911) 259.—**lc.**: Rech. f. and Koie, op. cit. 85, fig. 62.

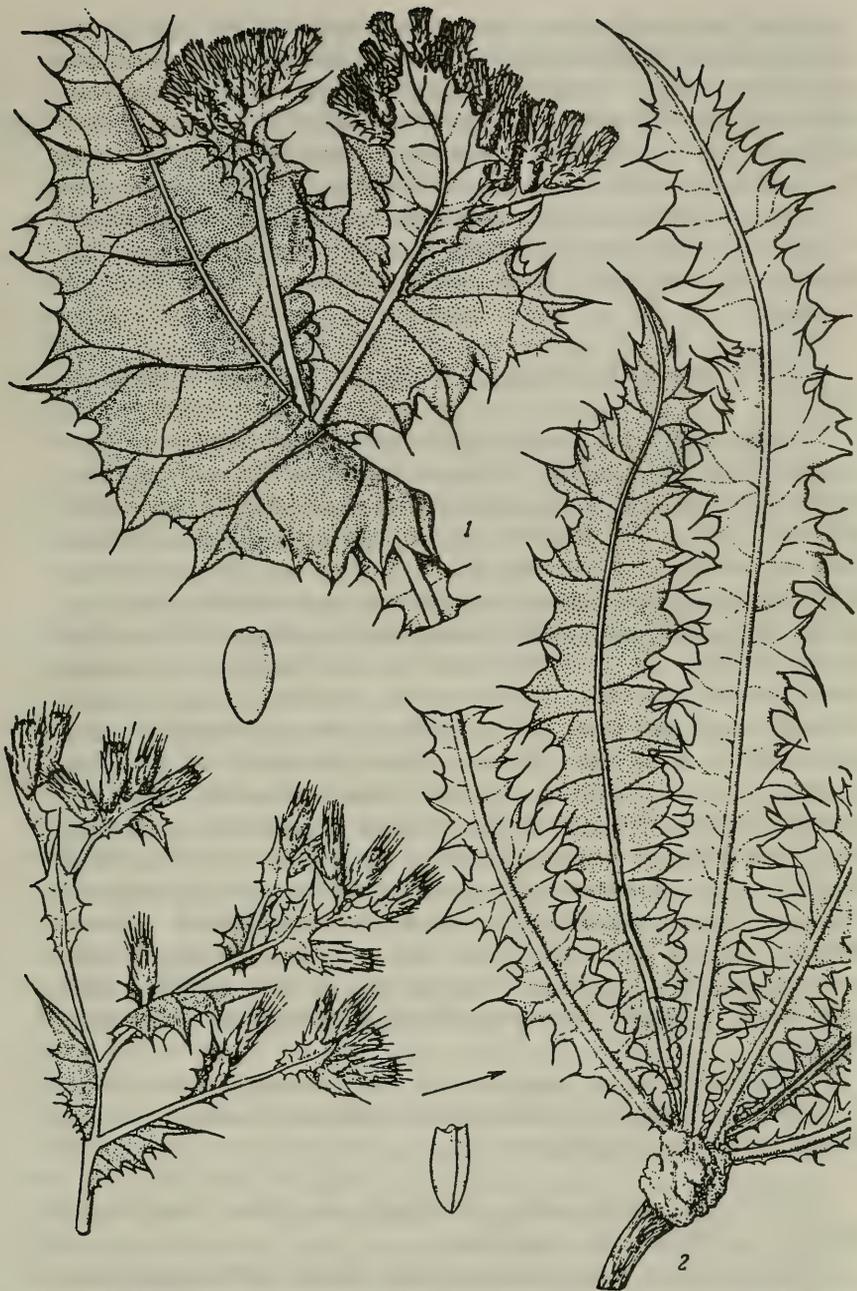
Perennial. Root woody, many-headed; caudices elongate, with less numerous membranous remains of previous year's leaves. Stems numerous, erect, branched in upper half, densely leafy, branches one-headed. Leaves grayish on both sides due to thin, closely appressed tomentum; basal leaves oblong, pinnatipartite in deltoid lateral lobes, usually with two acuminate-spinescent lateral lobes at base, acuminate-spinescent, with thick petioles; cauline leaves like basal but sessile, broadly long-decurrent on stem, gradually reduced toward stem apex; uppermost leaves almost pinnatilobate, with acuminate-spinescent lobes or even spinose-toothed. Capitula cylindrical, about 20 mm wide (excluding cusps), white-tomentose. Involucral bracts 50–60; outer and middle bracts coriaceous, erect-spreading, or outer bracts almost horizontal, 15–20 mm long, lanceolate, gradually attenuate toward apex, short acuminate-spinescent, carinate dorsally; inner bracts membranous, narrow-lanceolate or almost linear, scabrous dorsally and along margin, about 20 mm long. Corolla pink. Receptacular bristles scabrous. Achenes obovoid, almost smooth, about 5 mm long, with scarcely noticeable small teeth above. Flowering VII–VIII; fruiting VIII.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Shugnan, Pamir). *General distribution*: Afghanistan. Described from the region of the Karasu River (Kushakevich). Type in Leningrad.

Series 3. Pterolepideae Juz.—Involucral bracts somewhat flat, with membranous or coriaceous appendages; receptacular bristles smooth. Cauline leaves sessile.

100. **C. fedtschenkoana** Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 199; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 562.

Perennial. Root thick, woody. Stem erect-spreading, 40–60 cm high, with less numerous remains of previous year's leaves at base, longitudinally sulcate, arachnoid-hairy, usually simple, one-headed, less often sparsely branched in upper part; branches short, one-headed. Leaves green and finely arachnoid-hairy above, white-tomentose beneath, oblong; basal and lower cauline leaves about 17–25 cm long and 3.5 cm wide, petiolate, pinnatipartite into deltoid, approximate lateral lobes, with one or two pairs of acuminate-spinescent lateral lobes at base acuminate into long stiff spine; other leaves like basal but sessile, semiamplexicaul, gradually reduced toward stem apex. Capitula broadly ovoid, 22–28 mm wide (excluding cusps), glabrous. Involucral bracts numerous, about 100,



imbricate, broadened above in coriaceous (membranous in inner bracts) ciliate-toothed (irregularly incised in inner bracts), broad lanceolate appendages, usually acuminate-spinescent in short and stiff spine, erect or (in outer bracts) horizontal, 5–7 mm wide and 12–15 mm long. Corolla light pink. Receptacular bristles smooth. Achenes obovoid, about 6 mm long and 4 mm wide, smooth above. Flowering VII–VIII; fruiting VIII.

225 Gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Gissar Range). Endemic. Described from the Kafaraga Pass, between the villages of Zimarl and Anzob (Yagnob River). Type in Leningrad.

101. *C. korshinskyi* Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 236.

Perennial. Root thick, woody. Stems with remains of previous year's leaves at base, thick, up to 10 mm at base, 100–120 cm high, erect, striate-sulcate, floccose-arachnoid hairy, glabrescent, sparsely corymbosely branched in upper half; branches long, erect, almost leafless, one-headed. Leaves green and glabrous above, white-tomentose beneath, broad-oblong; basal and lower cauline leaves long-petiolate, about 40–60 cm long and 6 cm wide, pinnatipartite into broad lanceolate, about 3–3.5 cm long lateral segments, in turn pinnatilobate into short acuminate-spinescent lobes; cauline leaves like basal but sessile, semiamplexicaul, gradually reduced toward stem apex, sparse; uppermost leaves pinnatilobate, with acuminate-spinescent lobes. Capitula almost globose, 16–28 mm wide (excluding cusps), glabrous; involucre bracts about 80, imbricate, broadened above in broad-lanceolate, divergent (horizontal in outer bracts) acuminate-spinescent appendages, about 7 mm wide and 15–17 mm long; inner bracts with membranous, unequal, brownish appendages, with very short spine at apex. Corolla pink. Receptacular bristles smooth. Achenes obovoid, 7–8 mm long and 4–5 mm wide, glabrous, with two or three scarcely noticeable longitudinal ribs, and two or three indistinct small teeth above, or smooth. Flowering VII–VIII; fruiting VIII. (Plate XVI, Fig. 2).

Clayey slopes in the upper part of middle mountain zone.—*Soviet Central Asia*: Tien Shan (Fergana Range). Endemic. Described from the Kugart Pass. Type in Leningrad.

102. *C. pterolepida* Kult. in Tr. Tadzh. Bazy Akad. Nauk SSSR, VIIIc, VI (1929) 27.—*lc.*: Kult. *Ibid.*

Perennial. Root woody, many-headed; caudices with less numerous scaly remains of petioles or previous year's leaves. Stems several, 35–45 cm high, erect, arachnoid hairy-tomentose, simple, one-headed, less often sparsely branched; branches erect, one-headed. Leaves coriaceous,

226 grayish-green, finely arachnoid-hairy above, white-tomentose beneath; basal and lower cauline leaves about 14–25 cm long and 4–5 cm wide, petiolate, pinnatipartite in deltoid prickly-lobed lateral lobes; other leaves like basal but sessile, broadly short-decurrent, gradually reduced toward stem apex; uppermost leaves more or less prickly-lobed, with toothed acuminate-spinescent lobes. Capitula cylindrical, about 20 mm wide (excluding cusps), glabrous. Involucral bracts numerous, closely imbricate; outermost bracts dorsally white arachnoid-hairy, about 15 mm long, horizontal, lanceolate, acuminate-spinescent, ciliate-toothed; other bracts broad-lanceolate, broadened in upper half in membranous, usually transparent appendage brownish in inner bracts, irregularly toothed, acuminate into somewhat short stiff spine, and erect appendage. Corolla pink. Receptacular bristles smooth. Achenes obovoid, glabrous, smooth, about 8 mm long and 4 mm wide. Flowering VIII; fruiting VIII–IX.

Clayey slopes in subalpine mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from the Ugam Range, Kurum-Dzhul Pass. Type in Tashkent.

Series 4. Macilentae Tschern.—Involucral bracts lanceolate, scabrous dorsally, without appendages; receptacular bristles smooth. Cauline leaves sessile.

103. *C. macilenta* Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 222; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 551.

Perennial. Root woody, many-headed; caudices densely covered with remains of previous year's leaves. Stems few, erect, arachnoid hairy-tomentose, 30–60 cm high, usually with very short branches in upper half, sometimes branches reduced to 6 mm, always one-headed. Leaves coriaceous, grayish-green above due to arachnoid-hairy pubescence, appressed gray-tomentose beneath; basal and lower cauline leaves petiolate, 2–3 cm wide, 15–20 cm long, irregularly pinnatipartite into narrow deltoid, prickly-lobed lateral lobes, gradually attenuate into long spine; cauline leaves like basal but sessile, semiamplexicaul, gradually reduced upward; uppermost leaves almost spinose-pinnatilobate. Capitula ovoid, 13–15 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts about 60, all lanceolate, dorsally scabrous, often dark colored; outer bracts divergent, 8–10 mm long; weakly carinate, attenuate into short cusp; middle bracts with weakly divergent cusp, 10–16 mm long, short-acuminate; inner bracts erect, 18 mm long, short-acuminate into thin spine. Corolla pink. Receptacular bristles smooth. Achenes obovoid, glabrous, smooth, about 8 mm long and 4 mm wide. Flowering VII–VIII; fruiting VIII.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*:

Pamiro-Alai (Gissar Range). Endemic. Described from the vicinity of the village of Zarchob. Type in Leningrad.

227 *Section 20. Homalochaete* Juz.—in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 522, 550.—*Homalochaetae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 200 p. p.—Capitula solitary terminal on branches, arachnoid-hairy or tomentose; involucre bracts gradually long acuminate into almost horizontal attenuate cusp or short-acuminate; corolla pink; receptacular bristles smooth; achenes glabrous, smooth or weakly angular, obovoid. Perennial herbs with leaves grayish-green on both sides.

Lectotype of section: *C. corymbosa* Winkl.

104. *C. leptacma* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1959) 35.

Perennial. Stem erect, arachnoid-hairy, smooth, 25–30 cm high, branched above; branches one-headed, short, forming dense, sometimes corymbose inflorescence. Leaves coriaceous, densely white-tomentose on both sides; basal leaves petiolate (petioles one-third as long as lamina, with or without small remote lobes), oblong-elliptical, flat, finely lobed, lobes broadly deltoid, gradually attenuate in short, rather weak spine; cauline leaves reduced upward; lower cauline leaves like basal but sessile, auriculate; middle and upper leaves oblong-ovate, otherwise like basal leaves. Capitula cylindrical-oblong, 12–15 mm wide (excluding cusps), arachnoid-hairy. Involucre bracts numerous, deltoid, acicular, carinate; outer bracts decurved, 5–7 mm long; middle bracts arcuate, up to 15 mm long; subsequent bracts erect, straight, flat, 12–15 mm long; inner bracts almost membranous, linear, 20 mm long, small toothed, very long and narrowly acuminate. Receptacular bristles smooth. Achenes oblong-obovoid, gray, spotted. Flowering VII–VIII; fruiting VIII.

Limestone deposits in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Samarkand Mountains). Endemic. Described from the vicinity of the village of Sarykul. Type in Tashkent.

105. *C. litvinovii* Kult. ex Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 522, 550; Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15, 36.—*C. amoena* auct. non Winkl.: Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 150.—*Exs.*: GRF No. 1422.

Perennial. Stem 25–50 cm high, erect, striate-sulcate, appressed, branched from middle, branches short, one-headed. Leaves coriaceous, white-tomentose on both sides, with prominent veins, terminating in stiff spines; basal leaves petiolate, lanceolate or oblanceolate, lobed, lobes large, deltoid, spinescent, approximate, as a result margin appearing crisped; lower cauline leaves like basal but sessile, crenate-toothed below,

lobed above; middle leaves oblong-ovate, with acuminate-spinescent lobes; upper leaves ovate, smaller than middle, uppermost leaves oblong. 228 Capitula ovoid, 18–20 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts relatively short, divergent, with strong spine at apex; outer bracts 5–7 mm long, decurved; middle bracts up to 15 mm long, divergent, carinate, acuminate into three-angled spine; subsequent bracts smaller than middle, 10–12 mm long, more flat, with small spine at apex; inner bracts coriaceous, up to 20 mm long, with small teeth, with very short spine. Receptacular bristles smooth. Corolla pink. Achenes oblong-obovoid, dark. Flowering VII–VIII; fruiting VIII–IX.

In middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (western spurs of the Zeravshan Range). Endemic. Described from Aman-Kutan. Type in Leningrad.

106. **C. amoena** Winkl. in Tr. Peterb. Bot. Sada, XIII (1894) 237; XIV, 220; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 550; Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15, 36.

Perennial. Stem 25–60 cm high, erect, appressed-arachnoid-hairy, striate-sulcate, usually branched from middle, branches short, one-headed. Leaves coriaceous, white-tomentose on both sides, but tomentum thinner above, with prominent veins, terminating in stiff spines, large toothed basal leaves short-petiolate, oblanceolate, lobed, lobes sharply incised; lower cauline leaves like basal but sessile, semiamplexicaul; middle leaves smaller than lower, oblong-ovate, sessile, semiamplexicaul, large-toothed; upper leaves ovate, sessile, semiamplexicaul, acuminate-spinescent; uppermost leaves reduced. Capitula ovoid-globose, 18–25 mm wide (excluding cusps), weakly arachnoid-hairy. Involucral bracts squarrose, stiff, carinate, terminating in a three-angled spine; outer bracts up to 10 mm long, somewhat decurved; middle bracts up to 20 mm long, squarrose, three-angled acuminate; subsequent bracts somewhat flat, up to 20 mm long, up to 3 mm wide at base, short spinescent; inner bracts coriaceous, linear, up to 2 mm wide and 25 mm long, with small teeth terminating in very small spine. Receptacular bristles smooth. Corolla pink. Achenes obovoid, light gray. Flowering VI–VII; fruiting VII–VIII.

Stony screes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan Range). Endemic. Described from the Sangydzhuman Pass. Type in Leningrad.

107. **C. campyloraphis** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1950) 37.

Perennial. Stem erect, striate-sulcate, arachnoid-hairy-tomentose, 30–50 cm high, branched from middle; branches more or less short, one-

headed, forming lax, corymbose-inflorescence. Leaves coriaceous, grayish-tomentose on both sides, more sparsely above; basal leaves petiolate (petiole half as long as lamina, with or without small, remote, prickly lobes), oblong-elliptical, crisped and almost lobed-prickly-toothed, lobes deltoid, sharply incised, approximate; cauline leaves reduced upward; lower leaves like basal but with smaller petioles; middle leaves sessile, auriculate, with up to 1 cm long spines; upper and uppermost leaves reduced. Capitula broadly ovoid or globose, 15–17(20) mm wide (excluding cusps), arachnoid-hairy. Involucral bracts numerous, rather weak, dorsally carinate; outer bracts divergent, up to 10 mm long; middle bracts falcate, up to 25 mm long, subsequent bracts almost erect, more or less flat, up to 23 mm long; inner bracts almost membranous, linear, 25(30) mm long, finely toothed, acuminate, very sharp. Receptacular bristles smooth. Corolla pink. Achenes oblong-obovoid, gray, smooth, 6 mm long and 2.5 mm wide. Flowering VII–VIII; fruiting VIII.

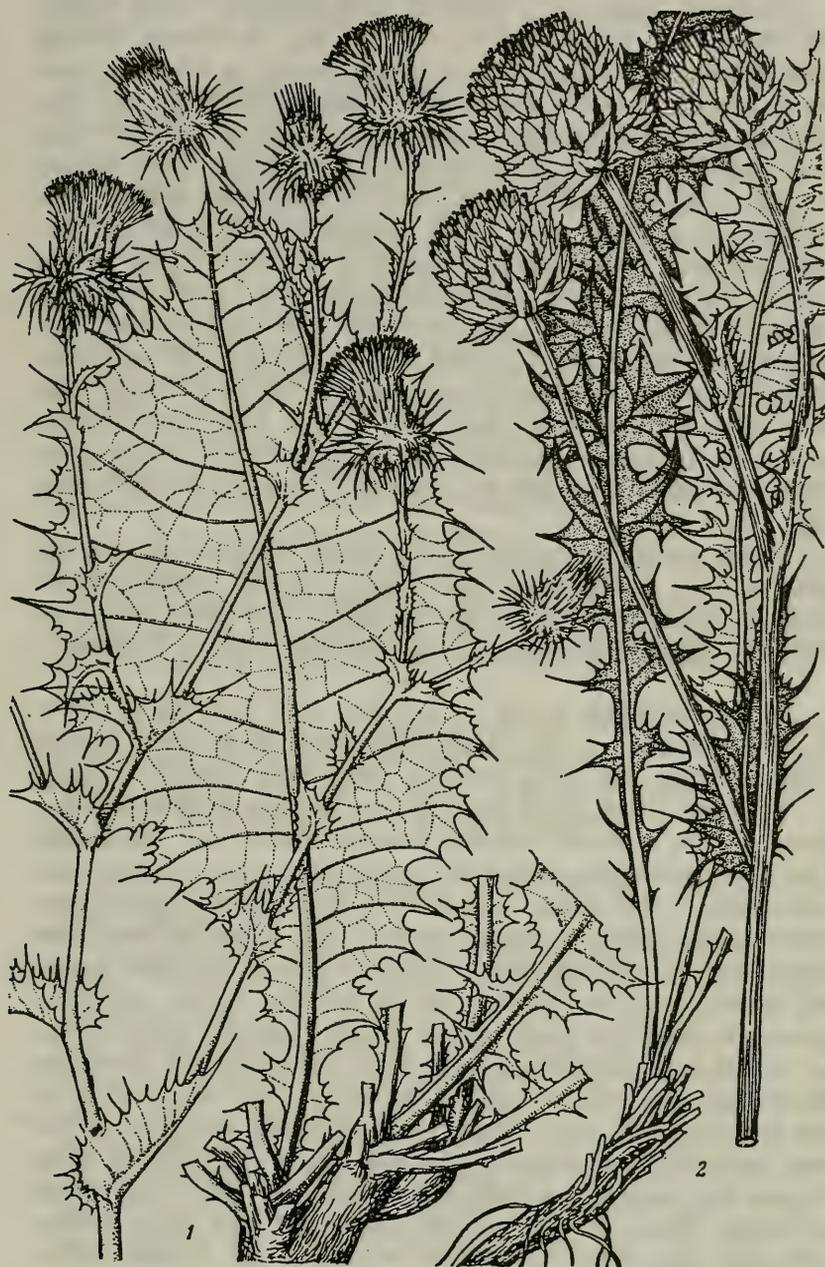
Middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the mountains south of Yakkabag. Type in Tashkent.

108. **C. proxima** Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 301; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 550; Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15, 38.

Perennial. Stem 30–80 cm high, erect, floccose-arachnoid hairy, striate-sulcate, branched from base; branches long, one-headed. Leaves coriaceous, finely arachnoid-hairy, grayish-green above, finely gray-tomentose beneath, with prominent veins, large-prickly dentate or lobed; basal leaves petiolate, oblong-lanceolate or lanceolate, large-toothed or lobed (only one-third lamina incised), lobes spinescent, remote; lower cauline leaves like basal, petiolate or sessile; middle leaves oblong-ovate, sessile, auriculate; upper leaves smaller than middle; uppermost leaves reduced. Capitula globose. 12–20 mm wide (excluding cusps), densely arachnoid-hairy. Involucral bracts comparatively small, finely short-spinescent, somewhat flat; outer bracts 3–6 mm long, decurved; middle bracts up to 10 mm long, divergent, weakly carinate dorsally; subsequent bracts somewhat flat, finely spinescent, not longer than middle bracts; inner bracts membranous, linear-lanceolate, up to 2 mm wide, acuminate, somewhat finely serrate. Receptacular bristles smooth. Corolla light pink. Achenes obovoid, gray. Flowering VI–VII; fruiting VII–VIII.

Middle mountain zone on rocks and stony-gravelly mountain slopes.—*Soviet Central Asia*: Pamiro-Alai (Gissar Range). Endemic. Described from rocks along the bank of the Sanga-Osiya River. Type in Leningrad.

230 109. **C. subcandicans** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1959) 41.



Perennial. Stems erect, arachnoid hairy-tomentose, striate-sulcate, 40–100 cm high, branched above; branches long, one-headed, forming lax inflorescence. Leaves coriaceous, gray-tomentose on both sides; basal leaves very short-petiolate, oblanceolate or oblong-oblanceolate, less often elliptical, weakly crisped-lobed, lobes deltoid, attenuate into short cusp, prickly-lobed; lowermost leaves reduced, distant; cauline leaves reduced upward; lower leaves like basal but sessile, auriculate; middle leaves oblong-ovate or ovate; upper leaves broad-ovate, with longer (up to 1 cm) more stiff spines; leaves on branches strongly reduced, closely placed. Capitula broadly ovoid, arachnoid-hairy, 12–15 mm wide (excluding cusps). Involucral bracts numerous, three-angled-subulate, stiff; outer bracts weak, decurved, 5–7 mm long; middle bracts stiff, horizontal, up to 15 mm long; subsequent bracts somewhat flat, erect, shorter; inner bracts almost membranous, linear, 20–22 mm long, finely serrate, acuminate, very sharp. Receptacular bristles smooth. Corolla pink; achenes oblong-obovoid, dark gray, spotted. Flowering VII–VIII; fruiting VIII.

Rocks, screes, and clayey slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (upper reaches of the Tankhas River). Endemic. Described from the Kashka-Darya River Basin, above the village of Chopukh, along the road to Tamshush. Type in Tashkent.

110. *C. candicans* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 300; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 550; Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15, 42.

Perennial. Stems 25–70 cm high, erect, appressed-arachnoid-hairy, almost smooth, branched from base, branches slender, long, one-headed. Leaves coriaceous, gray-tomentose on both sides, with prominent veins terminating in stiff spines, large-toothed; basal leaves short-petiolate, almost sessile, oblong or oblong-lanceolate, large-toothed or lobed, lobes sharply incised, with stiff spine; lower cauline leaves like basal; middle and upper leaves broad-ovate or almost orbicular, sessile, auriculate, spinescent; uppermost leaves closely placed, reduced. Capitula ovoid, 17–20 mm wide (excluding cusps), densely arachnoid-hairy. Involucral bracts squarrose, stiff, three-angled, spinescent; outer bracts up to 10 mm long, decurved; middle bracts somewhat falcate, divergent, 25 mm long, with stiff 3-angled spine; subsequent bracts somewhat flat, up to 15 mm long, gradually acuminate into short stiff spine; inner bracts coriaceous, linear, up to 2 mm wide and 25 mm long, finely toothed, with very short spine. Receptacular bristles smooth. Corolla purple; achenes oblong-obovoid, spotted, almost three-angled. Flowering VI–VII; fruiting VII–VIII.

Limestone slopes in middle mountain zone.—*Soviet Central Asia*:

Pamiro-Alai (Babatag Range). Endemic. Described from the central part of Babatag, from Bish-Archa Peak. Type in Leningrad.

111. **C. podophylla** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1959) 43.

Perennial. Stem erect, arachnoid hairy-tomentose, striate-sulcate, 30–40 cm high, branched in upper part, branches long, one-headed, very densely and leafy, forming lax inflorescence. Leaves coriaceous, gray-tomentose on both sides; basal leaves long-petiolate (petioles two-thirds, less often half, as long as lamina, with less numerous small prickly lobes), obovate or broad-elliptical, crisped to large-toothed, teeth broadly deltoid, abruptly attenuate in rather short spine and with lateral spines; cauline leaves reduced toward stem apex; lower leaves like basal but more short-petiolate or almost sessile; middle and upper leaves oblong-ovate or ovate, short-decurrent. Capitula ovoid, arachnoid-hairy, 12–17 mm wide (excluding cusps). Involucral bracts numerous; outer bracts decurved or almost horizontal, 5 mm long, middle bracts stiff, horizontal or more or less horizontal, carinate, about 15 mm long; subsequent bracts erect, smaller; inner bracts almost membranous, linear, 18–20 mm long, very finely serrate, attenuate, acute. Corolla purple. Receptacular bristles smooth. Achenes oblong-obovoid, almost three-angled, gray with dark spots, 6 mm long and 2 mm wide. Flowering VII; fruiting VIII. (Plate XVI, Fig. 1).

Gypsic and limestone slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Babatag, Gazimailik, Aktau and Gardani-Uшти). Endemic. Described from the Babatag Mountains (vicinity of the village of Dzhidda-Bulak. Type in Tashkent.

112. **C. leptocladoides** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1959) 45.

Perennial. Stem erect, slender, arachnoid hairy-tomentose, striate-sulcate, 25–50 cm high, branched from base; branches slender, long, one-headed, forming lax inflorescence. Leaves coriaceous on both sides, gray arachnoid hairy-tomentose, more sparsely and finely above; basal leaves short-petiolate (petioles one-sixth as long as lamina, with very narrow lobes, almost reduced to spines), crisped, oblong-oblongate, pinnatifid, with lateral deltoid lobes from broadly deltoid prickly-deltoid lobed base, attenuate into long and stiff spine; cauline leaves reduced above; lower cauline leaves sessile or subsessile, otherwise like basal; middle leaves elliptical-oblong, sessile, auriculate, with smaller spines; upper leaves ovate, sessile, auriculate, deltoid-lobed, lobes terminating into spine, terminal lobe stiff; leaves on branches strongly reduced, approximate, sessile, mainly in middle. Capitula oblong-ovoid,

10–12 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts relatively less numerous, carinate; outer bracts decurved, weak, short, up to 7 mm long; middle bracts horizontal, up to 20 mm long, three-angled-subulate, terminating in long spine; subsequent bracts flat, erect, 12–15 mm long, short-spinescent; inner bracts almost membranous, very narrow-linear, finely toothed, long attenuate, 15–17 mm long. Receptacular bristles smooth; corolla pink. Achenes oblong-obovoid, almost three-angled, light gray, spotted. Flowering VI–VIII; fruiting VIII–IX.

Gypsic slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (southwest). Endemic. Described from the upper reaches of the Katta-Uru River. Type in Tashkent.

Note. The material for this species is very heterogeneous; therefore, additional collections are necessary to determine the precise boundary of its range.

113. *C. gnezdilloi* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1959) 47.

Perennial. Stem erect, white arachnoid hairy-tomentose, glabrescent, striate-sulcate, 30–60 cm high, weakly branched above; branches long, one-headed, often sparsely leafy, forming lax inflorescence. Leaves coriaceous, very finely gray arachnoid hairy-tomentose on both sides; basal leaves short-petiolate (petioles one-fourth to one-third as long as lamina, smooth or almost smooth), oblong-obovate or obovate-elliptical, crisped, prickly-lobed, lobes deltoid, gradually attenuate-spinescent, repeatedly prickly deltoid-lobed; cauline leaves rather abruptly reduced above; lower cauline leaves short-petiolate or sessile, otherwise like basal; middle and upper leaves distant, ovate or broad-ovate, sessile, auriculate, large prickly-toothed: Capitula ovoid, 12–15 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts relatively less numerous, deltoid-subulate, carinate, stiff; outer bracts decurved, up to 10 mm long; middle bracts horizontal, almost two times as long as involucral diameter, 25–
234 30 mm long; subsequent bracts flat, erect or slightly recurved, with very short spine, 15–17 mm long; inner bracts almost membranous, linear, finely toothed, very long attenuate, 20–22 mm long. Receptacular bristles smooth. Corolla pink; achenes oblong-obovoid, light colored. Flowering VI–VII; fruiting VII–VIII.

Gypsic slopes.—*Soviet Central Asia*: Pamiro-Alai (southwest). Endemic. Described from the vicinity of Lake Kurgantash. Type in Tashkent.

114. *C. leptoclada* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 15; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 550; Tschern.

in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15, 49; Kult. in Fl. Turkm. VII, 206.

Perennial. Stem 30–60 cm high, slender, white-tomentose, striate-sulcate, moderately branched above; branches long, slender, usually one-headed. Leaves gray-tomentose on both sides, but tomentum thinner above, coriaceous, strongly spinose; basal leaves short-petiolate (petioles one-fifth as long as lamina), narrow oblong-lanceolate, about 45 mm wide (with spines), pinnatisect, strongly acuminate into long stiff spine, lateral segments numerous and strongly spinose; lower cauline leaves like basal but sessile; middle leaves oblong, pinnatisect, lateral segments narrow, uniformly spaced, spinescent; uppermost leaves sessile, densely spinose, small, remote on floriferous branches. Capitula oblong-ovoid, 10–12 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts fewer, green, subulate, dorsally carinate, squarrose; outer bracts decurved, up to 7 mm long; middle bracts horizontal, two or three times exceeding capitulum diameter (20–30 mm long), subulately acuminate in thin, long, three-angled spine; subsequent bracts somewhat flat, 12–15 mm long, erect, with short spine at apex; inner bracts membranous, narrow-linear, 1–2 mm wide, finely serrate. Receptacular bristles smooth. Corolla purple. Achenes obovoid, light colored. Flowering VI–VII; fruiting VII–VIII.

Stony slopes in the upper part of middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Kugitang Range). Endemic. Described from the Kugitang Range, near Kyzylalma. Type in Tashkent.

115. **C. hoplopylla** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1959) 49.

Perennial. Stem erect, strong, 50–80 cm high, arachnoid hairy-tomentose, sulcate, branched from middle; branches long, one-headed, forming lax inflorescence. Leaves coriaceous, green on both sides, gray-tomentose, basal leaves small, reduced; cauline leaves reduced above, 235 lower leaves very short-petiolate or sessile, oblanceolate, crisped, pinnatipartite, lateral segments triangular, remote and spiny-triangular, attenuate into strong, long spine; middle leaves sessile, auriculate, with weakly prickly lobes, otherwise like lower leaves; upper leaves ovate, auriculate, long and hard-prickly lobed, terminal lobe with more stiff spine; leaves on branches strongly reduced, spinescent, less numerous. Capitula globose, arachnoid-hairy, 18–20 mm wide (excluding cusps). Involucral bracts numerous, triangular, all bracts erect-spreading; outer more or less decurved, about 7 mm long; middle bracts 20–22 mm long; subsequent bracts shorter and more flat. Receptacular bristles smooth. Flowering VII.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Chulbair Mountains). Endemic. Described from Khodzha-Barku. Type in Tashkent.

116. *C. corymbosa* Winkl. in Tr. Peterb. Bot. Sada, X (1887) 89; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 550.

Perennial. Stem erect, floccose-arachnoid hairy, 80–100 cm high, cymosely branched in upper half; branches leafy, long, one-headed. Leaves coriaceous, finely arachnoid-hairy on both sides, more densely beneath; basal leaves petiolate, broad elliptical, prickly-lobed, 10–12 cm wide (with spines), with broad deltoid, acuminate-spinescent lobes; cauline leaves gradually reduced, sessile, semiamplexicaul, narrow deltoid-lobed, with acuminate-strong spinescent lobes, oblong-ovate; leaves on branches reduced, more finely prickly-lobed, more or less approximate. Capitula globose, 17–20 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts numerous, horizontal, gradually long-acuminate into long subulate cusp; outer bracts weakly decurved, 12–15 mm long; middle bracts horizontal, 20–25 mm long; inner bracts narrow-lanceolate, dorsally scabrous, thin and short acuminate, 20 mm long. Receptacular bristles smooth. Corolla light pink. Achenes obovoid, glabrous, smooth, 5 mm long and 2.5–3 mm wide. Flowering VII; fruiting VIII–IX.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the Gandarra Ravine. Type in Leningrad.

117. *C. coerulea* Kult. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 15 (1959) 51.—*C. subinermis* Tschern. Ibid. (1959) 40.

236 Perennial. Stem, erect, floccose-arachnoid hairy-tomentose, up to 100 cm high, branched in upper half; branches long, secondary branches rather short, one-headed, forming lax inflorescence. Leaves coriaceous, gray arachnoid-hairy to tomentose on both sides; basal leaves short-petiolate, with thick floccose-tomentose petioles bearing few narrow spinose lobes, oblong or oblong-ob lanceolate, prickly-lobed, with broadly deltoid, spinose-toothed, acuminate-cuspidate, rather approximate lobes, as a result leaf somewhat crisped; cauline leaves gradually reduced above; lower cauline leaves lanceolate, sessile, with auricles connate with stem, narrow deltoid-prickly-lobed, crisped; lobes deltoid, abruptly attenuate in long and stiff spine, unequally and broadly spinose-toothed; middle leaves oblong, otherwise like lower; upper leaves ovate, sessile, semiamplexicaul, with connate auricles, spinose-toothed; leaves on branches reduced, remote. Capitula globose-ovoid, 14–20 mm wide (excluding cusps), densely arachnoid hairy-tomentose. Involucral bracts numerous, narrow-lanceolate, acuminate into fine acicular cusp, squarrose; outer bracts slightly decurved, up to 5 mm long; middle bracts erect-spreading, 12–16 mm long; inner bracts erect, narrow-lanceolate.

gradually acuminate in short cusp, 22 mm long. Receptacular bristles smooth. Corolla whitish or light pink. Achenes obovoid, glabrous, smooth, weakly ribbed, 6 mm long and 3 mm wide. Flowering VII–VIII; fruiting VIII.

Gravelly stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Gissar Range). Endemic. Described from the Varzob River Basin, upstream along the Ziddy River from the confluence of Ziddy and Mai-Kur. Type in Tashkent.

Note. Study of additional material of this species leads to the conclusion that *C. coerulea* is more widely distributed in the Gissar Range and *C. subinermis* is a synonym of it. Now we can give a more detailed and expanded description of the species, because many of the features were not characterized in the original description, given that the specimens in our hands were very young.

Section 21. Lopholepis Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962).—Capitula solitary terminal on branches or main stem; involucre bracts coriaceous, lanceolate, cristate-prickly along margin, short-acuminate; receptacular bristles slightly scabrous; corolla whitish or pale yellow; anther tube glabrous, purple; achenes obovate, glabrous, smooth, roundish above.

Perennial plants with thick, woody, many-headed roots and sessile semiamplexicaul leaves.

Type of section: *C. rigida* Kult.

118. *C. rigida* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 26.—*lc.*: Kult. *Ibid.*, Fig. 26.

237 Perennial. Root woody, blackish-fibrous, many-headed; root collar white-hairy, with remains of old leaves. Stem erect, 35 cm high, weakly sulcate, finely arachnoid-hairy below, glandular throughout, densely above, simple, one-headed. Leaves coriaceous, green on both sides, with network of prominent veins, glandular; basal leaves long-petiolate, 20 cm long, with petioles somewhat thickened at base, lanceolate, attenuate toward both ends, entire, with remote, thin and short spines along margin, more approximate toward leaf base and continued on petiole; lower cauline leaves like basal but with shorter petioles; other cauline leaves sessile, semiamplexicaul, with thin spines at base. Capitula globose-cylindrical, truncate basally, 15–20 mm wide, 25–28 mm long (excluding corollas), and with very thin arachnoid-hairy pubescence. Involucre bracts densely glandular, all except inner ovate to oblong-ovate, 12–22 mm long and 6–7 mm wide at base, midrib somewhat prominent, more or less flat, cristate-prickly along entire margin, with numerous, thin, yellow spines, acuminate into erect cusp; inner bracts membranous,

narrow lanceolate, scabrous along margin, acuminate into thin cusp, dorsally brownish. Receptacular bristles smooth or few with one or two serrations. Corolla pale yellow; anther tube purple. Achenes obovoid, smooth, roundish above, 6 mm long, gray. Flowering VII–VIII. (Plate XVIII, Fig. 1).

Stony slopes.—*Soviet Central Asia*: Tien Shan (northern slope of the Alai Alatau and Kirgiz Alatau). Endemic. Described from the Kirgiz Alatau, Kosh-Archa-Sai. Type in Tashkent.

119. *C. mindshelkensis* B. Fedtsch. Perech. Rast. Turk. IV (1911) 261; B. Fedtsch. in Fedde, Repert, X, 164.

Perennial. Root thick, blackish-fibrous, with branched collar, covered with numerous remains of old leaves, with numerous sterile leaf rosettes and stems, forming thick pads. Stems 10–30 cm high, usually simple, one-headed, less often weakly branched above and then with two or three capitula on branch tips, white arachnoid-hairy. Leaves coriaceous, finely gray-tomentose on both sides, more densely beneath, glandular above with sessile glandular hairs; basal leaves attenuate toward both ends, short-petiolate, narrow-lanceolate or lanceolate, sparsely crenate-prickly-toothed along margin; cauline leaves strongly reduced, sessile, semiamplexicaul, like basal. Capitula globose-ovoid, 12–15 mm wide (excluding cusps) and 18 mm long (excluding corollas), almost glabrous or slightly arachnoid-hairy above; involucrel bracts except inner, coriaceous, lanceolate, dorsally glandular, acuminate, erect, cristate-prickly; inner and innermost bracts membranous, acuminate-spinescent, irregularly toothed along margin. Receptacular bristles unequal, longest
238 bristles slightly scabrous above. Corolla whitish or light pink; anther tube purple. Achenes oblong-obovoid, glabrous, smooth, roundish above, gray, 6 mm long, 2.5 mm wide. Flowering VII–VIII; fruiting IX.

Stony gravelly slopes.—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from Bish-Saz area. Type in Leningrad.

120. *C. gomolitzkii* Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 95.

Perennial. Root thick, woody, covered with black fibrous bark, many-headed, with thick collar densely covered with remains of old petioles, stems 25–50 cm high, numerous, straw-yellow to light brown, finely striate-sulcate, glandular with sessile glandular hairs and papillae scattered throughout. Basal leaves oblong, narrowed toward both ends, on short and thick petioles, margins boldly sinuate-toothed, teeth acuminate-spinescent, hard coriaceous, light green on both sides, glossy, with strongly prominent network of veins, densely glandular-hairy with short sessile hairs, sometimes finely white-tomentose beneath along margin or throughout (f. *hypoleuca*); cauline leaves gradually reduced, sessile,

semiamplexicaul, dense, otherwise like basal leaves. Capitula oblong-cylindrical, 22 mm long (excluding corollas) and 12–15 mm wide (excluding cusps), usually finely white- or ferruginous arachnoid-hairy above. Involucral bracts very densely glandular dorsally, with sessile glandular hairs, all except inner bracts narrowed from ovate base to narrow-lanceolate, acuminate, erect with cristately arranged thin spines along margin; inner and innermost bracts broad-linear, purple dorsally, almost membranous, scabrous, irregularly toothed along margin, acuminate-spinescent. Receptacular bristles unequal, longest slightly flattened above and weakly scabrous. Corolla white, anther tube purple. Achenes immature, oblong-obovoid, glabrous, smooth, roundish above, 7 mm long. Flowering VII–VIII.

Stony and rocky slopes.—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from the Obaly-Dzhan Mountain. Type in Tashkent.

Section 22. Pectinatae Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 263 p. p.—*Congestae* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 11 p.p.—*Uncinatae* Winkl. op. cit. 186 p. p.—Capitula in terminal corymbose or lax panicles, usually aggregated at branch apices; involucral bracts somewhat flat, cristate-toothed along margin, acuminate in straight or uncinatate cusp; receptacular bristles smooth; corolla yellow, with pale-purple, sparsely hairy anther tube; achenes obovoid, smooth, roundish above. Perennial monocarpic plants with large coriaceous basal leaves and smaller stems.

Lectotype of section: *C. albertii* Rgl. and Schmalh.

239 121. *C. albertii* Rgl. and Schm. in Tr. Peterb. Bot. Sada, VI (1879) 315; Winkl. *ibid* XII, 264.

Perennial. Stem erect, strong, floccose-arachnoid-hairy, striate-sulcate, in upper half profusely and dense cymosely branched, branches with capitula on short peduncles aggregated at tips, forming compact corymbose inflorescence. Leaves coriaceous, with network of prominent veins, green, sparsely arachnoid-hairy, glabrescent, densely white-tomentose beneath; basal and lower cauline leaves with thick petioles, slightly broadened at base, cordate-ovate or ovate, about 20 cm long excluding petioles, 15 cm wide, weakly crisped with two prickly teeth; middle and upper cauline leaves gradually reduced, sessile, semiamplexicaul, ovate-lanceolate, crisped, with two large prickly teeth, spines at leaf base stiff, strong, covering petiole. Capitula oblong-ovoid, with 12–15 florets, 17–19 mm long and 8–9 mm wide (excluding cusps), glabrous. Involucral bracts except inner ovate-lanceolate to oblong-lanceolate, appressed, cristate-spinulose on both sides in upper half, with two to six pairs of thin spines, acuminate in weakly incurved cusp; inner bracts linear-oblong, with somewhat membranous, usually

irregularly incised appendages, roundish above, with stiff and weakly curved spine. Receptacular bristles smooth. Corolla yellow, conspicuous, anther tube pale purple, sparsely sericeous. Achenes obovoid, 6 mm long, roundish above. Flowering V; fruiting VI.

Dry loamy-gravelly slopes.—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from Boroldai. Type in Leningrad.

Note. The hybrid between *C. albertii* Rgl. and Schmalh. and *C. umbrosa* Bge. is discussed in the note to the latter species.

122. *C. pentacantha* Rgl. and Schm. in Tr. Peterb. Bot. Sada, VI (1879) 315; Winkl. *ibid.*, XII, 189.—*Arctium pentacanthum* O. Ktze. Rev. Gen. 1 (1891) 308.

240 Perennial. Plants mostly with one stem. Stem erect, striate-sulcate, arachnoid-hairy, 30–60 cm high, profusely branched from base; branches relatively short, densely leafy, in turn branched into numerous secondary branches, bearing one to three or four capitula on each (1–2 cm long) peduncle, inflorescence lax, paniculate. Leaves coriaceous, basal leaves large, 25–30 cm long and 17–19 cm wide, ovate or oblong-ovate, attenuate toward both ends, finely arachnoid-hairy above, with isolated glandular hairs, gray-tomentose beneath, petiolate; petioles floccose-tomentose, flat adaxially slightly convex abaxially, sometimes with occasional narrow lobes; cauline leaves much smaller than basal, gradually reduced toward stem apex; middle cauline leaves sessile, elliptical or almost orbicular, narrowed toward base, finely toothed, glabrous above and gray-tomentose beneath. Capitula 15 mm long and 6 mm wide (excluding cusps), oblong-ovoid, glabrous. Involucral bracts numerous, usually 60, with (up to 3 mm long), uncinat apical spines; outer bracts narrow lanceolate, 3 mm long, with one or two pairs of very thin spines above along margin; middle bracts narrow lanceolate, 8–10 mm long, closely appressed at base, abruptly horizontal in upper part, with two or three pairs of thin, up to 2 mm long, spines along margin; inner bracts erect, lanceolate, 12 mm long, somewhat broadened at apex, with membranous border and up to 3 mm long, thin, uncinat spines. Receptacular bristles smooth. Corolla yellow; anther tube pale purple, sparsely pubescent. Achenes obovoid, gray. Flowering VI–VII; fruiting VII–VIII. (Plate XVII, Fig. 2).

Stony slopes in foothills.—*Soviet Central Asia*: Tien Shan (Mogoltau, foothills of the Chatkal Range, adjoining the Fergana Valley). Endemic. Described from the Maili River Basin. Type in Leningrad.

123. *C. horrescens* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 322.—*C. albertii* ssp. *horridula* Bornm. in Fedde, Repert. XXXVI (1934) 337.—*Exs.*: H.F.A.M. No. 478 (sub *C. albertii* Rgl. and Schmalh.).

Perennial. Plants with one stem. Stem erect, deeply striate-sulcate, finely arachnoid-hairy, almost glabrous, 50–60 cm high, branched from middle; branches, in turn, repeatedly branched in relatively short one-headed secondary branches; inflorescence dense, broadly corymbose. Leaves coriaceous, basal leaves large, cauline leaves abruptly reduced towards stem apex; basal leaves petiolate, ovate or oblong-ovate, with lamina up to 25 cm long and 15–16 cm wide, toothed, with broadly deltoid, somewhat approximate teeth, in turn, irregularly prickly-toothed, with prominent veins, green above, very finely and sparsely arachnoid-hairy with glandular hairs scattered throughout, white-tomentose beneath; upper leaves oblong, sessile, with two or three pairs of stiff basal spines, spinose-toothed, glabrous above, loosely tomentose beneath, with prominent midrib, terminating in stiff, 7–10 mm long, three-angled spine. Capitula ovoid, 10 mm wide (excluding cusps) and 22 mm long, glabrous, somewhat foveate at base. Involucral bracts numerous, more or less carinate, with scattered fine glandular hairs; outer bracts 7 mm long, divergent, lanceolate, acuminate into short spine; with two to four pairs of thin stiff spines along margin; middle bracts 10 mm long, lanceolate, basally appressed, cartilaginous-serrated, divergent in upper half, with three to five pairs of thin stiff hairs along margin; inner bracts oblong, 12 mm long, slightly broadened above, with wide membranous border, and short apical spine. Receptacular bristles smooth. Corolla greenish-yellow; anther tube pale purple, sparsely pubescent in upper part. Achenes obovoid, spotted, roundish above, weakly curved, about 5–6 mm long and 2.5–3 mm wide. Flowering V–VI; fruiting VI–VII.

Stony slopes from foothills to middle mountain zone—*Soviet Central Asia*: Tien Shan (west). Endemic. Described from the Bos-Su River Basin, vicinity of Niazbek. Type in Tashkent.

Note. Specimens with some resemblance to *C. albertii* Rgl. and Schmalh. are found in the foothills of Karatau, and possibly, are hybrids of these two species, which come in contact in the Karatau Mountains.

124. ***C. pentacanthoides*** Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 102.

Perennial. Plants with one stem. Stem erect, striate-sulcate, very finely arachnoid-hairy, almost smooth, 70–80 cm high, branched from base, branches long, repeatedly branched in relatively short branches with several capitula on 5–6 mm long peduncles; inflorescence lax, paniculate. Leaves coriaceous; basal leaves petiolate with short (6–7.5 cm long) petioles thickened at base and with isolated spines, lamina oblong-elliptical, 20–30 cm long and 10–15 cm wide, with prominent veins, with wide lobes, lobes finely toothed, green, densely or less often sparsely glandular, and very finely arachnoid-hairy above, white-

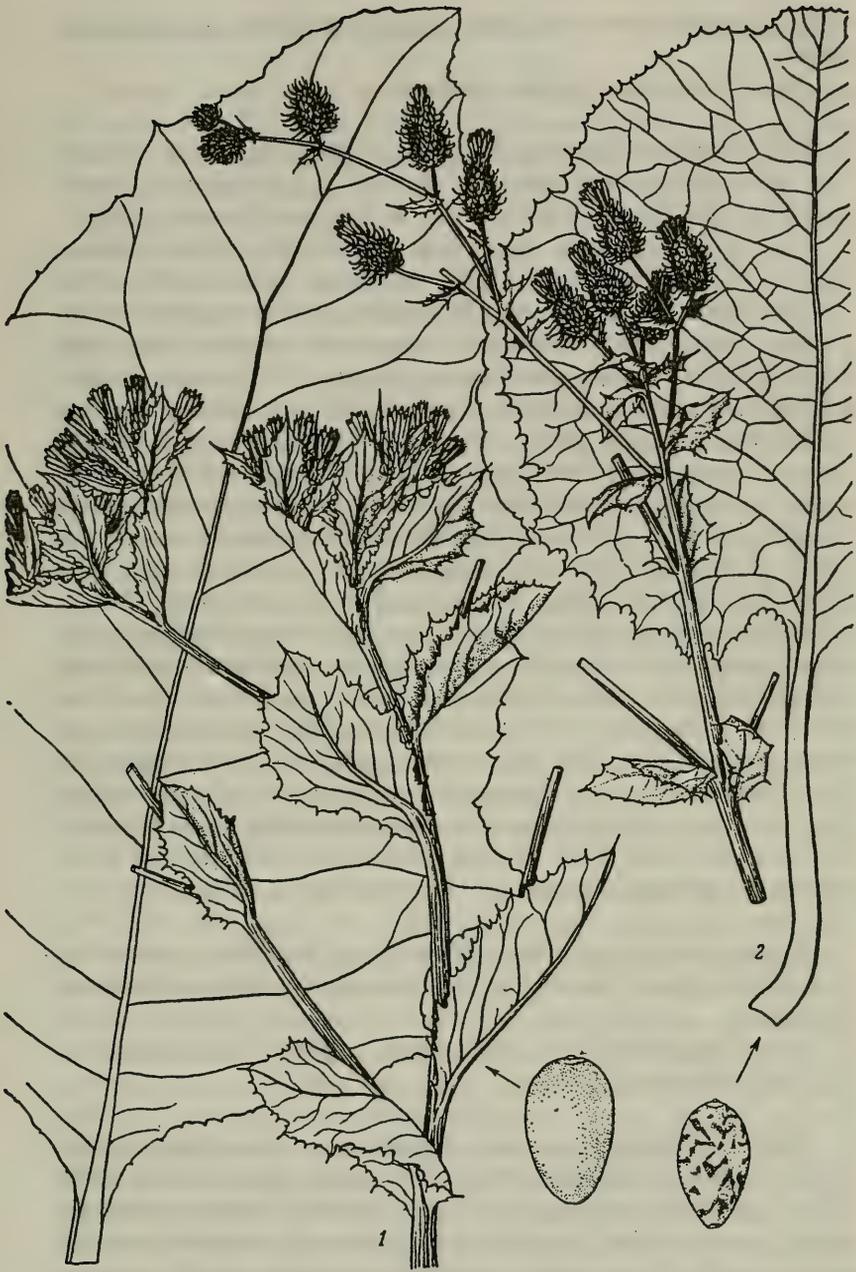
tomentose beneath; cauline leaves much smaller than basal, abruptly reduced toward stem apex; lower cauline leaves sessile, elliptical, narrowed toward both ends, acuminate into stiff, short spine, with three or four pairs of basal spines, almost glabrous and glandular above, gray-tomentose beneath; middle and upper leaves strongly reduced, oblong, sessile, with one or two pairs of basal spines. Capitula ovoid, 20 mm long and 7 mm wide (excluding cusps), glabrous. Involucral bracts 40–50; outer bracts 4–5 mm long, somewhat carinate, broad-lanceolate, with two or three pairs of thin spines along margin; middle bracts 7–9 mm long, closely appressed at base, entire, weakly divergent in upper half, acuminate into stiff, up to 3 mm long, thin, weakly curved spine, with three or four pairs of thin, up to 3 mm long spines along margin; inner bracts oblong, acuminate-deltoid, with membranous border, and up to 2 mm long slightly curved spine. Receptacular bristles smooth. Corolla yellow; anther tube pale purple, sparsely pubescent. Achenes narrow oblong, 7 mm long and 1.5–2 mm wide, roundish above, dorsally slightly curved, spotted. Flowering VI–VII; fruiting VII–VIII.

Stony slopes in lower mountain zone.—*Soviet Central Asia*: Tien Shan (west). Endemic. Described from the Kuraminskii Range, the mountain between Kurashi-Kuduk and the Kainar River. Type in Tashkent.

242 *Note.* Plants were collected from the region of the village of Kansai with characters intermediate between *C. pentacantha* Rgl. and Schmalh. (known from this region on the basis of collections from the Ungar-Tyube Mountain) and *C. pentacanthoides* Juz.; however, the strongly glandular surface of their leaves suggests that it would be more appropriate to include these plants under *C. pentacanthoides* Juz.

Specimens with less glandular leaves and a shorter, almost straight cusp of the involucral bracts were collected from the region of the village of Zarkent; on the basis of these herbarium specimens, S.V. Juzepczuk named the new species *C. intersita* Juz. The paucity of material from this region and the attendant impossibility of checking the constancy of these characters in a large collection compels us at present to interpret the species *C. pentacanthoides* more broadly, leaving the solution to the problem of segregating the new species until further observations in nature can be made.

Section 23. Oligantha Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 15, 565.—*Congestae* Bge. in Mém. Akad. Pétersb. 7 sér. 9, 2 (1865) 11 p. min. p.—Capitula oblong-cylindrical, aggregated on branch tips, readily falling, small; involucral bracts herbaceous, flat, closely appressed, with slightly divergent short cusp, cristate-toothed; receptacular bristles smooth; corolla whitish; achenes glabrous, smooth, roundish



above. Perennial herb with large, sparsely glandular and coriaceous leaves.

Type of section: *C. triflora* Schrenk.

125. *C. triflora* Schrenk in Bull. phys.-math. Akad. Pétersb. 3 (1845) 108; Bge. in Mém. Akad. Pétersb. 7 sér. 9, 2, 11; Winkl. in Tr. Peterb. Bot. Sada, XII, 264; XIV, 211; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 194; Juz. in Tr. Tadh. Bazy Akad. Nauk SSSR, 8, 565.—*Arctium triflorum* O. Ktze. Rev. Gen. (1891) 308.—Exs.: H.F.A.M. No. 197.

Perennial. Stem solitary, 60–120 cm high, erect, thick, striate-sulcate, glabrous, densely leafy, branched in upper half; branches short, leafy, in turn branched into branchlets bearing groups of 9–15 capitula at apices; general inflorescence corymbose-paniculate. Leaves later coriaceous; basal leaves petiolate, petioles thick and broadened at base, oblong-ovate, attenuate toward both ends, up to 40 cm long and 25 cm wide, sparsely glandular, with reticulate venation above, finely arachnoid-hairy beneath with wide crenate-toothed lobes; upper cauline leaves oblong-ovate, sessile, short-decurrent, finely toothed. Capitula on very short
244 peduncles, readily falling, 15 mm long and 4 mm wide, oblong-cylindrical, with few florets (three). Involucral bracts herbaceous, flat, closely appressed, with slightly divergent cusp; outer and middle bracts oblong-lanceolate, with membranous border from base, acuminate-spinescent, with three or four pairs of horizontal, sometimes flexuous spines on both sides; inner bracts entire, acuminate, with membranous border from base to apex. Receptacular bristles smooth. Corolla exserted from involucre, whitish. Achenes in capitulum usually solitary, large, 7 mm long and 4 mm wide, obovoid, glabrous, smooth, roundish above, whitish or light gray. Flowering VI–VII; fruiting VII–VIII. (Plate XVII, Fig. 1).

Loamy-stony slopes.—*Soviet Central Asia*: Tien Shan (northern and western Tien Shan), Pamiro-Alai (Alai Range), mountainous Turkmenia (Kopetdag).

Note. The hybrids of *C. triflora* and *C. umbrosa* are described in the note to the latter species.

Section 24. Chrysis Juz. in Tr. Tadh. Bazy Akad. Nauk SSSR, 8 (1940) 515, 548.—*Nudicaules* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 191 p. p.—Capitula at the apices of short branches, solitary, glabrous or weakly arachnoid-hairy; involucral bracts gradually acuminate into thin cusps; corolla bright yellow; receptacular bristles smooth; achenes obovoid, angular, distinctly toothed above. Perennial herbs with less numerous and more or less poorly developed, cauline leaves and large, usually rosulate, basal leaves.

Lectotype of section: *C. aurea* Winkl.

126. *C. aurea* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 476 quoad sp. seravschan.; XII, 196 p. p.; XIV, 218; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 138 (excl. var.); Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 548.—*Arctium aureum* O. Ktze. Rev. Gen. 1 (1891) 307.

Perennial. Stem erect, 30–100 cm high, striate-sulcate, almost glabrous, branched from base, branches long, repeatedly branched further, forming lax, broadly paniculate inflorescence. Basal leaves distinctly rosulate; cauline leaves less numerous, much smaller than basal, strongly reduced, and poorly developed, as a result, stem appearing almost leafless, especially in upper part; leaves of basal rosette large, petiolate, with petioles broadened at base, almost half as long as lamina, oblong-ovate, undivided, finely toothed, with two or three pairs of broadly deltoid basal lobes; lower cauline leaves petiolate, petioles winged, auricles of wings fused with stem; upper leaves scaly; all leaves glabrous above, green, white-tomentose beneath. Capitula small, 10 mm wide, ovoid, very finely arachnoid-hairy. Involucral bracts oblong, closely appressed
245 at base, with erect or weakly divergent cusp; outer bracts smaller than others but usually all bracts very similar to each other. Receptacular bristles smooth. Corolla yellow. Achenes obovoid, almost three-angled, with small teeth above, 6 mm long and 3 mm wide, slightly curved. Flowering VI–VII; fruiting VII–VIII.

Pebbled and gravelly slopes in lower and middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Voru River Valley, between Santuruch and the Kshtut Pass. Type in Leningrad.

127. *C. medians* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, VIII, Ser. 1, 3 (1936) 297; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, VIII, 549.

Perennial. Stems erect, up to 120 cm high, striate-sulcate, thick, glabrous, profusely branched; branches long, in turn repeatedly branched, forming broadly paniculate lax inflorescence. Basal leaves distinctly rosulate; cauline leaves less numerous, much smaller than basal, poorly developed, as a result stem appearing leafless, especially in upper part; basal and lower cauline leaves petiolate, broad-ovate, broadly toothed; middle and upper leaves sessile, lanceolate, prickly-toothed, reduced; all leaves almost green, glabrous or finely arachnoid-hairy above, finely tomentose beneath. Capitula numerous, 10–12 mm wide (excluding cusps), ovoid, almost glabrous. Involucral bracts numerous, ovate to oblong-ovate, abruptly narrowed into 5–7 mm long, horizontal cusp. Receptacular bristles smooth. Corolla yellow. Achenes obovoid, angular, with scarcely noticeable teeth above. Flowering VI–VII; fruiting VII–VIII.

Stony screes in middle mountain zone.—*Soviet Central Asia*: Pamiro-

Alai. Endemic. Described from the Kugitang Mountain, near the village of Kugitang. Type in Leningrad.

128. *C. refracta* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 297; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 549.—*C. aurea* β . *refracta* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 138.

Perennial. Stems erect, 60–120 cm high, striate-sulcate, almost glabrous, profusely branched in upper half; branches long, in turn, repeatedly branched, forming lax and spreading semiumbellate inflorescence. Basal leaves distinctly rosulate; cauline leaves less numerous, much smaller than basal, somewhat weakly developed, as a result stem appearing almost leafless in upper part; basal leaves petiolate, with petioles half as long as lamina, oblong-ovate or orbicular, entire, irregularly toothed; cauline leaves strongly reduced, with narrow-winged petioles, entire, finely toothed; uppermost leaves scaly; all leaves finely arachnoid-hairy above, white-tomentose beneath. Capitula numerous, 246 globose-ovoid, 15 mm wide (excluding cusps), almost glabrous. Involucral bracts imbricate, with up to 5 mm long thin and sharply decurved cusp, all similar. Receptacular bristles smooth. Corolla yellow. Achenes obovoid, almost three-angled, mildly curved, 6 mm long, 3 mm wide. Flowering VI–VII; fruiting VII–VIII.

Outcrops of varicolored rocks in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Karatag River Valley, the village of Hakimi. Type in Leningrad.

129. *C. schmalhausenii* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 474; XII, 195; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 549.—*Arctium schmalhausenii* O. Ktze. Rev. Gen. 1 (1891) 308.

Perennial. Stems erect, 120 cm high, striate-sulcate, glabrous or somewhat glandular, branched in upper half; branches long, in turn, repeatedly branched, forming lax paniculate inflorescence. Basal leaves distinctly rosulate, cauline leaves less numerous, strongly reduced; as a result, stem appearing almost leafless, especially above; basal leaves petiolate, petioles strongly broadened at base, oblong-ovate, pinnatipartite in upper half, and then undivided below, or pinnatilobate or pinnatipartite throughout, and then petioles winged; cauline leaves sessile, strongly reduced, uppermost leaves almost scaly; all leaves finely arachnoid-hairy above, white-tomentose beneath. Capitula numerous, small, 9–10 mm wide (excluding cusps), ovoid, finely arachnoid-hairy. Involucral bracts oblong-ovate above with very short cusp, imbricate, all bracts similar. Receptacular bristles smooth. Corolla yellow. Achenes oblong-obovoid, angular. Flowering V–VII; fruiting VII–VIII.

Stony and gravelly slopes in lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Zeravshan River Valley. Oalyk Ravine. Type in Leningrad.

130. *C. karatavica* Rgl. and Schm. in Tr. Peterb. Bot. Sada, VI (1880) 317; Winkl. *ibid.* XII, 194; XIV, 192; Bormm. in *Beih. bot. Centralbl.* XXXIV, 2, 138; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 549.—*Arctium karatavicum* O. Ktze. *Rev. Gen.* 1 (1891) 308.

Perennial. Stem erect, 40–150 cm high, striate-sulcate, weakly pubescent, branched almost from base, branches long, in turn repeatedly branched, forming broadly paniculate inflorescence. Basal leaves distinctly rosulate; cauline leaves less numerous, much smaller than basal, poorly developed; as a result, stem appearing almost leafless, especially above, leaves in rosette petiolate, uppermost oblong-ovate, pinnatisect in upper half, undivided below; inner leaves in rosette often pinnatisect throughout, with lateral segments deeply lobed or pinnatipartite; cauline leaves sessile, pinnatipartite or lobed; uppermost leaves reduced to scales; all leaves very finely arachnoid-hairy above, almost smooth, white-tomentose beneath. Capitula numerous, 7–10 mm wide, ovoid, very finely arachnoid-hairy, almost glabrous. Involucral bracts closely appressed at base, with falcately decurved, thin, up to 3 mm long cusp; outer bracts small, up to 3 mm long; middle bracts oblong-ovate, 12–13 mm long; inner bracts scarious, oblong-lanceolate, with short, divergent, thin cusp. Receptacular bristles smooth; corolla yellow. Achenes obovoid, angular, scarcely toothed above, 5 mm long and 2 mm wide. Flowering VI–VII; fruiting VII–VIII.

Stony and gravelly slopes in lower mountain zone.—*Soviet Central Asia*: Tien Shan (west and center), Pamiro-Alai. Endemic. Described from the Karatau Mountains, near Ishtyube. Type in Leningrad.

131. *C. haesitabunda* Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8 (1940) 516, 549.

Perennial. Stems erect, 20–25 cm high, shallow-sulcate, finely arachnoid-hairy, cymosely branched in upper half, sparsely leafy. Basal leaves rosulate, less numerous, petiolate, oblong-lanceolate, sparsely finely arachnoid-hairy above, white-tomentose beneath, pinnatisect, their lateral segments pinnatilobate, prickly-toothed; cauline leaves strongly reduced, sessile, semiamplexicaul, pinnatilobate or large-prickly-toothed. Capitula ovoid, 10–12 mm wide (excluding cusps), glabrous. Involucral bracts numerous, stiff, coriaceous, closely appressed at base, falcate in upper half and acuminate-spinescent; inner bracts lanceolate, erect, scarious with almost transparent border. Receptacular bristles smooth. Corolla yellow. Achenes obovoid, almost four-angled. Flowering V–VI; fruiting VI–VII. (Plate XIX, Fig. 1).

Middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Kaitash Mountains, Malguzar). Endemic. Described from the Kaitash Mountains, near the village of Karatash. Type in Leningrad.

132. *C. chlorantha* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VI (1929) 4; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 549.—*lc.*: Kult. op. cit. Fig. 4.

Perennial. Stem erect, 30–35 cm high, striate-sulcate, partly floccose-tomentose, sparsely branched from base, leaves crowded mainly in lower part of stem; stem appearing almost leafless above because of less numerous and usually poorly developed middle and upper leaves. Basal leaves oblong-lanceolate, petiolate, pinnatipartite or pinnatisect, with remote, oblong-lanceolate, sessile, entire or more or less distinctly toothed lateral lobes; lower cauline leaves like basal; middle leaves one-third to half as long as lower, sessile, semiamplexicaul, prickly-toothed; upper and uppermost leaves scaly; all leaves finely arachnoid-hairy above, white-tomentose beneath. Capitula ovoid, 12–17 mm wide (excluding cusps), partly pubescent. Involucral bracts closely appressed at base, coriaceous, ovate-oblong, herbaceous in upper half, abruptly and strongly decurved and gradually acuminate in thin, falcate cusp; all bracts similar, except inner oblong-lanceolate bracts, with membranous border above; receptacular bristles smooth; corolla yellow. Achenes obovoid or almost pyramidal, 5 mm long, three-angled, with scarcely noticeable three teeth above, slightly curved. Flowering VI–VII; fruiting VII–VIII. (Plate XXVII, Fig. 2).

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Turkestan Range). Endemic. Described from the region between Gop and Suforidum. Type in Tashkent.

133. *C. korolkovii* Rgl. and Schm. in Tr. Peterb. Bot. Sada, VI (1880) 315; Winkl. *ibid.* XII, 194; XIV, 192, 218; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 549.—*Arctium korolkovii* O. Ktze. Rev. Gen. 1 (1891) 308.

Perennial. Stem erect, 40–60 cm high, striate-sulcate, pubescent, sparsely branched mainly in lower half, leaves crowded in lower half, stem appearing leafless above because of few and poorly developed middle and upper leaves. Basal leaves short-petiolate, oblong-lanceolate, entirely pinnatisect, their lateral segments oblong, approximate, sessile, lobed or entire; lower cauline leaves like basal, but sessile; middle leaves one-fourth to one-third as long as lower, oblong, entirely pinnatipartite, semiamplexicaul; upper and uppermost leaves scaly; all leaves coriaceous, very finely arachnoid-hairy above, white-tomentose beneath. Capitula narrowly ovoid, 6–9 mm wide (excluding cusps), glabrous. Involucral

bracts ovate, closely appressed at base, acuminate in very short, erect or erect-spreading cusp, all similar, except inner; inner bracts oblong, obtuse, with membranous border. Receptacular bristles smooth; corolla yellow. Achenes obovoid, angular, toothed above, 5 mm long. Flowering VI–VII; fruiting VII–VIII.

Stony-clayey slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (city of Nuratau), Kyzyl-Kum. Endemic. Described from Kyzyl-Kum, between Khalaati and Adamkiriulgan. Type in Leningrad.

Section 25. Serratulopsis Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 83.—Capitula solitary terminal on long branches; involucre bracts closely appressed, with narrow membranous border, acuminate; inner bracts with scarious, incised, purple apical appendage. Receptacular bristles smooth; corolla whitish. Achenes obovoid, smooth, roundish above. Perennial plant with many-headed woody root and coriaceous, almost undivided or crenate-lobed leaves.

Type of section: *C. vavilovii* Kult.

134. *C. vavilovii* Kult. in Sched. ad Herb. Fl. As. Med. 8 (1926) No. 198; Byull. SAGU, 12, Suppl. 15.—Exs.: H.F.A.M. No. 198.

Perennial. Roots woody, many-headed. Stems numerous, erect, slender, elegant, about 40 cm high, longitudinally sulcate, finely and floccosely arachnoid-hairy, somewhat slender-branched almost throughout; branches axillary, long, one-headed. Leaves coriaceous, with network of prominent veins, light green and very finely arachnoid-hairy above, finely appressed-gray tomentose beneath; basal leaves petiolate, about 15–20 cm long and 5–6 cm wide, ovate, undivided, crenate-lobed or with two or three basal lobes; cauline leaves petiolate, ovate, undivided, somewhat acuminate, gradually reduced; upper cauline leaves sessile, oblong-lanceolate, entire or irregularly and finely crenate-toothed. Capitula oblong-ovoid, glabrous, with about 20-florets, 20–22 mm long and 8 mm wide. Involucre bracts closely appressed, about 55, ovate to oblong-ovate, roundish above, acuminate, with narrow membranous border, green; inner bracts with membranous appendage at apex irregularly incised and slightly purple. Receptacular bristles smooth. Corolla whitish; anther tube purple. Achenes obovoid, roundish above, matty, transversely black-striate, 6 mm long and 2.5–3 mm wide. Flowering VII; fruiting VII.

Rocky slopes in subalpine mountain zone.—*Soviet Central Asia*: Tien Shan (Kirgizian Range). Endemic. Described from Uch-Bulak. Type in Tashkent.

Section 26. Amberbopsis Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 83.—Capitula solitary terminal on

long, almost leafless branches; involucre bracts somewhat flat, with membranous border, acuminate; receptacular bristles smooth. Perennial plant with many-headed woody root and thin coriaceous, almost without spines, rather large leaves.

Type of section: *C. grandifolia* Kult.

135. *C. grandifolia* Kult. in Tr. Peterb. Bot. Sada, VIIIc, VI (1929) 9.—**lc.**: Kult. *ibid.*, Fig. 10.

Perennial. Root vertical, woody, many-headed. Stem erect, finely
250 longitudinally sulcate, finely and sparsely arachnoid-hairy, 80–100 cm high, somewhat sparsely branched in upper half, branches axillary, long, leafless, in turn, usually sparingly branched, one-headed. Leaves thin coriaceous, more densely spinose, green, glabrous, and lustrous above, appressed white-tomentose beneath; lower cauline leaves large, about 40 cm long and 25 cm wide, petiolate, oblong-ovate, almost lyrate, with large irregularly crenate, orbicular, terminal lobe, and 7–10 pairs broadly sessile, remote, crenate-toothed, lateral lobes reduced toward base of lamina; middle cauline leaves few, like lower, but much smaller, sessile, semiamplexicaul, with distinct basal lobes; upper leaves sessile, attenuate toward base, undivided or crenate-lobed; uppermost leaves strongly reduced. Capitula obovoid, 18–20 mm long (excluding corolla) and 12–13 mm wide, basally truncate or weakly foveate, glabrous. Involucre bracts about 55, closely appressed, green, with very short cusp and irregularly incised membranous border from ovate to oblong-ovate (outer bracts 4 × 5 mm, subsequent bracts 7 × 4 mm; middle bracts 8 × 4 mm, and inner bracts 17 × 3 mm); innermost bracts linear-lanceolate, 17 mm long and 1.5 mm wide, short acuminate. Receptacular bristles smooth. Corolla yellow; anther tube yellow. Achenes obovoid, smooth, roundish above, with irregular black dots, 8 mm long and 3 mm wide. Flowering V–VI; fruiting VI.

Stony slopes in ravines.—*Soviet Central Asia*: Tien Shan (western Tien Shan). Endemic. Described from the ravine of the Dau-Baby River. Type in Tashkent.

Section 27. Stenoloma Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8 (1940) 513, 547.—*Inermes* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 196 p. p.—Capitula solitary terminal on stem and branches, or in twos; involucre bracts gradually acuminate into very long and short-subulate cusp; corolla whitish, light pink or deep yellow; receptacular bristles smooth or scabrous; achenes obovoid or obpyramidal, somewhat angular. Perennial plants with entire leaves.

Lectotype of section: *C. komarowii* (O. Ktze.) Winkl.

Series 1. Komarowianae Tschern. Stem wingless and, like leaves,

sparingly pubescent; capitula oblong-ovoid; cauline leaves sessile, short-decurrent. Receptacular bristles smooth.

136. *C. komarowii* (O. Ktze.) Winkl. in Tr. Peterb. Bot. Sada, X (1889) 470; XI, 132; XII, 199; Kult. in Fl. Turkm. VII, 178.—*Arctium komaroffii* O. Ktze. in Tr. Peterb. Bot. Sada, X (1887) 197.—**lc.**: Fl. Turkm. VII, Plate 27, Fig. 1.

251 Perennial. Root woody, many-headed. Stem numerous, 30–40 cm high, with remains of old petioles at base, usually simple, less often branched, loosely arachnoid-hairy, grayish-green, later grayish-brown, stems and branches one-headed. Leaves soft, grayish-green and arachnoid-hairy above, finely white-tomentose beneath; basal leaves linear-lanceolate, petiolate, attenuate toward both ends, up to 15 cm long and 1–2 mm wide, usually undivided and entire or pinnatilobate, acuminate into short cusp; cauline leaves gradually reduced toward apex; middle leaves up to 5 cm long and 5–12 mm wide, sessile, semiamplexicaul, decurrent, with usually prickly-toothed auricles; upper cauline leaves reduced. Capitula ovoid-oblong. 7–8 mm wide, arachnoid hairy-pubescent. Involucral bracts 60–80, all except inner linear-subulate, 5–14 mm long, with triquetrous, erect cusps; inner bracts coriaceous; linear-lanceolate, short-spinescent, usually light pink. Receptacular bristles smooth, slightly broadened at apex. Corolla pink; anther tube purple. Achenes obovoid, more or less angular, 4.5–5 mm long, light gray, with small teeth above. Flowering VI; fruiting VII.

Stony-loamy slopes in middle mountain zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). *General distribution*: Northern Iran. Described from Kopetdag in the Ashkhabad District. Type in Leningrad.

137. *C. stenophylla* Kult. in Tr. Tadjh. Bazy Akad. Nauk SSSR, VIIIc, VI (1929) 7; Kult. in Fl. Turkm. VII, 176.—**lc.**: Fl. Turkm. VII, Plate 27, Fig. 2.

Perennial. Root woody, many-headed. Stems numerous, 30–40 cm high, slender, dark brown, finely arachnoid-hairy, simple or sparsely branched. Leaves soft, withering early, linear, acuminate, undivided, recurved, gray arachnoid-hairy on both sides; basal leaves petiolate, attenuate toward both ends, 12 cm long and 4–5 mm wide; cauline leaves gradually reduced, sessile, short-decurrent, slightly broadened at base, with three to five small teeth. Capitula ovoid-oblong or more or less ovoid, 8 mm wide (excluding cusps) and 15 mm long (excluding florets), densely arachnoid-hairy. Involucral bracts about 60, all except inner with subulate-triquetrous, long, almost horizontal cusp, 7–22 mm long; inner bracts erect, coriaceous, scabrous along margin, usually purple, linear, 16–18 mm long. Receptacular bristles broadened above,

smooth. Corolla whitish; anther tube pink. Achenes obpyramidal, three or four-angled, gray, toothed above, 4 mm long, and 1.5 mm wide. Flowering VI–VII; fruiting VII–VIII.

Loamy mountain slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from the vicinity of Ashkhabad. Type in Tashkent.

252 *Series 2. Leucanthae* Tschern.—Plants very sparsely pubescent; stems wingless; cauline leaves broadly long-decurrent. Capitula oblong-ovoid; receptacular bristles smooth.

138. *C. leucantha* Bornm. and Sint. in Russk. Bot. Zhurn. 1 (1911) 1; Kult. in Fl. Turkm. VII, 178.—*C. simplex* Kult. in Fl. Turkm. VII (1960) 180 in obs. (ross.).—*lc.*: Bornm. and Sint. op. cit. Plate 1; Kult. op. cit. Plate 28, Fig. 1.

Perennial. Root woody, many-headed; sterile branches creeping, somewhat decumbent; stems several or solitary, floccose-arachnoid-hairy, with remains of old leaves at base, sparsely branched in upper half, with long, one-headed branches. Leaves soft, finely arachnoid-hairy above, finely gray-tomentose beneath; basal leaves lanceolate, petiolate, attenuate toward apex, undivided entire, 13–17 cm long and 1.5–3 cm wide; cauline leaves gradually reduced toward stem apex, sessile, rather long-decurrent, usually finely prickly-toothed; leaves on branches strongly reduced. Capitula ovoid-oblong, 9–13 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts about 70, outer bracts broadened at base, attenuate into short, usually divergent cusp; middle bracts broad-lanceolate, deltoidly broadened in upper part, acuminate-spinescent with short, erect dark cusp, margin scabrous; inner bracts membranous-coriaceous, about 20 mm long, broadened above, gradually attenuate into short thin cusp, scabrous along margin. Receptacular bristles slightly broadened above, smooth. Corolla whitish or light pink; anther tube pink. Achenes obovoid, 4–5 mm long, gray, with dark spots, somewhat angular. Flowering VI–VII; fruiting VII.

On dry slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from Kyzyl-Arvat. Type in Leningrad.

Series 3. Griseae Tschern.—Stem very narrowly and discontinuously winged, arachnoid hairy-tomentose; cauline leaves long- and narrow-decurrent. Capitula ovoid; receptacular bristles scabrous.

139. *C. grisea* Kult. in Tr. Peterb. Bot. Sada, VIIIc, VI (1929) 5; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 547.—*C. komarowii* var. *patula* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 145.—*lc.*: Kult. op. cit. Fig. 6.



254 Perennial. Stems numerous, slender, 10–25 cm high, very narrowly and discontinuously winged, arachnoid hairy-tomentose, glabrescent, and then lustrous, pinkish, leafy, moderately branched above; branches slender, one-headed. Leaves soft, grayish-green above, white-tomentose beneath, entire; basal leaves linear-oblong, thin-petiolate, acuminate, lower and middle cauline leaves sessile, linear, narrowly long-decurrent, gradually narrowed toward apex in thin and short spine, entire or sometimes with two or three pairs of small teeth at base; upper cauline leaves small, sessile, almost nondecurrent or short-decurrent. Capitula ovoid, 8 mm wide (excluding cusps), pubescent. Outer and middle involucrel bracts green, appressed at base, linear-lanceolate, gradually attenuate into falcate, subulate cusp; inner bracts erect, linear, finely cuspidate. Receptacular bristles broadened above, scabrous. Corolla whitish (?); anther tube pink. Achenes oblong, scarcely angular, light gray with dark spots, 4 mm long and 2 mm wide. Flowering VI–VII; fruiting VII–VIII.

Loamy-gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (southwestern spurs of the Gissar Range). Endemic. Described from the Yakkabag District near Tutakat. Type in Tashkent.

Series 4. Alaicae Tschern.—Stems narrow-winged and like leaves sparingly pubescent; cauline leaves sessile, decurrent. Capitula ovoid; receptacular bristles smooth.

140. *C. alaica* Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzSSR, XVII (1962) 90.

Perennial. Stems numerous, erect, slender, pubescent, 15–25 cm high narrow-winged throughout, wings 1–2 mm wide, leafy, branched in upper half; branches slender, long, with two capitula each at tips on relatively short peduncles, or stems simple, with two terminal capitula. Leaves soft, long-decurrent, entire, grayish green above due to fine pubescence, gray-tomentose beneath; basal leaves thin-petiolate, linear, acuminate-finely spinescent; cauline leaves gradually reduced toward stem apex, sessile, decurrent, linear, acuminate-finely spinescent, sometimes with two subulate teeth at base. Capitula ovoid, 7 mm wide (excluding cusps), pubescent. Involucrel bracts, except inner, imbricate, appressed at base, acuminate in fine, erect cusp; inner bracts linear, broadened above, orbicular, with thin membranous border and thin spine. Receptacular bristles slightly broadened above, smooth. Corolla apparently white. Achenes weakly angular, gray, toothed above, 3–3.5 mm long. Flowering VI–VII; fruiting VII–VIII.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Alai and Trans-Alai ranges). Endemic. Described from the

Alai Range, vicinity of Shahimardan, along Peshkaut Gorge. Type in Tashkent.

- 255 141. *C. fallax* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 471; XII, 200; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 547.—*C. fallax* var. *armata* Winkl. ex O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 243.

Perennial. Many-branched plants. Stems with remains of petioles of previous year's leaves at base, 12–35 cm high, erect or somewhat ascending, finely white arachnoid-hairy, winged throughout with wings 2–2.5 mm wide, leafy, usually branched above; branches short, one-headed. Leaves soft, entire, less often with sparse small teeth, grayish-green and finely arachnoid-hairy above, finely grayish tomentose beneath; basal leaves thin-petiolate, narrow-lanceolate, attenuate toward both ends, acuminate-finely cuspidate; cauline leaves reduced, sessile, decurrent into stem wings, narrow-lanceolate, attenuate above into short cusp. Capitula ovoid, 6–9 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts except inner appressed at base, oblong-ovate, attenuate-acute with falcate cusp; inner bracts broadened above, scarious, orbicular-ovate, acuminate-finely cuspidate. Receptacular bristles slightly broadened above, smooth. Corolla deep yellow, less often turning red on drying. Achenes weakly angular, obovoid, 3 mm long, light gray. Flowering VII; fruiting VIII–IX. (Plate XIX, Fig. 2).

Stony-gravelly slopes in the upper part of middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (southern slopes of the Gissar Range, Baldzhuan). Endemic. Described from the vicinity of the village of Kalkot and the Sanglak Mountains. Type in Leningrad.

Series 5. Baranovianae Tschern.—Stems wingless and like leaves densely pubescent; cauline leaves sessile. Capitula globose; receptacular bristles smooth.

142. *C. baranovii* Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 92.

Perennial. Root slender, woody, many-headed, their collars covered with scaly remains of old leaves, bearing numerous sterile rosettes and floriferous stems. Stems erect, white-tomentose, simple, one-headed, leafy. Leaves finely gray-tomentose above, white-tomentose beneath, entire; leaves of basal rosette narrow-lanceolate, narrowed toward both ends, short-petiolate, 11–12 cm long, 7–8 mm wide, soft; cauline leaves gradually reduced, sessile, short-acuminate, sometimes with three to five pairs of thin spines at base. Capitulum globose, 12–13 mm wide (excluding cusps), rusty-tomentose; involucral bracts carinate to narrow-lanceolate, gradually acuminate, falcately decurved; middle and inner

bracts dorsally dark, purple; innermost bracts erect, spinescent. Receptacular bristles smooth. Corolla whitish (?); anther tube light pink. Flowering VII.

256 On mountain slopes.—*Soviet Central Asia*: Tien Shan (Talass Alatau). Endemic. Described from the ravine of Kara-Berek River Valley. Type in Tashkent.

Section 28. Kuekenthalia Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8 (1940) 513, 548.—Capitula solitary terminal on branches, more or less numerous on long peduncles; involucre bracts gradually attenuate-cuspidate; corolla pale yellow or purple; receptacular bristles scabrous; achenes glabrous, smooth, roundish above. Biennial plants with narrow-winged stems and sessile or decurrent leaves.

Lectotype of section: *C. kuekenthalii* Bornm.

Series 1. Neglectae Juz.—Stems strongly branched, with a significantly large number (10–60) of capitula; leaves weakly spinose.

143. *C. kuekenthalii* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 146; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 548.

Perennial. Stems erect, 20–50 cm high, narrow-winged, with wings 3–4 mm wide, sparsely arachnoid-hairy, sparsely branched in upper half. Leaves decurrent, narrow lanceolate, glaucous-green and sparsely arachnoid-hairy above, white-tomentose beneath; basal leaves petiolate, with narrow-winged petioles, pinnatisect; lower cauline leaves like basal but sessile; middle and upper leaves narrow-lanceolate, prickly-toothed; uppermost leaves reduced, spinescent. Capitula 15–25, on relatively short and wingless peduncles, oblong-ovoid, 8 mm wide (excluding cusps), finely arachnoid-hairy. Involucre bracts erect-spreading, strong, narrow-lanceolate, carinate, with thin, 3–5 mm long cusp; inner and innermost bracts coriaceous, linear, acuminate-spinescent. Receptacular bristles white below, smooth, broadened above, scabrous. Corolla pink; anther tube purple. Achenes obovoid, glabrous, smooth, glossy, roundish above, light gray with dark spots, 3 mm long. Flowering VII–VIII; fruiting VIII.

Outcrops of red clay or red sandstone in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Takhta-Karacha Pass, near the village of Amankutan. Type in Leningrad.

144. *C. neglecta* Juz. in Bot. Mat. Gerb. Glavn. Bot. Sada, IV (1923) 78; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 548.—*C. komarowii* auct. non Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 219.

Biennial. Stems erect, 30–50 cm high, winged throughout, wings in many rows and 1–3 mm wide, weakly pubescent, smooth at extreme tip, branched almost from base, with long, slender, repeatedly branched

257 twigs, forming broad inflorescence, leaves long-decurrent, mostly recurved, greenish and arachnoid hairy-tomentose above, white or gray-tomentose beneath; basal leaves withering before anthesis; lower cauline leaves oblong-lanceolate, pinnatipartite or pinnatisect, with lanceolate, entire, short-acuminate segments; upper leaves undivided, with large and remote teeth; uppermost leaves reduced. Capitula numerous (25–65), ovoid, 6–9 mm wide (excluding cusps), pubescent. Involucral bracts 75, herbaceous, closely appressed at base, ovate, gradually acuminate into subulate, thin, erect spine, almost as long as appressed part; inner bracts coriaceous, lanceolate, acuminate-spinescent. Receptacular bristles whitish below, smooth, thickened toward apex, light brown, scabrous. Corolla straw-yellow; anther tube purple. Achenes obovoid, almost truncate above, weakly longitudinally ribbed. Flowering VII–VIII; fruiting VIII–IX.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan Range). Endemic. Described from Mussabazari. Type in Leningrad.

145. **C. dissectifolia** Kult. in Tr. Turk. Nauchn. Obshch. 1 (1923) 111; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 548.—*lc.*: Kult. op. cit. Plate (1).—*Exs.*: H.F.A.M. No. 480.

Biennial. Stem erect, 30–50 cm high, with narrow, 3–4 mm wide wings, finely floccose-arachnoid-hairy, lax corymbosely branched in upper half. Leaves decurrent, gray-tomentose on both sides, more densely beneath; basal leaves petiolate, with narrow-winged petioles, pinnatisect, with numerous (up to 10) lateral segments; lower cauline leaves like basal but sessile; middle and upper leaves lanceolate, entire or sparsely prickly-toothed; uppermost leaves reduced. Capitula 15–30, ovoid, 10 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts stiff, carinate, acuminate in divergent, 3–4 mm long cusp; inner and innermost bracts linear, coriaceous, with erect acuminate-spinescent cusp. Receptacular bristles whitish below, smooth, broadened in upper half, scabrous. Corolla bright yellow; anther tube purple. Achenes obovoid, glabrous, smooth, roundish above, 4 mm long. Flowering V–VI; fruiting VI–VII.

On clayey slopes.—*Soviet Central Asia*: Pamiro-Alai (Samarkand Mountain). Endemic. Described from Zerabulak. Type in Tashkent.

146. **C. decurrentifolia** Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 53.

Biennial. Stem erect, 25–70 cm high with narrow, 3–4 mm wide wings, finely arachnoid-hairy, profusely cymosely branched in upper half; branches long. Leaves decurrent, sparsely above and densely gray-

tomentose beneath; basal leaves petiolate, with narrow-winged petioles, lanceolate, almost entire, sometimes with one or two pairs of basal teeth; 258 lower cauline leaves like basal, but sessile; middle and upper leaves linear-lanceolate, entire; uppermost leaves reduced. Capitula 10–25(60), on long peduncles, 6 mm wide (excluding cusps), ovoid, arachnoid-hairy. Involucral bracts stiff, carinate, with short, up to 2 mm long, arcuate cusp; inner bracts linear, with straight, erect cusp. Receptacular bristles broadened upward, scabrous. Corolla bright yellow; anther tube purple. Achenes obovoid, glabrous, smooth, roundish above, 3 mm long. Flowering VI–VII; fruiting VII–VIII. (Plate XX, Fig. 2).

Loamy-gravelly and stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the vicinity of the village of Tash-Kurgan. Type in Tashkent.

Series 2. Ulotomae Juz.—Stem with few branches; leaves almost unarmed. Capitula three to seven.

147. *C. ulotoma* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 148; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 548.

Biennial. Stem erect, 15–20 cm high, densely arachnoid hairy-gray tomentose and narrow-winged from base, or with few branches from middle; branches long, one-headed. Leaves soft, grayish-green, densely arachnoid-hairy on both sides, pinnatisect; lower leaves often bipinnatisect, with narrow-lanceolate segments, usually weakly crisped, early withering; all leaves except lower short-petiolate, sessile, decurrent into wings; cauline leaves gradually reduced toward stem apex; leaves on branches strongly reduced. Capitula broadly cylindrical, 9 mm wide (excluding cusps), floccose-arachnoid hairy. Involucral bracts about 40; outer bracts appressed at base, ovate, attenuate into short and recurved cusp; middle bracts oblong, appressed at base, gradually narrowed into almost arcuate cusp; inner bracts yellowish, membranous, linear-lanceolate (about 2 mm wide), 15–17 mm long, gradually acuminate in thin short cusp. Receptacular bristles more or less broadened above, scabrous. Corolla pale yellow; anther tube pink. Achenes obovoid, 4 mm long and 1.5 mm wide, glabrous, smooth, roundish above, light brown with dark spots. Flowering VII; fruiting VII. (Plate XX, Fig. 1).

Soviet Central Asia: Pamiro-Alai (Zaravshan Range). Endemic. Described from the vicinity of the villages of Madm and Kum. Type in Leningrad.

Section 29. Lasiandrae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 40.—Capitula solitary terminal; involucral bracts appressed, attenuate at divergence and broadened into grooved, subulate ciliate-

259 toothed cusp; receptacular bristles smooth; corolla yellow; anther tube yellow, velutinous due to flexuous, thin, and arachnoid-hairy pubescence; achenes narrow-obpyramidal, weakly ribbed, roundish above. Perennial (may be monocarpic) plant with woody many-headed roots, white-tomentose caudices and more or less cordate basal cauline leaves.

Lectotype of section: *C. lasiandra* Bge.

148. *C. lasiosiphon* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 311; Kult. in Fl. Turkm. VII, 170.

Perennial (Monocarpic ?). Roots woody, caudices white-tomentose with remains of old petioles. Stem erect, 30–35 cm high, arachnoid hairy-tomentose, sulcate, straw-yellow, branched almost from base or middle, branches long, usually repeatedly branched further, one-headed. Leaves weakly floccose-arachnoid hairy, green, and slightly lustrous above, densely gray-tomentose beneath; basal leaves short-petiolate, with flattened petiole, usually arachnoid hairy-tomentose below; lamina 11–14 cm long and 5–7 cm wide, ovate or obovate, somewhat attenuate toward both ends, with large and irregularly erose-toothed, somewhat obtuse, abruptly acuminate-spinescent; cauline leaves reduced toward apex; lower cauline leaves broad-ovate, middle almost orbicular; all sessile, deeply cordate, crenate-prickly-toothed, apex roundish, with short and thin spine; upper leaves strongly reduced. Capitula 7–14 on each plant, 2–2.5 cm wide (excluding cusps), ovoid or broadly ovoid, truncate at base or weakly roundish, arachnoid-hairy. Involucral bracts about 80; outer and middle bracts lanceolate, appressed at base, slightly narrowed at divergence and broadened into grooved cusp with thin erect spines along margin, acuminate into hard, stiff and subulate spine; inner bracts thin-coriaceous, linear, scabrous dorsally, somewhat flat, gradually acuminate in long and thin spine. Receptacular bristles smooth, white. Corolla yellow; anther tube yellow, velutinous due to flexuous, thin, arachnoid-hairy pubescence. Achenes narrow-obpyramidal, acuminate towards base, 3.5–5 mm long, 1–1.5 mm wide, somewhat ribbed, with narrow fringe along margin, roundish above, matty, finely matted, light brown with dark spots. Flowering VII; fruiting VIII. (Plate XXI, Fig. 2).

Stony slopes.—*Soviet Central Asia*: mountainous Turkmenia (Badkhyz). Endemic. Described from the vicinity of Pul-i-Khatum. Type in Leningrad.

Section 30. Cynaroideae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 47.—*Macrocephalae* Bge. Ibid., 41.—*Appendiculatae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 268.—*Constrictae* Winkl. Ibid., 264 p. min. p.—Capitula solitary terminal on stem on branches; involucral

bracts narrowed in middle and broadened above into coriaceous, broadly lanceolate, weakly carinate or almost sagittate, short-acuminate, divergent appendages; corolla purple, whitish, or yellow; receptacular bristles scabrous, less often smooth; achenes obpyramidal, angular, narrow-winged along angles, toothed above. Perennial monocarpic or biennial plants, usually with long-decurrent cauline leaves; stems and branches almost leafless in upper part.

Lectotype of section: *C. cynaroides* (MB.) C.A.M.

149. *C. onopordioides* Ldb. in Echwald, Casp. Cauc. (1831–1833) 40; DC. Prodr. VI, 556; Ldb. Fl. Ross. II, 680; Bge. in Mém. Acad. Pétersb. 7 sér. 92, 54; Boiss. Fl. or. III, 507; Winkl. in Tr. Peterb. Bot. Sada, XI, 137; XII, 277; XIV, 235; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 191; Kult. in Fl. Trukm. VII, 172.—*C. karelini* Less. in Bull. Soc. Nat. Mosc. XII (1839) 159.—*C. albicaulis* Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 128; Bge. op. cit. 2, 53; Boiss. Fl. or. III, 507; Winkl. in Tr. Peterb. Bot. Sada, XII, 278; Kult. in Fl. Turkm. VII, 174.—*Onopordon polyacanthum* Eichwald, op. cit. (1831–1833) 3, nomen.—*Arctium polyacanthum*, *A. albicaule* and *A. karelini* O. Ktze. Rev. Gen. 1 (1891) 307 and 308.—*lc.*: Eichwald, op. cit. tab. 37; Fl. Turkm. VII, Plate 25; Boiss. and Buhse, op. cit. tab. 9.

Perennial (apparently monocarpic). Stem erect, densely arachnoid hairy-tomentose at base, with remains of old petioles; 80–100 cm high, whitish, glossy, glabrous or arachnoid-hairy, sulcate, broad-winged due to wide long-decurrent leaves, branched, branches spreading, up to 50 cm long, one-headed. Leaves coriaceous, grayish-green on both sides; finely arachnoid-hairy or glabrous, with prominent veins; basal leaves petiolate, broad-lanceolate, 18–30 cm long, 6–8 cm wide, pinnatilobate, with acuminate-spinescent, prickly-toothed lobes; cauline leaves sessile, broadly long-decurrent, gradually reduced toward stem apex, oblong-lanceolate, deeply crenate-toothed, with acuminate-spinescent, prickly-toothed teeth, cuspidate, slightly divergent from stem. Capitula solitary, about 40 mm wide (excluding cusps), arachnoid-hairy, ovoid-globose, with many florets. Involucral bracts numerous (about 100); outer bracts coriaceous, green, 35 mm long, 10 mm wide, carinate dorsally, broad-lanceolate, with three or four pairs of thin erect spines along margin, cuspidate, decurved; middle bracts about 50 mm long, appressed at base, 8–9 mm wide, hard-coriaceous, yellowish, glabrous, attenuate in middle, then broadened into broad-lanceolate, coriaceous, green, somewhat carinate, divergent appendage, acuminate into stiff cusp toward apex and with two or three pairs of stiff erect spines along margin; inner bracts 60 mm long, 4 mm wide, linear-lanceolate, glabrous, glossy, gradually and



long acuminate, scabrous along margin, erect. Receptacular bristles scabrous. Corolla pink (?); anther tube pink. Achenes obpyramidal, 5–7.5 mm long, 2–4 mm wide, ribbed, with corona above. Flowering V–VI; fruiting VII.

Stony, gravelly slopes of lower mountain zone and in the foothills.—*Caucasus*: Eastern Transcaucasia; Talysh; *Soviet Central Asia*: Aralo-Caspian (Mangyshlak), Kara-Kum; mountainous Turkmenia (Kopetdag, Bolshie Balkhany). *General distribution*: Iran, Pakistan, Afghanistan. Described from the vicinity of Tyu-Karagan (Mangyshlak). Type in Leningrad.

150. **C. cynaroides** (MB.) C.A.M. in Verz. (1831) 230; DC Prodr. VI, 556; Ldb. Fl. Ross. II, 680; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 50; Boiss. Fl. or. III, 506; Winkl. in Tr. Peterb. Bot. Sada, XI, 137; XII, 276; XIV, 215; Grossh. Fl. Kavk. IV, 168; Takht. in Tr. Arm. Fil. Akad. Nauk, Biol. Ser. 2, 191; Kult. in Fl. Turkm. VII, 174; Isaev in Fl. Azerb. VIII, 363.—*Carthamus cynaroides* MB. in Besch. Länd. Casp. (1800) 195; MB. Fl. taur.-cauc. II, 285.—*Onobroma cynaroides* Spreng. Syst. veg. ed. 3 (1826) 392; C.A.M. Verz. (1831) 67.—*Arctium cynaroides* O. Ktze. in Rev. Gen. 1 (1891) 307.—**lc.**: Fl. Azerb. VIII, Plate 37.

Perennial. Stem with numerous remains of old leaves at base, tomentose, erect, 30–40 cm high, usually white arachnoid-hairy, densely leafy, discontinuously winged, with decurrent leaves, usually branched; branches one-headed. Leaves coriaceous, usually arachnoid-hairy on both sides, more dense beneath, grayish green; basal leaves petiolate, lanceolate-oblong, pinnatifid, with acuminate-spinescent, approximate prickly-toothed lobes; cauline leaves sessile, broadly long-decurrent, gradually reduced toward stem apex, ovate, prickly-toothed, acuminate-cuspidate, slightly divergent; uppermost leaves reaching capitula. Capitula 20 mm wide (excluding cusps), ovoid-globose, arachnoid-hairy. Involucral bracts numerous; outer bracts 18 mm long, green, coriaceous, about 10 mm wide at base, broad-lanceolate, with two or three pairs of spinescent teeth along margin, acuminate into stiff, decurved cusp; middle bracts appressed at base, stiff-coriaceous, glabrous, attenuate in middle and broadened into lanceolate, coriaceous, green, cuneate, 13 mm long and up to 5 mm wide, divergent appendage with one or two pairs of spines along margin, acuminate-cuspidate, subsequent bracts similar but with longer base and slightly shorter appendage; inner bracts 26 mm long and 4 mm wide, linear-lanceolate, gradually acuminate into long, thin deflexed cusp, scabrous dorsally and along margin. Receptacular bristles unequal, longest scabrous. Corolla yellow; anther tube pink. Achenes angular, narrow-winged along edges, 4–4.5 mm long and 1.5 mm wide,

gray, obpyramidal, with fine teeth above. Flowering V–VI; fruiting VII.

Dry slopes.—*Caucasus*: Eastern Transcaucasia, Talysh; *Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran (north). Described from Talysh. Type in Leningrad.

151. *C. macrocephala* C.A.M. Verz. (1831) 231; DC. Prodr. VI, 556; Ldb. Fl. Ross. II, 681; Bge. in Mém. Acad. Pétersb. 7, sér. 9, 2, 41; Boiss. Fl. or. III, 503; Winkl. in Tr. Peterb. Bot. Sada, XII, 271; Grossh. Fl. Kavk. IV, 168; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 190; Fl. Azerb. VIII, 370.—*C. macrocephala* β . *spinulosa* Lomak. ex Lipsky; Fl. Kavk. (1899) 355; Grossh. Fl. Kavk. IV, 168.—*Onobroma macrocephalum* C.A.M. in Verz. (1831) 67.—*Arctium macrocephalum* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial (or monocarpic). Stem erect, tomentose at base, with remains of old petioles, 30–40 cm high, arachnoid-hairy, longitudinally sulcate, discontinuously winged due to decurrent leaves, usually weakly branched from base; branches densely leafy, one-headed. Leaves coriaceous, grayish-green, arachnoid-hairy on both sides, more densely beneath, lower side with strongly raised veins; basal leaves petiolate, with short, somewhat flat petioles, oblong, pinnatilobate, with unequal lanceolate, acuminate-spinescent lobes; cauline leaves gradually reduced, sessile, broadly long-decurrent, oblong-lanceolate to ovate, broadly crenate-prickly-toothed attenuate-cuspidate. Capitula 30–35 mm wide (excluding cusps), somewhat arachnoid-hairy, flat-globose. Involucral bracts numerous (about 80); outer bracts broad-lanceolate, herbaceous, coriaceous, carinate, cuspidate, usually recurved, 20–40 mm long, smooth along margin or less often with thin short spines; middle bracts 30–45 mm long, appressed at base, 6 mm wide, attenuate in middle, broadened above into broad-lanceolate, coriaceous, carinate appendages, latter smooth, acuminate into stiff short cusp, smooth along margin; inner bracts 35 mm long, narrow-lanceolate, gradually acuminate. Receptacular bristles unequal, longest somewhat scabrous. Corolla yellow; anther tube purple. Achenes obovoid, 5 mm long, indistinctly longitudinally ribbed, truncate above. Flowering VI–VII; fruiting VIII–IX.

Dry slopes in middle mountain zone.—*Caucasus*: Eastern and southern Transcaucasia, Talysh. *General distribution*: Iran (north). Described from Talysh. Type in Leningrad.

152. *C. lyrata* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 53; Boiss. Fl. or. III, 509; Winkl. in Tr. Peterb. Bot. Sada, XII, 278; XIV, 235; Kult. in Fl. Turkm. VII, 170.—*C. caesia* Winkl. op. cit. (1897) 238; Kult. op. cit. VII, 171.—*Arctium lyratum* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial, or perennial. Plants branched from base. Stem erect, weakly branched in upper half, arachnoid-hairy; branches one-headed. Leaves green and finely arachnoid-hairy above, gray-tomentose beneath; basal leaves 10–16 cm long, petiolate, lyrate, with large, roundish, somewhat cordate, and finely prickly-toothed terminal lobe and broad-lanceolate, sessile lateral lobes; cauline leaves 5–7 cm long, sessile, broadly short-decurrent on stem, oval-ovate, divergent, obtuse, with short spine, irregularly prickly-toothed, gradually reduced toward stem apex; uppermost leaves 1.5–2 cm long. Capitula globose, 2–2.5 cm wide (excluding cusps, 4–6 cm with cusps) and 4–4.5 cm long (with florets), arachnoid-hairy, somewhat foveate at base. Involucral bracts about 65, all except inner with thick coriaceous, broad-lanceolae or almost rhombic appendages, 8–12 mm broad at base, usually with prominent network of veins, gradually acuminate into stiff grooved cusp with two or three spinescent teeth along margin; involucral bracts themselves coriaceous, ovate, closely appressed; inner bracts erect, almost linear, often pink, gradually acuminate, short-spinescent. Corolla pink, with yellow anther tube. Receptacular bristles scabrous. Achenes obpyramidal, dark, four-angled, 5 mm long, with three or four small teeth above. Flowering VI–VII; fruiting VII–VIII. (Plate XXI, Fig. 1).

Stony-gravelly slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag, Badkhyz). *General distribution*: Northern Iran. Described from Iran. Type in Leningrad.

153. **C. purpurea** C.A.M. ex DC. Prodr. VI (1837) 555; Ldb. Fl. Ross. II, 680; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 51; Boiss. Fl. or. III, 511; Winkl. in Tr. Peterb. Bot. Sada, XII, 277; Grossh. Fl. Kavk. IV, 167; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 191; Takht. and Fedtsch. Fl. Erev. 318; Fl. Azerb. VIII, 372.—*Arctium purpureum* O. Ktze. Rev. Gen. 1 (1891) 308.—*Exs.*: Pl. or. exs. No. 23.

Biennial (or monocarpic). Stem erect, with scaly remains of old petioles at base, 15–30 cm high, finely arachnoid-hairy, longitudinally sulcate, discontinuously winged with long-decurrent leaves, branched almost from base; branches leafy, one-headed. Leaves coriaceous, finely arachnoid-hairy above, finely grayish-tomentose beneath; basal leaves petiolate, broad-lanceolate, finely crenate-spinose-toothed; cauline leaves gradually reduced upward, sessile, broadly long-decurrent, oblong-lanceolate, crenate and finely spinose-toothed. Capitula globose or
265 globose-ovoid, very finely arachnoid-hairy, 15–17(25) cm wide (excluding cusps). Involucral bracts numerous, all except inner closely appressed at base, constricted in middle, and broadened in small, lanceolate, dorsally carinate horizontal or arcuately decurved appendages

with two pairs of thin spines along margin; inner bracts lanceolate, gradually acuminate, thin cuspidate, erect. Receptacular bristles unequal, weakly scabrous above. Corolla purple; anther tube creamish. Achenes obpyramidal, almost four-angled, with four small teeth above, 5 mm long. Flowering VII–VIII; fruiting VIII–IX.

Dry slopes in lower and middle mountain zone, often as weeds.—*Caucasus*: Southern Transcaucasia. *General distribution*: Northern Iran. Described from the area between towns of Nakhichevan and Kok. Type in Leningrad.

154. *C. freynii* Bornm. and Sint. in Russk. Bot. Zhurn. 1 (1911) 4; Kult. in Fl. Turkm. VII, 204.—*lc.*: Bornm. and Sint. op. cit., Plate III.

Perennial (monocarpic?). Root vertical, woody blackish-fibrous; root collar thickened. Stem 100–150 cm high, basally covered with numerous woody remains of old leaves, tomentose, erect, glabrous above, long paniculately branched; branches glabrous, long, often bent, with solitary terminal capitula, usually capitula also axillary; stem and branches leafy mainly in lower half, almost leafless above. Leaves coriaceous, appressed white-tomentose on both sides; basal leaves petiolate, narrow oblong-lanceolate, 15–20 cm long, 4 cm wide, pinnatipartite, sinuate with approximate lobes, lobes 12–15 pairs, deltoid, acuminate-spinescent, spinose-toothed; cauline leaves like basal but sessile, smaller; uppermost leaves 1–1.5 cm long, lanceolate, acuminate-spinescent, divergent. Capitula flat-cylindrical, 20–25 mm wide (excluding cusps), finely arachnoid-hairy, somewhat foveate at base. Involucral bracts 50–60, all except inner basally appressed, slightly narrowed in middle and then broadened into coriaceous, green, somewhat grooved, deltoid-triangular, acuminate-spinescent appendage, smooth along margin, 7–10–12 mm wide at base and 12–20 mm long; inner bracts membranous, straw-yellow, lanceolate, scabrous along margin, gradually and short thin acuminate; receptacular bristles smooth. Corolla light purple. Achenes 5–6 mm long, 3 mm wide, indistinctly ribbed; slightly compressed, with small corona. Flowering VI–VII; fruiting VII.

Mountain slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). *General distribution*: Northern Iran. Described from Sulyukli. Type in Czechoslovakia.

155. *C. beckeri* Trautv. in Tr. Peterb. Bot. Sada, IX (1886) 457; XII, 268; XIV, 212; Kult. in Fl. Turkm. VII, 172.—*lc.*: Fl. Turkm. VII, Plate 26.

266 Perennial (monocarpic). Root woody, root collar thick, covered with remains of old leaves. Stem erect, 20–40 cm high, white-tomentose, simple or sparsely branched; branches one-headed, stem and branches

densely leafy, appearing discontinuously winged with broadly long-excurrent leaves. Leaves coriaceous, finely arachnoid-hairy above, white-tomentose beneath; basal leaves oblong, 7–10 cm long, lyrate, lateral lobes triangular-ovate, decurrent along midrib, acuminate-spinescent, prickly-toothed; cauline leaves strongly reduced, 2–2.5 cm long, 13–20 mm wide, almost obovate, acuminate-spinescent, prickly-toothed, sessile, broadly long-decurrent over stem. Capitula globose, densely arachnoid-hairy, 20–22 mm wide (excluding cusps; with cusps 55 mm); 35–40 mm long (with florets). Involucral bracts numerous, constricted in middle, lanceolate and closely appressed at base, with foliaceous, recurved, carinate, acuminate-spinescent, basally sagittate appendage in upper half, with 2 opposite teeth; inner bracts with shorter appendage, with shorter obtuse teeth; innermost bracts finely coriaceous, linear, scabrous along margin, short acuminate-spinescent. Receptacular bristles almost smooth, with scarcely noticeable indentation. Corolla whitish. Achenes obovoid, four-angled, with narrow and thick wings along edges, gray, 5 mm long, 3 mm wide. Flowering V–VI; fruiting VI–VII.

Mountain slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). Endemic. Described from Kyzyl-Arvat. Type in Leningrad.

Section 31. Kopetdagia Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 84.—*Odontocarpae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 253 p. min. p.—Capitula solitary terminal on stem or branches; involucral bracts lanceolate, carinate, gradually attenuate into short cusp; corolla pink or pale-yellow; receptacular bristles scabrous; achenes four-angled, narrow-winged along edges. Monocarpic perennial or biennial plants with decurrent cauline leaves.

Type of section: *C. smirnowii* Trautv.

156. *C. smirnowii* Trautv. in Tr. Peterb. Bot. Sada, VIII (1883) 488; Winkl. *ibid.* XI, 136; XII, 259; Kult. in Fl. Turkm. VII, 191.—*C. smirnowii* var. *armata* Winkl. *op. cit.* XI (1890) 136; XII, 259.—*C. smirnowii* var. *globosa* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VII (1929) 5.—*C. russeola* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 319; Kult. in Fl. Turkm. VII, 190.—*Arctium smirnowii* O. Ktze. Rev. Gen. 1 (1891) 308.— *Ic.*: Fl. Turkm. VII, Plate 30, Fig. 1.— *Exs.*: H.F.A.M. No. 49.

Perennial (monocarpic). Root woody, root collar with remains of old leaves. Stem erect, white-tomentose, striate-sulcate, leafy, cymosely branched in upper half. Leaves soft, grayish-green, gray arachnoid-hairy on both sides; basal leaves in many-leaved rosette, 8 cm long, 2.5 cm wide, petiolate, with 2 cm long petioles; oblong-lanceolate, pinnatisect, with deltoid-lanceolate, acuminate-spinescent segments or bipinnatifid

with prickly-toothed lobes; cauline leaves gradually reduced, sessile, usually decurrent, and then stem appearing discontinuously winged; lower cauline leaves usually like basal; middle leaves pinnatilobate, with narrow-triangular or almost lanceolate acuminate-spinose lateral lobes, broadly decurrent; upper cauline leaves ovate, crenate-spinose-toothed, long-decurrent, narrowed into stiff, divergent, short cusp; uppermost leaves strongly reduced. Capitula solitary terminal on branches, arachnoid hairy-tomentose, with white or rusty tomentum, 20–28 mm wide (excluding cusps). Involucral bracts about 70, all except inner lanceolate, dorsally carinate, appressed at base, deflected almost from middle in grooved tip; outer bracts almost horizontal or slightly decurved, 15–20 mm long, middle bracts divergent, 22–28 mm long; inner bracts membranous, erect, narrow-lanceolate, short and thin acuminate, scabrous along margin, usually pink dorsally, 28–30 mm long; receptacular bristles scabrous; corolla pink. Achenes 5 mm long, 2.5–3 mm wide, four-angled, obovoid or narrow-winged along angles, smooth, usually with four teeth above, dark gray. Flowering VI–VII; fruiting VII–VIII.

In the zone of alpine steppes, montane xerophytes and juniper forests.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). *General distribution*: Iran. Described from the vicinity of Akhal-Teke. Type in Leningrad.

Note. The plants from Chapandag, described by S.V. Juzepczuk under the name *C. russeola*, differ somewhat from the type of *C. semenowii* Trautv. by larger, rusty-tomentose capitula and thicker involucral bracts. At present, we have extensive material of this species from the town of Chapandag, from which it can be judged that *C. russeola* does not deserve recognition; only one species grows in Kopetdag, which varies somewhat in its characters.

157. *C. botschantzevii* Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 93.

Biennial. Stem erect, 20–40 cm high, shallow-sulcate, arachnoid-hairy, discontinuously winged, branched in upper half; branches one-headed; stem wings 2–4 mm wide, with sparse small teeth. Leaves grayish-green and scatteredly arachnoid-hairy above, finely gray-tomentose beneath; basal leaves short-petiolate, lanceolate, pinnatisect into unequal, narrow-lanceolate, remote lateral lobes; lower cauline leaves like basal but sessile, decurrent in stem wings; middle leaves oblong, pinnatipartite, decurrent in stem wings; upper and uppermost leaves short-lanceolate, with small teeth, short decurrent. Capitula globose, with many florets, 18 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts green, almost coriaceous, all squarrose, gradually acuminate into very short, thin spine; inner and innermost bracts with scarious, lanceolate,

short acuminate appendages. Receptacular bristles scabrous. Corolla yellow, exserted. Achenes obovoid, glabrous, glossy, roundish above, grayish with dark spots. Flowering V; fruiting VI. (Plate XXIII, Fig. 1).

Stony-gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Nuratau Mountains). Endemic. Described from Nuratau. Type in Tashkent.

Section 32. Helianthae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 39; Juz. in Tr. Tadh. Bazy Akad. Nauk SSSR, 8, 553.—Capitula solitary terminal on stem and branches; involuclral bracts acuminate in long, stiff, three-angled cusp; corolla pale yellow; receptacular bristles smooth. Achenes obovoid, flat-compressed, broad-winged along edges. Biennial herbs with wingless stem and coriaceous, sessile cauline leaves.

Type of section: *C. heliantha* Bge.

158. *C. spryginii* Kult. in Pochv. i Bot.-Geogr. Issl. Bass. rr. Amu-i S̄yr-Dari, 2 (1916) 78; Juz. in Tr. Tadh. Bazy Akad. Nauk SSSR, 8, 553.—*Ic.*: Kult. op. cit. No. 24.

Biennial. Stem 20–40 cm high, erect, arachnoid-hairy, striate-sulcate, branched from base; branches unicapitulate, leafy. Leaves finely arachnoid-hairy above, gray-tomentose beneath, prickly-toothed; basal leaves short-petiolate (petioles broad, winged), oblong-obovate, crenate-lobate, lobes short-acute; lower cauline leaves like basal but sessile; middle and upper cauline leaves sessile, oblong-obovate, roundish above with short and thin spine, crenate-toothed, half to two-thirds as long as basal leaves. Capitula globose, large, 25–35 mm wide (excluding cusps), densely arachnoid-hairy. Involuclral bracts acuminate into long, stiff, three-angled spine; outer bracts slightly decurved, 25 mm long, stiff, carinate; middle bracts squarrose, up to 40 mm long, subulate, carinate; subsequent bracts somewhat flat, gradually acuminate into spine; inner bracts coriaceous, linear-lanceolate, acuminate, not exceeding middle bracts. Receptacular bristles smooth. Corolla pale yellow. Achenes obovoid, flat, margins with broad wings (one-third or one-fourth of achene width), not connivent at apex, grayish-green with dark dots, 4.5–5 mm long and 3 mm wide. Flowering V–VII; fruiting VII–VIII.

269 On varicolored rock strata in the foothills.—*Soviet Central Asia*: Pamiro-Alai (southwest). Endemic. Described from the vicinity of Baisun. Type in Tashkent.

Section 33. Dichotomae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 8 p. max. p.—*Squarrosae* Boiss. in Fl. or. III (1875) 460 p. min. p.—*Constrictae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 264 p. p.—Series *Dichotomae* Juz. in Tr. Tadh. Bazy Akad. Nauk SSSR, 8 (1940)

545.—Plants dichotomously branched. Capitula solitary or aggregated at stem or branch tips; involucre bracts gradually attenuate into thin, squarrose or almost horizontal, less often almost falcate cusp; corolla pink, whitish or pale yellow; receptacular bristles smooth or scabrous; achenes longitudinally ribbed, narrow-winged along ribs, toothed above. Annual plants with soft, sessile, almost undivided or prickly-toothed leaves.

Lectotype of section: *C. dichotoma* Bge.

159. *C. dichotoma* Bge. in Delect. Sem. Hort. Dorpat. (1845) 3; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 9; Boiss. Fl. or. III, 478; Winkl. in Tr. Peterb. Bot. Sada, XII, 267 p. p.; XIV, 231; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 545; Kult. in Fl. Turkm., VII, 166.

Annual. Stem erect, 10–25 cm high, slender, with isolated many-celled hairs, leafy, dichotomously branched right from base; branches one-headed. Leaves green on both sides, upper surface with isolated many-celled hairs scattered throughout, lower surface glandular with many-celled hairs, sessile, semiamplexicaul, ovate, spinose-toothed. Capitula 5–6 mm wide (excluding cusps), arachnoid-hairy. Involucre bracts less numerous, lanceolate, gradually acuminate into thin, erect cusp; inner and middle bracts green, sparsely glandular, 5–8 mm long, inner bracts membranous above, short-acuminate and erect; receptacular bristles white, smooth; corolla pink, eglandular. Achenes obovoid, with longitudinal narrow-winged ribs, toothed above. Flowering V–VI; fruiting VI.

Sands in foothill deserts.—*Soviet Central Asia*: Kyzyl-Kum, Amu-Darya. Endemic. Described from Kyzyl-Kum. Type in Paris; cotype in Leningrad.

160. *C. erectispina* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 94.

Annual. Stem dichotomously branched right from base, 15–30 cm high, erect, with isolated many-celled hairs and weakly arachnoid-hairy pubescence, leafy; branches somewhat ascending, long, in turn branched, one-headed. Leaves green on both sides, almost glabrous above with isolated glandular and many-celled hairs, glandular beneath with very thin arachnoid-hairy pubescence and many-celled hairs on midrib, sessile, semiamplexicaul, lanceolate or oblong-ovate, prickly-toothed. Capitula ovoid, 7–8 mm wide (excluding cusps), finely arachnoid-hairy. Involucre bracts sparsely glandular; outer and middle bracts lanceolate, 10–15 mm long, gradually acuminate in stiff, horizontal or erect, 9–12 mm long cusp; inner bracts membranous above, short-acuminate; receptacular bristles white, smooth; corolla pink. Achenes obovoid, longitudinally

ribbed, with narrow discontinuous wings along ribs, pitted-rugose, spotted, 3–3.5 mm long. Flowering V; fruiting VI.

On sandy takyr, old fields, saline areas with sandy soil.—*Soviet Central Asia*: Syr-Darya, Kyzyl-Kum, Kara-Kum. Endemic. Described from Ziadin. Type in Tashkent.

161. *C. polytimetica* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 103.

Annual. Stem dichotomously and divaricately profusely branched from base, with many-celled, flat, white hairs and arachnoid-hairy pubescence. Leaves coriaceous, green on both sides, glandular above, glandular and finely arachnoid-hairy beneath; basal leaves short-petiolate, oblong, crenate-spinose-toothed; cauline leaves sessile, semiamplexicaul, crenate-toothed, teeth terminating into stiff erect spine. Capitula ovoid, 9–10 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts green, acuminate into stiff, yellow, subulately three-angled spine, all except inner narrow-lanceolate, dorsally carinate, glandular, erect-spreading, 12–15 mm long; inner bracts membranous, scabrous along margin, short and thin acuminate, about 10 mm long; receptacular bristles smooth, white; corolla pink. Achenes obovoid, longitudinally ribbed, narrow-winged along ribs, toothed above, 3 mm long. Flowering VI; fruiting VII.

In the foothills and high deserts.—*Soviet Central Asia*: Pamiro-Alai (along the Zeravshan River in the foothills of Nuratau). Endemic. Described from the foothills of the Nuratau Range, Tatak-Sai. Type in Leningrad.

162. *C. patentispina* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 101.—Exs.: GRF No. 2777 (sub. *C. bungeana* Rgl. and Schm.).

Annual. Stem erect, 20–30 cm high, white, with isolated glandular and many-celled hairs, leafy, dichotomously branched from base; branches one-headed. Leaves green on both sides, glabrous above with occasional many-celled hairs, glandular beneath with very thin arachnoid-hairy pubescence and many-celled hairs along midrib; basal leaves apparently petiolate; cauline leaves sessile, amplexicaul, oblong-lanceolate, prickly-toothed along margin. Capitula 7–8 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts green, very sparsely glandular; outer and middle bracts lanceolate, 8–11 mm long, acuminate in somewhat decurved stiff cusp; inner bracts membranous above, erect, short-acuminate; receptacular bristles white, smooth; corolla pink. Achenes obovoid, longitudinally ribbed, with very narrow discontinuous wings, pitted-rugose. Flowering V; fruiting VI.



On takyrs.—*Soviet Central Asia*: Syr-Darya, Kyzyl-Kum, Kara-Kum. Endemic. Described from Mubarek. Type in Tashkent.

163. *C. sylvicola* Bge. in Delect. Sem. Hort. Dorpat. (1845) 3; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 9; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, VIII, 545.—*C. dichotoma* auct. non Bge.: Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 263 p. p.; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 194.

Annual. Stem erect, 7–10 cm high, slender, with isolated many-celled hairs, leafy, branched above; branches short, one-headed. Leaves finely coriaceous, green and glabrous above; grayish-green and finely arachnoid-hairy beneath; basal leaves petiolate, oblong-lanceolate, crenate-toothed, teeth acuminate into thin and short (1–1.5 mm long) spines; cauline leaves sessile, somewhat amplexicaul, lanceolate, short prickly-toothed, gradually reduced toward stem apex. Capitula 5–6 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts green, somewhat flat; outer and middle bracts 8–9 mm long; lanceolate, with falcately decurved cusp, inner bracts lanceolate, membranous above, short-acuminate, erect; receptacular bristles smooth, white; corolla creamish (?). Achenes three-angled, pitted, with teeth above.

On sands.—*Soviet Central Asia*: Amu-Darya, Kyzyl-Kum (?). Endemic. Described from the area between the Kuvan and Yandarya rivers. Type in Paris.

Note. A little known species; additional material is necessary in order to compare it with all members of the section.

164. *C. bungeana* Rgl. and Schmalh. in Tr. Peterb. Bot. Sada, VI (1880) 318; Winkl. *ibid.* XII, 267 p. p.; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 545.—*Arctium bungeanum* O. Ktze. Rev. Gen. 1 (1891) 307.

Annual. Stem spreadingly branched from base, 25–30 cm high, white, with numerous thick hairs and arachnoid-hairy pubescence, often glandular below capitulum, leafy; branches one-headed. Leaves thin-coriaceous, green, very finely and sparsely arachnoid-hairy, glandular above, grayish-green and finely arachnoid hairy-tomentose beneath; basal leaves usually short-petiolate, lanceolate; cauline leaves ovate or sometimes orbicular, sessile, auriculate, prickly crenate-toothed. Capitula 13–14 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts green, densely glandular; outer and middle bracts lanceolate, squarrose, dorsally carinate, wide, up to 2 mm wide at base; inner bracts linear, membranous at apex, short-acuminate; receptacular bristles smooth, white; corolla creamish or pale yellow, eglandular. Achenes obovoid, 3 mm long, almost three-angled, longitudinally ribbed, with

narrow discontinuous wings and small pits. Flowering V–VI; fruiting VI.

On sandy, loamy-gravelly substrates.—*Soviet Central Asia*: Syr-Darya, Tien Shan (western foothills). Endemic. Described from the vicinity of Leninabad (Khodzhent). Type in Leningrad.

Note. The species varies greatly in the glandular cover of the leaves and involucre bracts; this character is very important in this group of species and deserves further study, in the first instance in the populations.

165. **C. pusilla** Winkl. in Tr. Peterb. Bot. Sada, X (1889) 468; XII, 197; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, VIII, 545.—*Arctium pusillum* O. Ktze. Rev. Gen. 1 (1891) 308.

Annual. Stem erect, 8–15(25) cm high, white, arachnoid-hairy leafy, sparsely branched in upper half; branches short, one-headed. Leaf coriaceous, green and glabrous above, sparsely grayish-tomentose beneath, broad-lanceolate, sessile (except lower short petiolate), with small teeth, teeth acuminate into thin, short, 1–2 mm long spine. Capitula broadly ovoid, 7–9 mm wide (excluding cusps), arachnoid-hairy. Involucre bracts green; outer and middle bracts lanceolate, 7–10 mm long, without glands, acuminate into horizontal thin cusp; inner bracts membranous, short-acuminate, usually purple; receptacular bristles white, smooth; corolla pink, eglandular. Achenes obovoid, 3 mm long, almost three-angled, longitudinally ribbed, with narrow discontinuous wings and small spots, pitted-rugose. Flowering V; fruiting V–VII.

Saline sandy loams, in the foothills.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the vicinity of Dzhalikul on the left bank of the Vakhsh River. Type in Leningrad.

166. **C. orthacantha** Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 98.

Annual. Stem divaricately branched from base, 15–20 cm high, white, sparsely glandular, with thick many-celled hairs and arachnoid-hairy pubescence, leafy; branches somewhat ascending, leafy, in turn profusely branched with numerous short branchlets. Leaves coriaceous, grayish-green, sparsely sessile glandular-hairy, and finely arachnoid-hairy above, sparsely white-tomentose beneath with prominent veins, large-toothed, teeth acuminate into stiff, 3–5 mm long spine; basal leaves oblong-lanceolate, short-petiolate; cauline leaves ovate, sessile, weakly amplexicaul. Capitula broadly ovoid, 10–12 mm wide (excluding cusps), arachnoid-hairy. Involucre bracts green; outer and middle bracts divergent, 11–14 mm long, narrow-lanceolate, carinate dorsally, glandular, acuminate in short cusp; inner bracts lanceolate, 13 mm long, membranous, white, short acuminate; receptacular bristles smooth;

corolla creamish (?) or light pink. Achenes obovoid, 3–3.5 mm long, longitudinally ribbed with very narrow undivided wings along ribs. Flowering V; fruiting VI.

On stable sands.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the Kafirgigan River Valley near Tshkan-Tepe. Type in Tashkent.

167. *C. tedshenica* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 105.

Annual. Stem divaricately branched almost from base, 10–20 cm high, whitish, indistinctly striate-sulcate with many-celled, somewhat flat, flexuous hairs. Leaves thin-coriaceous, green above with isolated many-celled hairs scattered throughout, finely arachnoid-hairy beneath and also with many-celled hairs; basal leaves oblong, short-petiolate, crenate-toothed, teeth acuminate in thin spine; cauline leaves sessile, semiamplexicaul, reduced toward stem and branch apices. Capitula broad cylindrical, 7–10 mm wide (excluding cusps), very finely arachnoid-hairy, usually foveate at base. Involucral bracts numerous, green, all except inner ovate, closely appressed, free in middle, very sharply decurved, acuminate in short cusp; inner bracts membranous, broad-lanceolate, weakly scabrous along margin, 10–12 mm long, with short thin cusp, 2–2.5 mm wide in upper broadened part; receptacular bristles unequal, longest slightly scabrous. Corolla creamish (?). Achenes obovoid, three-angled, 4 mm long, narrow-winged along edges, pitted-rugose. Flowering IV, fruiting V.

Stable sands and outcrops of bedrocks in deserts.—*Soviet Central Asia*: mountainous Turkmenia (Badkhyz), Kara-Kum. Endemic. Described from the vicinity of Lake Er-Oilan-Duz. Type in Tashkent.

168. *C. murgabica* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 97.—*C. pygmaea* auct. non Winkl.; Kult. in Fl. Turkm. VII (1960) 164.—*C. bungeana* auct. non Winkl.: Kult. *ibid.* 168.

Annual. Stem 20–25 cm high, weakly and repeatedly branched from base, whitish, cylindrical, with many-celled hairs. Leaves thin-coriaceous, green above, sparsely glandular, finely arachnoid-hairy beneath, very slightly reduced toward stem and branch apices; cauline leaves sessile, semiamplexicaul, crenate-toothed, with teeth acuminate into thin erect spine. Capitula globose-pyramidal, 9–11 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts numerous, all except inner ovate to oblong-ovate, free in middle, narrow-lanceolate, about 10 mm long, gradually acuminate into thin subulate, horizontal cusp; inner bracts membranous, narrow-lanceolate, 1–1.5 mm wide, scabrous along margin,

acuminate into thin, short, erect cusp; receptacular bristles unequal, weakly scabrous; corolla whitish or pale pink (?). Achenes obovoid, angular, narrow-winged, toothed, 3–3.5 mm long. Flowering V; fruiting V.

On sands.—*Soviet Central Asia*: Kara-Kum. Endemic. Described from the sands near the village of Sary-Yazy. Type in Leningrad.

169. *C. angusticeps* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 323; Kult. in Fl. Turkm. VII, 167.

Annual. Stem erect, somewhat arachnoid-hairy, glossy. Leaves sessile, ovate-oblong, almost undivided, spinescent, erose-toothed, green on both sides, somewhat arachnoid-hairy-flocculose beneath. Capitula 12–13 mm long (with florets) and 4 mm wide (excluding cusps), ovoid-oblong, roundish below, aggregated at stem apices. Involucral bracts (about 30) pale green, somewhat arachnoid-hairy; outer bracts 2 mm long and 0.5 mm wide at base; middle bracts appressed at base, lanceolate, 5 mm long and 1 mm wide, attenuate into thin 1.5 mm long divergent spine at apex; inner bracts 11 mm long and 1 mm wide, linear, membranous, glossy, gradually acuminate, toothed, whitish; receptacular bristles weakly scabrous; corolla yellowish; anther tube pink. Achenes 4 mm long and 1.5 mm wide, oblong-pyramidal, pitted-rugose, toothed above. Flowering IV–V; fruiting V. (Plate X, Fig. 1).

Sandy and clayey deserts.—*Soviet Central Asia*: Kara-Kum, mountainous Turkmenia (Kopetdag). Endemic. Described from Kara-Kum between the village of Annenkovo and the Kara-Kuyu well. Type in Leningrad.

170. *C. eugenii* Kult. in Bot. Mat. Gerb. Glavn. Bot. Sada, V (1924) 141; Kult. in Fl. Turkm. VII, 164.

Annual. Stem dichotomously branched from base, forming hemispherical shrub, 6–10 cm high, whitish, flocculose-arachnoid-hairy, leafy. Leaves coriaceous, sessile, attenuate toward both ends, broad-lanceolate, acuminate into thin spine, crenate-toothed, teeth acuminate into 6–10 mm long, thin spine, green and finely arachnoid-hairy above, glaucous and finely tomentose beneath. Capitula small, 7 mm wide (excluding cusps), broadly ovoid, finely and appressed pubescent. 276 Involucral bracts numerous, all equal, narrow lanceolate, gradually acuminate in long, weakly uncinat, thin spine, deflexed only at tip; outer bracts 5–6 mm, middle up to 10 mm, inner up to 12 mm long, purple-tipped. Corolla purple. Receptacular bristles smooth. Achenes narrow, obpyramidal, almost four-angled, 3.5 mm long and 1 mm wide, narrow-winged, rugose-pitted, toothed above. Flowering V; fruiting VI–VII.

On semistable sands.—*Soviet Central Asia*: Kara-Kum, Amu-Darya, Kyzyl-Kum, mountainous Turkmenia (Badkhyz). Endemic. Described from region between Karshi and Kagan. Type in Tashkent.

Section 34. Xiphiolepidae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 38 p. p.—*Serratuloideae* Bge. in Boiss. Fl. or. III (1875) 459 p. p.—*Constrictae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 264 p. p.—Capitula solitary terminal on stem and branches; involucre bracts numerous, carinate, gradually acuminate; corolla whitish; receptacular bristles smooth; achenes obovoid, without pappus. Biennial plants with many rows of wings on stem, and cauline leaves decurrent into wings.

Lectotype of section: *C. xiphiolepis* Boiss.

171. *C. hystrix* C.A.M. in Ind. sem. hort. Petrop. 2 (1835) 34; DC. Prodr. VI, 554; Ldb. Fl. Ross. II, 677; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 38; Winkl. in Tr. Peterb. Bot. Sada, XII, 267; Boiss. Fl. or. III, 466; Bornm. in Vestn. Tifl. Bot. Sada, 30, 19, 24; Grossh. Fl. Kavk., IV, 167; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 177; Fl. Azerb. VIII, 364.—*Carthamus pterocaulos* C.A.M. Verz. (1831) 67.—*Arctium hystrix* O. Ktze. Rev. Gen. 1 (1891) 308.

Annual. Stem erect, white arachnoid-hairy, winged throughout, wings in many rows, crenate-prickly-toothed. Leaves coriaceous, gray arachnoid-hairy on both sides, more densely beneath; basal leaves petiolate, oblong-lanceolate, pinnate-prickly lobed, with narrow triangular, spinescent lobes; cauline leaves gradually reduced upward, sessile, decurrent in wings, like basal but usually with more approximate lobes, not in same plane, as a result leaf margin appearing spinose. Capitula globose-pyramidal, 25 mm wide (excluding cusps), finely arachnoid-hairy. Involucre bracts numerous, erect or outermost bracts almost horizontal, narrow-lanceolate, weakly carinate, gradually attenuate in short cusp, 20–30 mm long; inner bracts membranous above, gradually acuminate into subacute cusp, dorsally scabrous in middle; receptacular bristles smooth. Corolla whitish; anther tube pink. Achenes obovoid, 4–4.5 mm long, with scarcely noticeable longitudinal stripes and short corona above, without pappus. Flowering VII–VIII; fruiting VIII–IX. (Plate XXII, Fig. 2).

277 Gravelly dry mountain slopes in middle mountain zone.—*Caucasus*: Eastern Transcaucasia, Talysh. *General distribution*: Northwestern Iran. Described from Talysh. Type in Leningrad.

Section 35. Pugioniferae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 30 p. p.—*Calcitrapae* Boiss. Fl. or. III (1875) 460 p. p.—*Xiphaeanthae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 232 p. p.—

Macropterae Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2 (1937) 189.—Capitula solitary terminal on stem and branches; involucre bracts less numerous, closely appressed at base, ovate, abruptly attenuate in stiff carinate cusp; corolla purple; receptacular bristles smooth; achenes obovoid, longitudinally ribbed. Biennial plants with discontinuously winged stems and long-decurrent cauline leaves.

Lectotype of section: *C. pugionifera* Spach.

172. **C. macroptera** C.A.M. in DC. Prodr. VI (1837) 555; Ldb. Fl. Ross. II, 679; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 32; Boiss. Fl. or. III, 492; Winkl. in Tr. Peterb. Bot. Sada, XII, 234; Grossh. Fl. Kavk. IV, 165; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 190; Takht. in Fl. Erev. 318; Fl. Gruzii, VIII, 443; Fl. Azerb., VIII, 370.—*C. obovata* Boiss. Fl. or. III (1875) 491.—*C. macroptera* var. *obovata* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 235.—*Arctium macropterum* O. Ktze. Rev. Gen. 1 (1891) 308.—*A. obovatum* O. Ktze. Ibid.—*Cousinia carlinoides* auct. non DC.: Boiss. and Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 126; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 32 (quoad Boiss. and Buhse).—**lc.**: Fl. Azerb., VIII, Plate 36.

Biennial. Stem erect, 15–40 cm high, white arachnoid-hairy, spreadingly branched from middle, forming hemispherical inflorescence; stem and branches densely leafy, discontinuously winged with long and broadly excurrent leaves. Leaves coriaceous, grayish green and finely arachnoid-hairy above, white-tomentose beneath, with network of prominent veins; basal leaves short-petiolate, obovate-orbicular or ovate, crenate-prickly-toothed or shallow lobate; cauline leaves gradually reduced, sessile, broadly long-decurrent, lanceolate or oblong-lanceolate, finely prickly-toothed, acuminate-spinescent. Capitula globose-ovoid, 8–9 mm wide (excluding cusps), about 20 mm long, corolla erect, finely arachnoid-hairy basally truncate. Involucre bracts less numerous, 25–30, abruptly attenuate towards apex into divergent or almost horizontal, short, carinate cusp; inner bracts lanceolate, purple in middle, transparent-scarious above, orbicular, erect; receptacular bristles smooth. Corolla purple; anther tube purple. Achenes narrow-obovoid, longitudinally ribbed, transversely rugose, with small toothed above, about 4 mm long, dark. Flowering V–VI; fruiting VI–VII.

278 Dry stony slopes in lower mountain zone.—*Caucasus*: Southern Transcaucasia. *General distribution*: Asia Minor (Turkey), Iran. Described from Nakhichevan. Type in Leningrad.

Section 36. Microcarpae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 43.—*Alpinae* Bge. Ibid. (1865) 45 p. p.—*Xiphiolepidis* Bge. Ibid. (1865) 38 p. p.—*Psilacanthae* Boiss. Fl. or. III (1875) 461.—

Serratuloideae Boiss. Ibid. (1875) 459 p. p.—*Lampocarpae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 242.—*Odontocarpae* Winkl. Ibid. (1892) 253 p. p.—*Homalochatae* Winkl. Ibid. (1892) 200 p. p.—*Microcarpa* Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8 (1940) 514, 553.—Capitula solitary terminal on stem or branches; involucre bracts either almost linear, acuminate in thin stiff cusps, or almost lanceolate, acuminate in short, stiff, triangular cusp; corolla purple, whitish, or yellow; receptacular bristles scabrous, less often smooth; achenes glabrous, smooth, less often almost three-angled. Biennial, less often perennial or monocarpic herbs, with wingless or winged stems and sessile, less often short-decurrent cauline leaves.

Lectotype of section: *C. microcarpa* Boiss.

Subsection 1. Coronophora Juz.—Involucre bracts numerous, gradually acuminate in thin stiff cusp; inner bracts with membranous appendages, forming “collar” or “corona”; achenes glabrous, smooth; receptacular bristles scabrous. Biennial or perennial plants with wingless stem.

173. *C. radians* Bge. in Delect. Sem. Hort. Dorpat. (1845) 3; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 44; Boiss. Fl. or. III, 495; Winkl. in Tr. Peterb. Bot. Sada, XII, 253; XIV, 207; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 172; Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR 8, 553.—*C. stenolepis* Rgl. and Schmalh. in Izv. Obshch. Lyubit Estestv. Antrop. i Etn. 34, 2 (1882) 49; Winkl. in Tr. Peterb. Bot. Sada, XII, 252; XIV, 207.—*C. interrupta* Winkl. Ibid. XII (1892) 229.—*C. coronata* auct. non Franch.: Winkl. Ibid. XIV (1897) 229 p. p.—*Arctium radians* O. Ktze. Rev. Gen. 1 (1891) 307.—*A. stenolepis* O. Ktze. Ibid. (1891) 308.—**Exs.:** GRF No. 1423 (sub. *C. stenolepide* Rgl. and Schmalh.).

Perennial or biennial. Stems 30–60 cm high, erect, partly arachnoid-hairy, glabrescent, weakly branched, usually from middle; branches one-headed, leafy. Leaves coriaceous, relatively finely spinose-toothed, green and glabrous above, white-tomentose beneath; basal leaves short-petiolate, lyrate, with ovately acuminate terminal lobe and ovate lateral lobes or pinnatisect; lower cauline leaves like basal but sessile; middle leaves oblong-lobate, sessile, auriculate; upper leaves oblong, acuminate-spinose with short spine, one-third to half as long as middle leaves, sessile, auriculate; uppermost leaves strongly reduced. Capitula ovoid-globose, 15–20 mm wide (excluding cusps), weakly arachnoid-hairy. Involucre bracts numerous, stiff, 1–1.2 mm wide at base, with subulate cusp, as wide as thick, green, erect-spreading; outermost bracts 5–15 mm long and outer 18–20 mm long, both not exceeding middle bracts; middle bracts coriaceous, carinate, 20–22 mm long; inner bracts with

membranous, oblong-lanceolate, usually pale purple appendages, forming corona, exceeding adjacent middle bracts by 20 mm; receptacular bristles scabrous. Corolla pink, not exerted from collar. Achenes oblong-obovoid, grayish, indistinctly three-angled. Flowering VI–VII; fruiting VII–VIII.

Clayey and gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. *General distribution*: Iran. Described from the Zeravshan Basin, near Samarkand. Type in Paris.

174. *C. coronata* Franch. in Ann. Sc. Nat. Bot. 6 sér. 16 (1883) 321; Winkl. in Tr. Peterb. Bot. Sada, XIV, 229 p. p.—*C. campylacantha* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 312; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 554.—*C. radians* β . *paradoxa* Bornm. in Beih. bot. Centralbl. XXXIV.—2 (1916) 178.—*Arctium coronatum* O. Ktze. Rev. Gen. 1 (1891) 307.—*lc.*: Franch. op. cit. tab. 18.

Perennial or biennial. Stem 25–50 cm high, erect, sparsely arachnoid-hairy, striate-sulcate, weakly branched from middle or base; branches one-headed, leafy. Leaves coriaceous, finely spinose-toothed, green and glabrous above, finely gray-tomentose beneath; basal leaves short-petiolate, lyrate, with ovately acuminate terminal lobe or pinnatisect; lower cauline leaves like basal but sessile; middle leaves lobed, lobes acuminate-spinescent; upper leaves oblong, shorter than middle; uppermost leaves reduced. Capitula ovoid-globose, 18–22 mm wide (excluding cusps), weakly arachnoid-hairy. Involucral bracts stiff, carinate, with short cusp, green, wider than in previous species, 2 mm wide at base, erect, weakly arcuately decurved; outermost bracts half as long as outer; outer bracts 15 mm long; middle bracts coriaceous, carinate, slightly flat above, with short cusp; inner bracts with membranous broadly lanceolate appendages, 5–6 mm wide, forming corona, exceeding middle bracts by 15–20 mm; receptacular bristles scabrous. Corolla pink, not exerted from collar. Achenes obovoid, light brown. Flowering VI–VII; fruiting VII–VIII.

Loamy-gravelly and stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the vicinity of Urmitan. Type in Paris.

Note. *C. radians* Bge. and *C. coronata* Franch. are quite distinct in the extreme forms, but in the contact regions of their ranges transitional forms are produced probably of hybrid origin, which are very difficult to distinguish. We see such a picture, for example, in the vicinity of the village of Urgut from where numerous specimens are represented mainly by transitional forms. We see such abundance of transitional forms also in the Tupalang River Valley.

Numerous hybrids of *C. coronata* and *C. microcarpa* Boiss.,

described under the name *C. atripurpurea* Juz. (cf. note to *C. microcarpa* Boiss.), are known.

175. *C. pulchra* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 478; XII, 252; XIV, 207; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 554.—*C. subtilis* Juz. Ibid. (1940) 559, quoad typum.—*C. pseudostenolepis* Rech. f. and Edelbg. in Dan. Biol. Skr. 8, 2 (1955) 147, fig. 99 and 103E.—*Arctium pulchrum* O. Ktze. Rev. Gen. 1 (1891) 308.—**lc.**: Rech. f. l.c.

Perennial or biennial. Stem 25–50 cm high, erect, partly arachnoid-hairy, glabrescent, branched from base or middle; branches one-headed, leafy. Leaves finely spinose-toothed, gray-tomentose beneath, green and glabrous above; basal leaves petiolate, lyrate, with ovately acuminate terminal lobe; lower cauline leaves like basal, sessile or short-petiolate with narrow-winged petioles; middle cauline leaves sessile, lyrate, with one or two pairs of lateral lobes or oblong, sessile, semiamplexicaul; upper leaves oblong, acuminate; uppermost leaves strongly reduced. Capitula ovoid-oblong, 8–12 mm wide (excluding cusps), somewhat arachnoid-hairy. Involucral bracts stiff, carinate, with subulate cusp, 1–1.5 mm wide at base, green, somewhat horizontal; outer bracts as long as or longer than capitulum diameter (considering only divergent part without appressed base); middle bracts coriaceous, with short cusp, shorter than outer bracts, 1–2 mm wide at base; inner bracts with membranous, purple, lanceolate, up to 1 cm long and 2 mm wide appendage forming a collar and two times as long as adjacent middle bracts; receptacular bristles scabrous above. Corolla pink, slightly exerted. Achenes obovoid, almost three-angled, spotted, about 5–5.5 mm long. Flowering VI–VII; fruiting VII–VIII.

Stony slopes on the outcrops of red sandstones in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Babatag, Gazimailik, Gardani-Uшти, Khodzha-Kozian, Koi-Pioz-Tau, Sarsaryak, mountain slopes along Pyandzh). *General distribution*: Afghanistan. Described from the Gazimailik Mountains above Khoshbulak. Type in Leningrad.

Note. The species is quite polymorphic. Plants with involucral bracts shorter than in typical *C. pulchra* are found in Babatag. We find plants with longer leaves and capitula in the eastern part of the range in southern Tadzhikistan. It is possible that such variability can be explained by hybridization between closely related species, or perhaps that these are small geographical races, which quite likely will be considered as separate narrowly localized species after further study of extensive material.

While studying the variability in *C. pulchra*, we came to the conclusion that it is difficult to distinguish the type of *C. subtilis* from *C. pulchra*, in any case from its eastern members, and we refer this



species to the synonyms of *C. pulchra*. Cf. also the note to *C. alpina* Bge.

176. *C. alpestris* Bornm. ex Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 554.—*C. radians* γ. *alpestris* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 178.

Biennial or perennial. Stem 35–60 cm high, erect, arachnoid-hairy, glabrescent, cymosely branched in upper part or almost from base; branches one-headed, leafy. Leaves green and very finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, almost bipinnatisect into spinose-toothed narrow-lanceolate lateral segments; lower cauline leaves like basal, other cauline leaves sessile, oblong, spinose-lobate, gradually reduced toward stem apex. Capitula ovoid-globose, very finely arachnoid hairy, 12–14 mm wide (excluding cusps); involucre bracts numerous, stiff, carinate, with subulate cusp; outer bracts decurved, almost half as long as middle; middle bracts almost horizontal, almost as long as or somewhat longer than capitulum diameter; subsequent bracts smaller, flat, 10–12 mm long, short-acuminate, erect; inner bracts with membranous, broad-lanceolate, 10–12 mm long, 2–3 mm wide appendages forming corona; receptacular bristles apically broadened, scabrous. Corolla pale pink or whitish. Achenes obovoid, glabrous, smooth, glossy, 3.5–4 mm long. Flowering VII–VIII.

Stony-gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Yagnob River Basin near the village of Novobad. Type in Leningrad.

Note. Hybrids of *C. alpestris* Bornm. and *C. submutica* Franch., described as *C. heteromorpha* Bornm. (B.B.C. 34, 2 (1916) 145), are known from Novobad (Yagnob River Basin). These plants have almost lyrate basal and lower cauline leaves, ovoid-globose capitula with a somewhat foveate base and involucre bracts with a more or less arcuately decurved, short, thin cusp, the inner bracts with membranous appendages usually as long as the corolla.

177. *C. mulgediifolia* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 139; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 554.

283 Biennial or perennial. Stem 45–100 cm high, erect, almost glabrous, usually branched from base, leafy; branches in turn branched, branchlets one-headed. Leaves coriaceous, glabrous and green above with network of prominent veins, white-tomentose beneath, sparsely very finely spinose-toothed or almost entire; basal leaves oblong-ovate, attenuate toward both ends, petiolate, petioles almost as long as lamina, or less often almost lyrate, with large terminal lobe and one or two pairs of small lateral lobes; lower cauline leaves like basal or almost sessile,

semiamplexicaul; middle leaves obovate, sessile, semiamplexicaul, with wide auricles; upper leaves gradually reduced, almost ovate, sessile, semiamplexicaul, acuminate. Capitula ovoid-globose, 12–15 mm wide (excluding cusps), very finely arachnoid-hairy. Involucral bracts numerous, with subulate, squarrose cusp, about 1 mm wide at base; outer and middle bracts not exceeding capitulum diameter, 10–12 mm long; inner bracts with membranous, lanceolate, usually pale purple appendages, forming corona, exceeding adjacent involucral bracts by 8–10 mm; receptacular bristles scabrous. Corolla pale purple or whitish, slightly exerted from corona. Achenes obovate-obovoid, glabrous, smooth, about 3.5 mm long, light gray. Flowering VII–VIII; fruiting VIII.

Stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the vicinity of Charga (former Shuroabad District). Type in Leningrad.

178. **C. leptocampyla** Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 179; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 554.

Biennial or perennial. Stem erect, 70–80 cm high, very finely arachnoid-hairy, sparsely branched from base; branches in turn branched into slender, long, leafy, one-headed branchlets. Leaves coriaceous, finely arachnoid-hairy above, white-tomentose beneath, finely spinose-toothed; middle leaves sessile, crenate-lobed, with large, about 4 cm long, terminal lobe, usually finely spinose-toothed and with three or four pairs of almost entire, acuminate-spinose, 1–1.5 cm long lateral lobes; upper leaves obovate-obovoid, semiamplexicaul, with wide auricles, finely spinose-toothed, acuminate; leaves on branches small, sessile, spinose-toothed. Capitula numerous, globose, 10–13 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts numerous; outer and middle bracts linear-subulate, rather weak, almost arcuately decurved, with somewhat short cusps, 3–12 mm long; inner bracts membranous, flat, with whitish, lanceolate appendages above, exceeding adjacent bracts by 8–10 mm, forming corona; receptacular bristles scabrous. Corolla pale yellow or almost white. Achenes obovate-obovoid, glabrous, smooth, about 3 mm long. Flowering VII–VIII; fruiting VIII.

284 Stony-gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the vicinity of Faizabad (central Tadzhikistan). Type in Leningrad.

Note. A little known species that, except for the type specimen, no one has collected. It is morphologically very unique and stands out prominently among the closely related species.

Subsection 2. Carduncellus Juz.—Involucral bracts relatively less numerous, gradually acuminate in cusp, inner bracts with or without

“crown” or “corona”; achenes glabrous, smooth or almost three-angled; receptacular bristles scabrous or smooth. Biennial or perennial plants with wingless stems.

Note. The division of the subsection into series will be possible only after monographic treatment of the genus.

179. *C. alpina* Bge. in Delect. Sem. Hort. Dorpat. (1845) 3; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 46; Boiss. Fl. or. III, 495; Winkl. in Tr. Peterb. Bot. Sada, XII, 249; XIV, 229.—*C. acicularis* Franch. in Ann. Sc. Nat. Bot. 6 sér. 16 (1883) 319; Winkl. op. cit. XII, 252; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 170.—*C. lyratifolia* Winkl. op. cit. X (1887) 90; XII, 249; XIV, 229; Bornm. op. cit. 170.—*C. subtilis* Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8 (1940) 559, quoad specimina examinata.—*Arctium alpinum* O. Ktze. Rev. Gen. 1 (1891) 307.—*A. aciculare* O. Ktze. Ibid.

Biennial. Stem erect, 30–50 cm high, striate-sulcate, finely arachnoid-hairy, leafy almost from base, cymosely branched almost from middle; branches long, leafy, one-headed. Leaves coriaceous, greenish-gray and finely arachnoid-hairy above, finely gray-tomentose beneath; basal leaves short-petiolate, oblong, pinnatifid into triangular, uncinately, lateral lobes acuminate in stiff cusp, or lyrate with large ovate, terminal lobe; cauline leaves gradually reduced, sessile, short-decurrent; lower cauline leaves like basal; other cauline leaves lanceolate, acuminate in stiff cusp, spinose-toothed. Capitula ovoid-globose, 10–15 mm wide (excluding cusps), white or rusty-tomentose. Involucral bracts about 80; outer bracts narrow-subulate-triangular, decurved, 8–12 mm long; middle bracts appressed at base, gradually attenuate in stiff erect, carinate, triangular-subulate, 20–35 mm long, less often 10–12 mm long cusp; inner bracts thin-coriaceous, lanceolate, somewhat attenuate above, usually brownish dorsally, 18–22 mm long; receptacular bristles scabrous. Corolla purple; anther tube pink. Achenes obovoid, 4 mm long, glabrous, smooth, roundish above. Flowering VII–VIII; fruiting VIII–IX.

Loamy-stony slopes in upper part of the middle or upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Turkestan, Gissar, Zeravshan, Peter the Great ranges, and mountains of southern Tadzhikistan). Endemic. Described from the Karatau Range (Lehmann). Type in Paris.

Note. The species is extremely variable in capitulum size and length of involucral bracts. Apparently, it hybridizes easily with *C. submutica* Franch. and other species of section *Microcarpae*, which possibly explains the variety of forms.

In describing *C. subtilis* Juz., S.V. Juzepczuk, as is evident from the specimens labeled by him and the characters listed in the key for identification, had in mind the plants without a corona and with white-

tomentose capitula, which cannot be considered a separate species, given the variation of *C. alpina* Bge. However, as the type for *C. subtilis*, Juzepczuk selected a plant that undoubtedly belongs to the group of species with a corona. Cf. also the note to *C. pulchra* Winkl.

180. *C. carduncelloidea* Rgl. and Schmalh. in Izv. Obshch. Lyubit Estestv. Antrop. Etn. 34, 2 (1882) 50; Winkl. in Tr. Peterb. Bot. Sada, XII, 244; XIV, 206; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 160; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 556.—*Arctium carduncelloideum* O. Ktze. Rev. Gen. 1 (1891) 307.

Biennial. Usually many-stemmed plants; stems erect, arachnoid-hairy, striate-sulcate, 15–30 cm high, branched; branches densely leafy, one-headed. Leaves coriaceous, green and finely arachnoid-hairy above, finely gray-tomentose beneath; basal leaves petiolate with petioles broadened at base, unevenly pinnatifid into triangular, acuminate-spinose lobes, with stiff spine, large-spinose-toothed; cauline leaves gradually reduced, sessile, semiamplexicaul, short-decurrent, lanceolate, lobed or large spinose-toothed. Capitula ovoid-globose, 17 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts about 60, narrow-lanceolate, gradually and long-acuminate, carinate; outermost bracts slightly decurved, about 10 mm long; subsequent bracts almost horizontal, 23–25 mm long; middle bracts 15–18 mm long, erect; inner bracts scarious, erect, somewhat flat, 20–22 mm long, scabrous above along margin, acuminate; corolla pink; receptacular bristles scabrous. Achenes about 4 mm long, glabrous, smooth. Flowering VI–VII; fruiting VII–VIII.

Stony gravelly slopes.—*Soviet Central Asia*: Pamiro-Alai (Alai Range). Endemic. Described from the Isfairam Pass in “Kokania.” Type in Tashkent; cotype in Leningrad.

Note. Plants very similar to *C. carduncelloidea* are found in Shugnan, but whether they belong to this species or are some sort of hybrids between *C. rava* Winkl. and *C. bupthalmoides* Rgl. that resemble *C. carduncelloidea*, in fact can be decided only after studying the plants in nature.

181. *C. outichaschensis* Franch. in Ann. Sc. Nat. Bot. 6 sér. 16 (1883) 322; Winkl. in Tr. Peterb. Bot. Sada, XII, 256; XIV, 208; Juz. 286 in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 566.—*C. commixta* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 18; Juz. op. cit. 566.—*C. glaucifolia* Kult. op. cit. (1929) 19; Juz. op. cit. 566.—*C. bupthalmoides* auct. non Rgl.: Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 258 p. p.; XIV, 230; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 185.—*C. carduncelloidea* auct. non Rgl. and Schm.; Winkl. op. cit. XIV (1897) 227.—*Arctium outichaschense* O. Ktze. Rev. Gen. 1 (1891) 308.—*Ic.*: Kult. op. cit. Figs. 18, 19.—*Exs.*: H.F.A.M. No. 481.

Biennial. Stem 15–35 cm high, striate-sulcate, arachnoid-hairy, branched from base or middle; branches one-headed, leafy. Leaves greenish and finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, lanceolate, pinnatipartite into unequal, triangular-lanceolate, acuminate-spinose, spinose-toothed lobes, alternating with smaller lobes, reduced to spines or lyrate, with oblong-orbicular terminal lobe, acuminate-spinose at base, slightly cuneately decurrent on petiole, finely spinose-toothed, 25–30 mm long, with lateral lobes about 12–15 mm long, broadly sessile, ovate-orbicular, acuminate-spinose; lower cauline leaves like basal; middle leaves sessile, semiamplexicaul, with small auricles, ovate-oblong, large spinose-toothed, acuminate into stiff, slightly divergent spine; upper leaves thin, reduced, oblong-lanceolate, spinose-toothed, acuminate-spinose; uppermost leaves strongly reduced. Capitula ovoid-globose, 15–20 mm wide (excluding cusps), loosely arachnoid-hairy. Involucral bracts about 75; outer bracts stiff, subulate-triangular, about 15–25 mm long, gradually acuminate into decurved cusp; subsequent bracts longer, 25–28–30 mm long, almost horizontal; middle bracts somewhat flat, 18–20 mm long, scarcely carinate dorsally, mucronate; inner bracts coriaceous, 21–25 mm long, flat, scabrous along margin, very short-acuminate into thin spine, often pale purple above; innermost bracts linear, mucronate, whitish; corolla pink, exerted from involucre; receptacular bristles scabrous. Achenes obovoid; glabrous; smooth, roundish above, about 4–5 mm long. Flowering VI–VII; fruiting VII–VIII.

Limestone and gypsum deposits, stony and gravelly slopes in middle and upper mountain zones.—*Soviet Central Asia*: Pamiro-Alai (Kugitang, Gissar, Zeravshan, Turkestan and Alai ranges). Endemic. Described from the Zeravshan Valley (Outikasch). Type in Paris.

Note. A highly polymorphic species. At one time attempts were made to separate several species on the basis of the shape of the basal leaves. However, the study of extensive material shows that plants with different kinds of basal leaves are found in the same population, and there is no basis to consider such plants as separate species.

287 Hybrids of *C. outichaschensis* Franch. and *C. submutica* Franch., described as *C. iskanderi* Bornm. (cf. the note to *C. submutica* Franch.) are known. Hybrids of *C. outichaschensis* Franch. and *C. pulchella* Bge. have also been described, as *C. heterogenetos* Bornm. (*B.B.C.* 34, 2 (1916) 163), from the Dzhidzhikrud River Valley near the village of Zimarl (*C. heterogenetos* α . *pulchelliceps* Bornm. *ibid.* 164 and β . *majoriceps* Bornm. *ibid.* 165). This is a plant with thin and rather long decurrent leaves, arachnoid-hairy capitula, and numerous, thin, squarrose involucral bracts.

182. *C. stellaris* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 161; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 559.—*C. carduncelloidea* β. *sonchifolia* Bornm. op. cit. (1916) 160.—*C. sonchifolia* Bornm. ex Juz. op. cit. (1940) 556.—*C. rotundifolia* auct. non Winkl.: Bornm. op. cit. 171.

Biennial. Stem 30–35 cm high, arachnoid-hairy, glossy, striate-sulcate, branched at base or throughout; branches one-headed, leafy. Leaves greenish, finely arachnoid-hairy above, densely tomentose beneath; basal leaves petiolate, lyrate, with almost orbicular, 5–8.5–11 cm long, sometimes more or less cordate, spinose-toothed terminal lobe, lateral lobes 1.5–2 cm long, thin, often three pairs, finely spinose-toothed, broadly sessile, terminating in small, stiff spine; cauline leaves sessile, auriculate, ovate-orbicular, spinose-toothed, terminating in small, stiff spine; upper cauline leaves strongly reduced. Capitula ovoid-globose, (1.5)2–2.5 cm wide (excluding cusps), arachnoid-hairy. Involucral bracts about 60; outer bracts stiff, subulate-triquetrous, gradually acuminate in long spine, decurved, about 25 cm long; middle bracts like outer but longer, 30–32 mm long and horizontal; subsequent bracts coriaceous, somewhat flat, slightly carinate, weakly attenuate in middle, scabrous along margin, terminating in small stiff spine, 17–19 mm long; inner bracts membranous, with broad ovate, about 5–6 mm wide whitish appendage along margin, acuminate; innermost bracts linear-lanceolate, scabrous along margin; corolla pink, exerted from involucre; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, glossy, roundish above, blackish, longitudinally whitish-striate, about 5 mm long. Flowering V–VI–VII; fruiting VII–VIII.

In the foothills and lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai (foothills of the Alai Range). Endemic. Described from the Alai Range (Margelan District, Shiman). Type in Leningrad.

183. *C. buphtalmoides* Rgl. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 155; Boiss. Fl. or. III, 501; Winkl. in Tr. Peterb. Bot. Sada, XII, 258 quoad sp. afganica.—*Arctium buphtalmoides* O. Ktze. Rev. Gen. 1 (1891) 307.

288 Biennial. Stem erect, 15–45 cm high, striate-sulcate, arachnoid-hairy, usually branched throughout or at base, leafy; branches one-headed. Leaves coriaceous, finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, lyrate, with large, ovate, almost cordate, and finely spinose-toothed terminal lobe, lateral lobes small, three to five pairs, lanceolate, finely spinose-toothed or less often almost bipinnatilobate; cauline leaves lanceolate-oblong, sessile, short-decurrent, pinnatilobate, lobes acuminate-spinescent, spinose-toothed gradually reduced toward apex. Capitula ovoid, 13–15 mm wide (excluding cusps), finely

arachnoid-hairy. Involucral bracts about 50; outermost bracts lanceolate, attenuate into narrow-lanceolate cusp, usually decurved, 8–15(23) mm long, with small thickening on inner side at transition of closely appressed part with narrowed cusp; subsequent bracts similar but almost horizontal or erect-spreading, about (17)30–32 mm long, strongly carinate dorsally; middle bracts more flat, lanceolate, erect, short-acuminate, 12–15 mm long; inner bracts lanceolate, flat, erect, acuminate, usually dark colored dorsally in upper part, about 20 mm long; corolla purple; receptacular bristles scabrous. Achenes obovoid, about 4 mm long; young achenes with conspicuous ribs, terminating in teeth above, mature achenes glabrous, smooth, with inconspicuous ribs. Flowering VI–VII; fruiting VIII.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (western Pamir). *General distribution*: Afghanistan. Described from Afghanistan.

Note. Plants with lyrate basal leaves predominate, but plants with leaves nearly bipinnate occur in the same population. Many different forms are found within the range of *C. buphthalmoides*, whose taxonomic status is difficult to determine at present. It is possible, that these are hybrids of *C. rava* Winkl. and *C. buphthalmoides* among them and it is probable that separate species also occur, but this can be decided only after studying them in nature. Probably, these also include the already described *C. hilariae* Kult. and *C. darwasica* Winkl. The plants from Shugnan, which resemble *C. carduncelloidea*, evidently, also belong to such forms.

184. *C. hilariae* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 22; Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8, 556.—*lc.*: Kult. op. cit. Fig. 21.

289 Biennial. Stem erect, about 70 cm high; branches one-headed, arachnoid-hairy, striate-sulcate, leafy. Leaves green, arachnoid-hairy above, gray-tomentose beneath; basal leaves ovate-oblong, short-petiolate, with broadened petioles, finely spinose-toothed, lyrate, crenate-pinnatifid in lower part, terminal lobe ovate-oblong; lower cauline leaves like basal but sessile, semiamplexicaul; middle and upper leaves strongly reduced, oblong-ovate, sessile, semiamplexicaul, with roundish auricles, attenuate-spinose, spinose-toothed. Capitula ovoid-globose, about 20 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts 40–50, all except inner broad-lanceolate, strongly carinate; outer bracts 12–20 mm long, usually decurved; middle bracts about 30 mm long, divergent, grooved in upper half; subsequent bracts more flat, mucronate, about 20 mm long; inner bracts membranous; lanceolate, yellowish, scabrous along margin, acuminate, receptacular bristles scabrous. Corolla

pale-pink, prominent. Achenes obovoid, roundish above, glabrous, smooth, about 4 mm long. Flowering VI–VII; fruiting VII–VIII.

In middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Shugnan). Endemic. Described from Pyandzh River Valley, near Ravak. Type in Tashkent.

Note. A little studied species, known only from one locality.

185. *C. knorringiae* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 201.

Biennial. Stem erect, 20–30 cm high, finely arachnoid-hairy, almost glabrous in upper half, with scattered, flexuous flat hairs throughout, branched almost from base, leafy; branches one-headed. Leaves coriaceous, glabrous and green above, finely gray-tomentose beneath; basal leaves short-petiolate, 25 cm long, oblong, lyrate, with roundish, somewhat cordate and finely spinose-toothed terminal lobe and unequal, almost ovate, slightly decurved, somewhat attenuate at both ends and spinose-toothed lateral lobes; lower cauline leaves like basal but sessile and smaller; other cauline leaves gradually reduced toward stem apex, broad ovate or orbicular, cordate, sessile with roundish auricles, crenate-spinose-toothed, stiff cuspidate. Capitula oblong-cylindrical, 40 mm long (with florets) and 15–20 mm wide (excluding cusps), glabrous. Involucral bracts less numerous (about 25); outer bracts lanceolate, gradually acuminate, short spinescent, falcately decurved, 5 mm wide at base, about 10–12 mm long; middle bracts somewhat flat, broad-lanceolate, 10–14 mm wide at base, 27–30 mm long, gradually acuminate-spinescent, closely appressed at base, divergent in middle, weakly furrowed at divergence; subsequent bracts flat, broad-lanceolate, roundish above, with short spine, erect, 8–10 mm wide, 27 mm long; inner bracts membranous, broad-lanceolate, usually light purple, scabrous along margin, short-acuminate 32–35 mm long, 3–5 mm wide; receptacular bristles scabrous.
290 Corolla light purple; anther tube light creamish. Achenes obovoid, 4–4.5 mm long, glabrous, smooth, roundish above. Flowering VII–VIII; fruiting VIII–IX.

Stony-gravelly slopes.—*Soviet Central Asia*: Tien Shan (Uzun-Akhmat Range). Endemic. Described from the Ungar-Tyube and Shatak-Tape mountains. Type in Leningrad.

186. *C. grigorievii* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 313; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 556.

Biennial. Stem erect, 30–35 cm high, arachnoid hairy-tomentose, flexuously and repeatedly branched from base. Leaves finely arachnoid-hairy and grayish-green above, white-tomentose beneath; basal leaves oblong, short-petiolate, almost lyrate, lateral lobes oblong-triangular, acuminate-spinescent, irregularly spinose-toothed, terminal lobe oblong-

ovate, sometimes almost cordate, finely spinose-toothed; cauline leaves gradually reduced; lower cauline leaves sessile, ovate, semiamplexicaul; middle and upper leaves orbicular, sparsely spinose-toothed, somewhat cordate, auriculate, usually adnate; uppermost leaves strongly reduced. Capitula almost globose, 12–20 mm wide (excluding cusps), gray arachnoid-hairy, with many florets. Involucral bracts lanceolate; outer and middle bracts acuminate stiff spinescent, short dorsally carinate, weakly grooved in divergent part, arcuately decurved, 10–35 mm long; subsequent bracts coriaceous, somewhat flat, broad-lanceolate, somewhat acuminate, terminating in thin and short erect spine, 17–19 mm long, inner bracts membranous, broadened above, dark, with thin short spine, scabrous along margin, 20–25 mm long; receptacular bristles scabrous. Corolla exerted, dark purple; anther tube glabrous, yellowish when dry. Achenes obovoid, glabrous, smooth, light gray with dark spots, about 4.5 mm long. Flowering VI; fruiting VII.

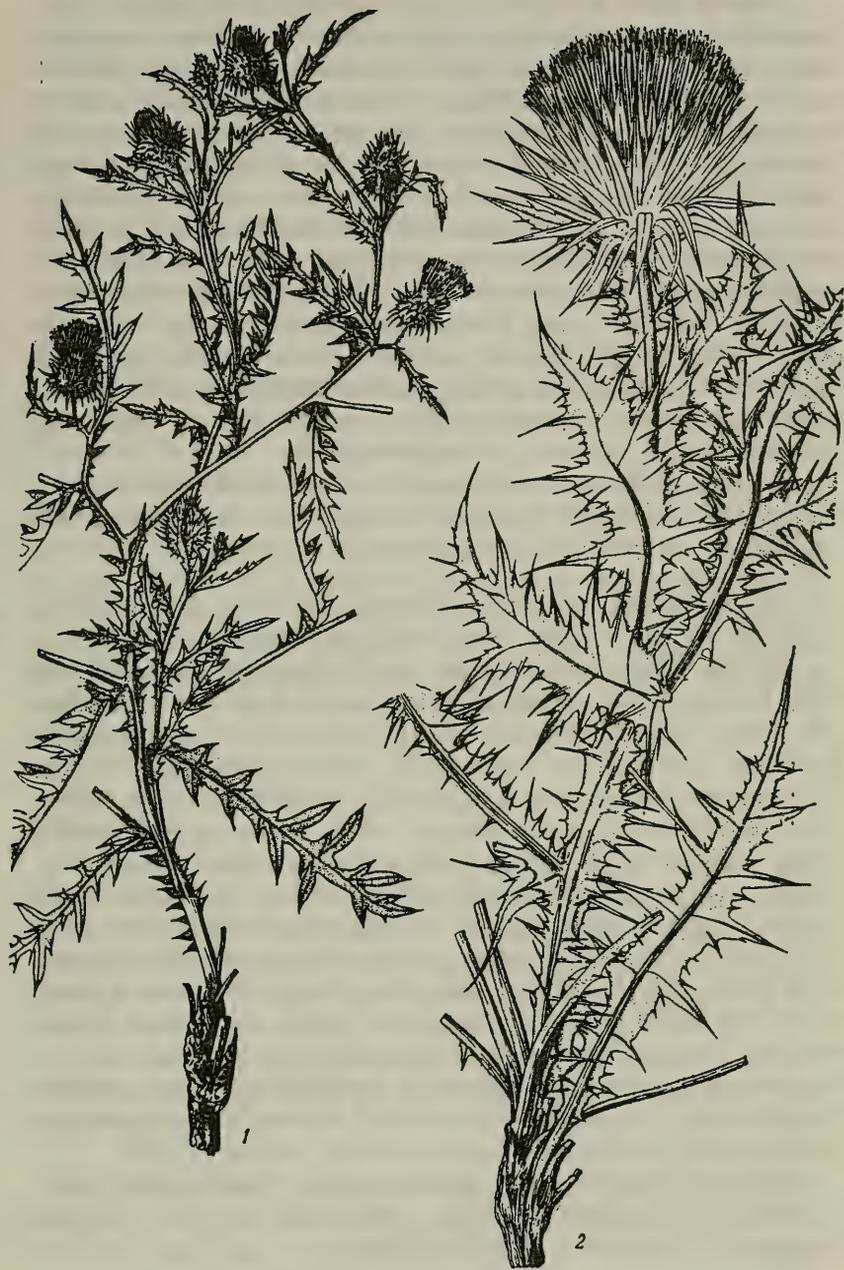
Stony, loamy and gypsic slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the top of the Sarsaryak Range, above the village of Dagana. Type in Leningrad.

187. *C. rava* Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 227; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 556.

Perennial. Root woody, many-headed. Stem erect, arachnoid-hairy, 25–40 cm high, branched from base; branches long, one-headed. Leaves coriaceous, bright green, finely arachnoid-hairy above, finely gray-tomentose beneath; basal leaves short-petiolate, oblong to narrow-lanceolate, pinnatifid or crenate-lobate, segments or lobes broadly triangular, acuminate-spinescent, finely spinose-toothed; lower cauline leaves like basal but sessile, semiamplexicaul; middle and upper leaves lanceolate, gradually reduced, acuminate-spinescent, spinose-toothed, sessile, irregularly short-decurrent. Capitula cylindrical, about 15–17 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts about 60; outer bracts lanceolate, acuminate-spinescent, carinate, almost horizontal, 15–17 mm long; middle bracts erect, somewhat flat, lanceolate, usually somewhat dark colored dorsally, acuminate-spinescent, 12–13 mm long; inner bracts scarious, lanceolate, mucronate, flat, whitish, erect, 15–17 mm long. Corolla purple, 16 mm long; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, about 4 mm long. Flowering VII–VIII; fruiting VIII–IX.

Stony-gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Pamir, Shugnan). Endemic of Lake Yashil-Kul. Type in Leningrad.

188. *C. glabriseta* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 7; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 557.



Biennial. Stem 10–30 cm high, arachnoid-hairy, striate-sulcate, leafy, branched from base; branches leafy, one-headed. Leaves coriaceous, finely arachnoid-hairy above, finely white-tomentose beneath, spinose-toothed; basal leaves short-petiolate, lyrate, with large ovate, about 7 cm long and 5 cm wide, terminal lobe slightly cuneate at base and lanceolate, 2–2.5 cm long, 1–1.2 cm wide lateral lobes; lower cauline leaves like basal but sessile; middle and upper leaves gradually reduced, orbicular, sessile, semiamplexicaul, with large roundish auricles and short apical spine; uppermost leaves strongly reduced. Capitula ovoid-globose, arachnoid-hairy, 20–22 mm wide (excluding cusps). Involucral bracts about 50, squarrose; outer bracts stiff, carinate dorsally, horizontal; middle bracts slightly reduced, weakly carinate dorsally; inner and innermost bracts coriaceous, greenish, somewhat acuminate. Corolla pink; receptacular bristles smooth. Achenes obovoid, about 4 mm long, glabrous, smooth. Flowering V–VI; fruiting VII.

Gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Kugitang). Endemic. Described from the Kugitang and Kyzylalma mountains. Type in Tashkent.

189. *C. triceps* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 8; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR 8, 557.

293 Biennial. Stem 15–22 cm high, usually developing three branches from base or middle, arachnoid-hairy, striate-sulcate, leafy; branches one-headed. Leaves coriaceous, finely arachnoid-hairy above, white-tomentose beneath; basal leaves lyrate, short-petiolate with roundish, finely spinose-toothed, acuminate, weakly cordate terminal lobe, lateral lobes broadly sessile, finely spinose-toothed, alternating with smaller lobes; lower cauline leaves like basal but sessile; middle leaves oblong-orbicular, acuminate, finely spinose-toothed; uppermost leaves very small, almost reduced to spines. Capitula ovoid-globose, arachnoid-hairy, 10–15(20) mm wide (excluding cusps). Involucral bracts about 50, squarrose; outer bracts stiff, dorsally carinate, terminating in three-angled spine; subsequent bracts like outer, horizontal; middle bracts broad linear, carinate, short-acuminate; inner bracts coriaceous, linear, green, acuminate; innermost bracts with narrow membranous frill along margin. Corolla yellow; receptacular bristles smooth. Achenes obovoid, glabrous, smooth, about 4 mm long. Flowering VI–VII; fruiting VII–VIII.

Gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Kugitang). Endemic. Described from the Kugitang Mountains of Kyzylalma. Type in Tashkent.

190. *C. fetissowii* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 247.

Biennial. Stem 20–40 cm high, striate-sulcate, arachnoid-hairy, usually sparsely branched almost from base; branches one-headed, leafy.

Leaves greenish and finely sparsely arachnoid-hairy above, finely gray-tomentose beneath; basal leaves short-petiolate, lanceolate, large spinose-toothed, lower cauline leaves like basal; other cauline leaves sessile, semiamplexicaul, spinose-toothed, roundish at base gradually reduced upward. Capitula 20–25 mm wide (excluding cusps), arachnoid-hairy, broad pyramidal, weakly foveate at base. Involucral bracts numerous, narrow-lanceolate, acuminate-spinescent; outer and middle bracts arcuately or completely decurved, 15–20 mm long; subsequent bracts squarrose, 10–17 mm long; inner bracts lanceolate, short-acuminate, usually dark-colored throughout, about 20 mm long; receptacular bristles scabrous. Corolla purple. Achenes obovoid, glabrous, smooth, about 4–5 mm long. Flowering VI–VII; fruiting VII–VIII. (Plate XXIII, Fig. 2).

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the headwaters of the Uzun-Akhmat (Terek-Bel Ravine). Type in Leningrad.

Note. A highly polymorphic species, its morphological and geographical separation from *C. outichaschensis* Franch. is not clear at present, as the specimens of the latter species from the upper Zeravshan are very similar to *C. fetissowii* Winkl. in habit, smaller capitula, narrower and shorter involucral bracts and more or less strongly decurved outer involucral bracts. The plants in the Talass Alatau are sturdier, with larger capitula; plants in the region of the Fergana Range are intermediate between *C. fetissowii* Winkl. and *C. schischkinii* Juz. in their characters.

191. *C. schischkinii* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 316.

Biennial. Plants very similar to *C. fetissowii* Winkl., differing from it by stronger stem; narrower, cuneate (and not roundish), basally always deeply pinnatilobate cauline leaves; one and one-half times as large capitula; shorter involucral bracts, of which outer squarrose (and not arcuately decurved), inner erect, squarrose, pale throughout (and not greenish-black in lower part). Flowering VII; fruiting VIII.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Tien Shan (Fergana Range). Endemic. Described from the Airtash Pass. Type in Leningrad.

192. *C. speciosa* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 579; XII, 257; XIV, 230; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 557.—*C. batalini* auct.; Winkl. op. cit. (1897) 299 quoad sp. alaicam.

Biennial. (Monocarpic.) Stem usually branched from base, shrubby, 30–50 cm high; branches arachnoid-hairy, striate-sulcate, leafy, usually simple, one-headed, less often sparingly branched. Leaves coriaceous,

green and very finely arachnoid-hairy above, finely gray-tomentose beneath; basal leaves oblong, petiolate, pinnatilobate, with spinose-toothed, broadly triangular, acuminate-spinose lateral lobes; lower cauline leaves like basal but with shorter petiole; middle and upper leaves gradually reduced upward, broad-lanceolate, attenuate toward both ends, sessile, spinose-toothed, attenuate into short stiff spine, somewhat erectopatent. Capitula broad cylindrical, 20–25 mm wide (excluding cusps), finely-arachnoid-hairy, truncate at base or weakly foveate. Involucral bracts about 70, coriaceous; outer and middle bracts erect-spreading, lanceolate, carinate dorsally, gradually acuminate into short stiff spine, 15–35 mm long, about 5–6 mm wide; inner bracts membranous, whitish, lanceolate, scabrous along margin, gradually acuminate, about 25–30 mm long, erect. Corolla pinkish; receptacular bristles scabrous. Achenes obovoid, about 4–5 mm long, glabrous, smooth. Flowering VII–VIII; fruiting VIII–IX.

Stony slopes and screes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Alai Range). Endemic. Described from the Alai Range (Archaty). Type in Leningrad.

- 295 193. *C. batalinii* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 248; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 557 (quoad typum).—*C. batalinii* α . *latisecta* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 167.

Biennial. (Or monocarpic?) Stem erect, 40–60 cm high, leafy, arachnoid hairy-pubescent, spreadingly branched from base or middle; branches long, one-headed. Leaves coriaceous, green and finely arachnoid-hairy above, gray-tomentose beneath with prominent veins; basal leaves oblong, petiolate, with petioles broadened at base, pinnatilobate, with broadly triangular, usually large spinose-toothed, acuminate in stiff spine lateral lobes; lower cauline leaves like basal but sessile; middle and upper leaves gradually reduced, sessile, almost semiamplexicaul with roundish auricles, ovate or oblong-ovate, spinose-lobed or large spinose-toothed, attenuate into stiff, arcuate cusp. Capitula broadly pyramidal, 20–25 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts about 50; outer and middle bracts almost horizontal, lanceolate, long acuminate, carinate dorsally, 30–32 mm long; inner bracts flat, membranous, lanceolate or linear-lanceolate, somewhat scabrous along margin, whitish above, about 30 mm long. Corolla purple; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, about 5 mm long. Flowering VI–VII; fruiting VII–VIII.

Stony-gravelly slopes in middle and lower parts of the upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Vakhsh River Valley, from Tavildar. Type in Leningrad.

194. *C. calva* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 317; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 557.—*C. batalinii* β . *tenuisecta* Bormm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 168.

Biennial. Stem erect, striate-sulcate, 50–70 cm high, pubescent in lower half with thick, flexuous, flat hairs, arachnoid-hairy above, sparsely branched from middle; branches one-headed, long. Leaves coriaceous, green above, glabrous beneath or glabrous and with flat, thick, flexuous hairs only along midrib, or finely arachnoid-hairy; basal leaves almost pinnatisect in narrow-lanceolate, spinose, numerous (12–15 pairs) lateral segments, petiolate, with petioles broadened at base, densely pubescent throughout with thick, flexuous, flat hairs; lower cauline leaves like basal; middle and upper leaves sessile, semiamplexicaul, gradually reduced toward stem apex, pinnatipartite into strongly spinose-toothed lobes; uppermost leaves strongly reduced. Capitula broadly cylindrical, about 25 mm wide (excluding cusps), white arachnoid-hairy; involucrel bracts about 70; outer and middle bracts narrow lanceolate, squarrose, gradually acuminate-cuspidate, dorsally carinate, 20–25 mm long; inner bracts lanceolate, membranous, whitish above, acute, scabrous along margin, erect, about 30 mm long. Corolla purple; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, about 6 mm long. Flowering V–VI; fruiting VI–VII.

Exposed red clay from middle to lower border of the upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (spurs of the Khodzretisho Range). Endemic. Described from the city of Imam-Askara. Type in Leningrad.

195. *C. oxytoma* Rech. f. in Dan. Biol. Skr. 8, 2 (1955) 135.—*C. batalinii* β . *virescens* Bormm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 168.—*lc.*: Rech. f. op. cit. 139, fig. 93, 94G.

Biennial. Stem erect, about 30 cm high, striate-sulcate, arachnoid-hairy, leafy, branched from base; branches one-headed. Leaves coriaceous, green and finely arachnoid-hairy above, densely and finely gray arachnoid-hairy beneath with prominently raised veins; basal leaves petiolate, with petioles broadened at base, often dark colored, almost bipinnatisect, lateral segments narrow lanceolate, acuminate-spinose, second order segments unequal, acuminate-spinose, spinose-toothed; lower cauline leaves like basal, but sessile; middle and upper leaves gradually reduced toward stem apex, pinnatipartite into lanceolate, acuminate-spinose, spinose-toothed, sessile lobes with small auricles. Capitula broadly cylindrical, 20–22 mm wide (excluding cusps), arachnoid-hairy. Involucrel bracts about 70; outer and middle bracts divergent, sometimes outer bracts decurved, 20–22 mm long, lanceolate,

acuminate-spinescent; inner bracts lanceolate, whitish, scabrous along margin, acuminate-short spinescent, erect, 20–22 mm long. Corolla pink; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, immature achenes about 4 mm long. Flowering VII.

Stony mountain slopes.—*Soviet Central Asia*: Pamiro-Alai (Peter the Great Range). *General distribution*: Afghanistan. Described from Afghanistan. Type in Vienna.

196. *C. ovczinnikovii* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 99.

Biennial (or monocarpic?). Stem erect, arachnoid-hairy, striate-sulcate, 50–60 cm high, usually branched from middle or almost from base; branches long, simple, sparsely leafy, one-headed. Leaves coriaceous, grayish-green and finely arachnoid-hairy above, finely gray-tomentose beneath; basal leaves petiolate, with short and broadened petioles, narrow-lanceolate, 2(3) cm wide and 12–13 cm long, pinnatilobate, lobes broadly triangular, acuminate-spinescent, spinose-toothed, approximate; lower cauline leaves like basal but somewhat smaller and sessile; leaves on branches oblong, spinose-toothed, sessile, short-decurrent, acuminate in short cusp. Capitula flat-globose, about 20 mm wide (excluding cusps), somewhat rusty-tomentose. Involucral bracts about 80; outer and middle bracts lanceolate, gradually attenuate into cusp, horizontal or weakly decurved, 15–20(23) mm long; subsequent bracts broad lanceolate, mucronate, 10–12 mm long; inner bracts membranous above, with small cusp, whitish, 22 mm long. Corolla pale pink; anther tube purple; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, dark-spotted, about 5 mm long. Flowering VII; fruiting VIII. (Plate XXIV, Fig. 2.)

Stony screes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Peter the Great Range). Endemic. Described from the Garmo Glacier. Type in Dushanbe.

197. *C. peduncularis* Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 101.

Biennial (or monocarpic?). Stem profusely branched almost from base into long one-headed branches, almost leafless in upper half, flocculose-arachnoid hairy, moderately leafy below, about 80 cm high. Leaves coriaceous, green, and glabrous above, white-tomentose beneath; basal leaves long-petiolate (with petioles 20–35 cm long), petioles almost as long as lamina, oblong-ovate, undivided or almost lyrate, with large, broadly ovate terminal lobe and three or four pairs of broadly sessile oblong lateral lobes; cauline leaves few, strongly reduced, ovate, spinose-lobate or large spinose-toothed, sessile, acuminate in stiff, divergent spine;

uppermost leaves almost reduced to spines. Capitula broadly pyramidal, 20–35 mm wide (excluding cusps), white arachnoid-hairy, similar to capitula in *C. batalinii*. Corolla pale pink; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, about 7 mm long. Flowering V–VI; fruiting VI. (Plate XXV, Fig. 2.)

On red sandstones.—*Soviet Central Asia*: Pamiro Alai (south). Endemic. Described from the Kyzyl-Su River Basin in the Karatau Mountains. Type in Leningrad.

198. *C. gulczensis* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 16; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 557.—*C. corymbosa* f. *ramosissima* Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 219.—*lc.*: Kult. op. cit. Fig. 16.

298 Biennial. Stem erect, 25–50 cm high, striate-sulcate, finely arachnoid-hairy, usually branched from base; branches one-headed. Leaves grayish-green and finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate; lower cauline leaves petiolate, with petioles almost as long as lamina, or sessile, attenuate toward base, lanceolate, pinnatifid, lateral lobes long acuminate-spinose, spinose-toothed; middle leaves sessile, broad-lanceolate, attenuate toward both ends, spinose-toothed, spinose; upper leaves ovate, acuminate-spinose spinose-toothed, sessile, with roundish auricles. Capitula ovoid-oblong, about 20 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts about 80; outer bracts narrow lanceolate, gradually acuminate-short cuspidate, weakly carinate dorsally, arcuately decurved, 8–10 mm long; subsequent bracts more stiff, lanceolate, mucronate, arcuately decurved, 15–22 mm long; middle bracts oblong-lanceolate, somewhat erect-spreading, more or less flat, 18–22 mm long; inner bracts membranous in upper part, erect, forming “corona,” usually whitish or very pale purple, lanceolate, gradually acuminate in short thin cusp; scabrous along margin, 30–35 mm long; innermost bracts almost linear, about 30 mm long; receptacular bristles scabrous. Corolla purple, usually not exerted from corona or almost equaling. Achenes obovoid, glabrous, smooth, roundish above, about 4.5 mm long. Flowering VI; fruiting VII–VIII.

Middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Alai Range). Endemic. Described from the Alai Range (between Karabulak and Gulchei). Type in Leningrad.

199. *C. schtschurowskiana* Rgl. and Schmalh. in Izv. Obsch. Lyubit Estestv. Antrop. i Etn. 34, 2 (1882) 50 p. p. quoad sp. e Dshisman; emend. Kult. and Byull. Inst. Pochv. i Geobot. Sredneaz. Gos. Univ. 1, 111; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 557.—*Arctium stshurowskianum* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial. Stem erect, 30–40 cm high, densely arachnoid-hairy, branched from middle; branches long, leafy, one-headed. Leaves green, arachnoid-hairy above, gray-tomentose beneath, short spinose-toothed, acuminate in triquetrous spine; basal leaves broad petiolate, lyrate, with large, ovate, cordate, short spinose-toothed terminal lobes, and three or four pairs of broadly sessile, short spinose-toothed lateral lobes; cauline leaves gradually reduced upward; lower cauline leaves oblong, lobate, acuminate-spinose, short spinose-toothed, sessile; middle and upper leaves sessile, semiamplexicaul, auriculate, oblong-ovate, acuminate-spinose, spinose-toothed; uppermost leaves strongly reduced. Capitula with many florets, 35–40 mm wide (excluding cusps), broadly cylindrical, flocculose-tomentose. Involucral bracts numerous, carinate dorsally, grooved in upper half; outer bracts 20 cm long and 5 mm wide, broad-lanceolate, acuminate-short spinose; middle bracts lanceolate, 25–30 mm long and 4 mm wide at base, acuminate-stiff spinose, subsequent bracts thin, coriaceous, somewhat flat, lanceolate, 25–30 mm long and 3.5 mm wide, acuminate-thin spinose; inner bracts about 45–50 mm long, 2.5 mm wide at base, with membranous appendages forming corona, exceeding adjacent middle bracts by 25–30 mm; receptacular bristles scabrous. Corolla not exerted from corona, pink. Achenes obovoid, roundish above, compressed dorsally, light gray, about 5 mm long. Flowering V–VI; fruiting VI–VII.

Gravelly and stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Nuratau, Aktau, Khabduntau mountains). Endemic. Described from Nuratau Mountains, Dzhezman Ravine. Type in Tashkent; cotype in Leningrad.

200. *C. pseudodshisakensis* Tschern. and Vved. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 16 (1961) 59.—*C. dschisakensis* Kult. in Byull. Inst. Pochv. Geobot. Sredneaz. Gos. Univ. 1 (1925) 115 p. p. quoad spec. e Pschigar.; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 558 p. p.—*C. stshurowskiana* auct. non Rgl. and Schmalh.; Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 253 quoad sp. e Warsaminor.

Biennial. Stem erect, 20–50 cm high, somewhat arachnoid-hairy, striate-sulcate, leafy, branched almost from base; branches long, leafy, one-headed. Leaves green, finely arachnoid-hairy above, appressed white-tomentose beneath; basal leaves broad-petiolate, lyrate, with oval, cuneate at base, and short spinose-toothed terminal lobe, and three or four pairs of sessile, ovate, acuminate-spinose, short spinose-toothed lateral lobes; lower cauline leaves sessile, oval-oblong, crenate-lobate; middle and upper leaves sessile, short-decurrent, semiamplexicaul, roundish, strongly divergent, short spinose-toothed, spinose; outermost leaves reduced. Capitula 25–30 mm wide (excluding cusps), arachnoid-hairy, broadly

cylindrical, constricted below corona, with many florets. Involucral bracts numerous, carinate-grooved with subulate-triquetrous cusp; outer and middle bracts squarrose, almost horizontal, narrow-lanceolate, acuminate; outer bracts 20 mm and middle 25 mm long; subsequent bracts somewhat flat, lanceolate, 21–22 mm long, 3.5 mm wide at base, acuminate-thin spinescent; inner bracts linear-lanceolate, 35 mm long, with broad-lanceolate, membranous, acuminate-thin spinescent appendages forming “corona”, exceeding adjacent middle bracts by 15–20 mm; innermost bracts membranous, linear, 35 mm long and 1 mm wide; receptacular bristles scabrous. Achenes obovoid, roundish above, glabrous, smooth, about 4 mm long. Flowering V–VI–VII; fruiting VII–VIII. (Plate XXIV, Fig. 1.)

Gravelly and stony slopes, on rocks in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Turkestan and Malguzar ranges). Endemic. Described from Guralash. Type in Tashkent.

- 300 201. *C. dshisakensis* Kult. in Byull. Inst. Pochv. Geobot. Sredneaz. Gos. Univ. 1 (1925) 115 quoad spec. e Dshisak; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 558 p. p.

Biennial. Stem 20–35 cm high, flocculose-arachnoid hairy, striate-sulcate, branched from middle; branches one-headed, approximate, forming compact bush. Leaves green, arachnoid-hairy above, gray-tomentose beneath, large spinose-toothed, acuminate in stiff spine; basal leaves lyrate, broad-petiolate, with large, ovate, almost undivided terminal lobe, lateral lobes remote, oblong, spinescent, three or four pairs; lower cauline leaves oblong, lobed, spinescent; middle and upper leaves oblong-ovate, sessile, weakly decurrent; uppermost leaves sessile, reduced. Capitula with many florets, flocculose-tomentose, ovoid-globose, constricted below corona, 20(25) mm wide (excluding cusps). Involucral bracts numerous, grooved-carinate; outer bracts lanceolate, acuminate into short decurved spine, 17 mm long and 2 mm wide at base; middle bracts like outer but squarrose, about 20 mm long and almost 3 mm wide at base; subsequent bracts somewhat flat, erect, mucronate, 22 mm long, 3 mm wide at base; inner bracts 35 mm long, with membranous lanceolate appendages at apex, about 2.5 mm wide, forming corona; innermost bracts linear, scarious, about 35 mm long; receptacular bristles scarious. Corolla slightly exerted from corona, pink. Achenes obovoid, almost three-angled, roundish at apex, light gray. Flowering V; fruiting VI.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the vicinity of Dzhizak. Type in Tashkent.

202. *C. princeps* Franch. in Ann. Sc. Nat. Bot. 6 sér. 16 (1883) 324; Winkl. in Tr. Peterb. Bot. Sada, XII, 258; XIV, 230; Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8, 558.—*C. stshurowskiana* auct. non Rgl. and Schmalh.: Winkl. op. cit. XII, 253, quoad sp. e Iskanderkul.—*C. schtschurowskiana* γ . *subadpressa* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 181.—*Arctium princeps* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial? Stem erect, 30–50 cm high, branched almost from base; branches long, erect, leafy, arachnoid-hairy, one-headed. Leaves coriaceous, green and finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, petioles thick and flattened, sometimes armed along margin, lyrate, usually with four or five pairs of oblong, short-spinose and spinose-toothed lateral lobes and broad ovate, short spinose-toothed, acuminate-spinose, sometimes cordate terminal lobe; lower cauline leaves usually like basal but with broader petiole, or pinnatifid; other cauline leaves gradually reduced toward apex, sessile, broad-ovate, short acuminate into cusp, weakly crenate-spinose-toothed, semiamplexicaul, auriculate, auricles adnate, short-decurrent. Capitula globose, 22–27 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts numerous, somewhat flat, all erect; outer bracts lanceolate, somewhat erect or sometimes almost horizontal, 15–25 mm long; all others except inner 22–28 mm long; inner bracts membranous in upper half, broad-lanceolate, gradually acuminate, usually pale purple, about 40 mm long, forming 25 mm long “corona;” receptacular bristles scabrous. Corolla purple, not exerted from “corona.” Achenes narrowly obovoid, glabrous, smooth, lustrous, roundish above, about 6 mm long. Flowering VII–VIII; fruiting VIII.

Stony slopes and outcrops of varicolored rocks in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Gissar and Zeravshan ranges). Endemic. Described from the Anzob Pass in the Yagnob River Valley. Type in Paris.

203. *C. laniceps* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 316; Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8, 558.—*C. schtschurowskiana* α . *laniceps* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 181.

Biennial? Stem erect, 20–25 cm high, branched almost from base, with robust one-headed branches. Leaves on both sides arachnoid-hairy, grayish-green, more densely beneath; basal leaves petiolate, pinnatisect or pinnatifid, lateral segments broadly ovate, acuminate-spinose, irregularly spinose-toothed; lower cauline leaves like basal but slightly smaller and with shorter petioles; all other leaves gradually reduced, sessile, orbicular or oblong-ovate, short-decurrent with adnate auricles,



spinose-toothed, with short and stiff cusp at apex. Capitula 25–35 mm wide (excluding cusps), densely white-tomentose, subglobose, slightly constricted below “corona.” Involucral bracts lanceolate, carinate, outer and middle bracts arcuately decurved, 17–22 mm long; subsequent bracts somewhat flat, erect, short-acuminate, 20 mm long, inner bracts membranous above, broadly lanceolate, about 40 mm long, purple, erect, forming 15–20 mm long “corona,” obtuse above, scabrous along margin; receptacular bristles scabrous. Corolla purple, not exerted from “corona.” Achenes obovoid, glabrous, smooth, roundish above, about 5 mm long, dark gray. Flowering V–VI; fruiting VI–VII.

303 Gypsic stony slopes in foothills.—*Soviet Central Asia*: Pamiro-Alai (foothills of the Alai Range). Endemic. Described from Kokterek. Type in Leningrad.

204. *C. tianschanica* Kult. in Byull. Inst. Pochv. Geobot. Sredneaz. Gos. Univ. 1 (1925) 113 p. p., excl. sp. mogoltavica.

Biennial. Stem erect, 22–25 cm high, striate-sulcate, sparsely arachnoid-hairy, leafy, branched from base; branches one-headed. Leaves light green, finely arachnoid hairy above, arachnoid-hairy beneath, large spinose-toothed; basal and lower cauline leaves lanceolate, short-petiolate, pinnatipartite or pinnatisect, lateral segments acuminate-spinescent; middle leaves oblong, sessile, undivided or lobate, acuminate-spinescent; upper leaves sessile, semiamplexicaul, acuminate-spinescent. Capitula ovoid, constricted below corona, 18–25 mm wide (excluding cusps), weakly arachnoid-hairy, with many florets. Involucral bracts numerous, stiff, carinate; outer bracts lanceolate, about 15 mm long and 3 mm wide at base, gradually acuminate in falcately decurved cusp; middle bracts like outer but divergent, about 20 mm long and 4 mm wide at base; subsequent bracts somewhat flat, broadly lanceolate, about 20 mm long and 5 mm wide at base, short-acuminate; inner bracts thin coriaceous, about 30 mm long, with membranous apical appendages, gradually acuminate in short thin spine, forming “corona;” innermost bracts membranous, about 35 mm long, linear, short-acuminate; receptacular bristles scabrous. Corolla pink, slightly exerted. Achenes oblong-ovoid, almost three-angled, smooth, lustrous, roundish above, gray, dark-spotted, about 5 mm long. Flowering VI–VII; fruiting VII–VIII.

Stony-gravelly slope near the lower boundary of middle mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from the Akbash-Tau Mountains, Badam River (village of Dorofeevka). Type in Tashkent.

Note. A type is not designated in the description of the species, but on the specimen with the label: “Syr-Darya Region, Chimkent Area,

Akbash-Tau Mountains, Badam River (village of Dorofeevka). Zone of steppe rocky xerophytes. Stony slope, 1921 VIII 10. Abolin, Popov, No. 8047"; "Typus" is written in Kultiasow's hand. The plant cited should be considered the lectotype of the species.

205. *C. mogoltavica* Tschern. and Vved. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 16 (1961) 55.—*C. tianschanica* Kult. in Byull. Inst. Pochv. Geobot. Sredneaz. Gos. Univ. 1 (1925) 113, quoad spec. *mogoltavica*.—Exs.: H.F.A.M. No. 196 (sub. *C. tianschanica*).

304 Biennial. Stem erect, 25–45 cm high, arachnoid-hairy, striate-sulcate, leafy, branched from base; branches one-headed. Leaves somewhat pubescent, tomentose beneath; basal leaves broad-petiolate, lyrate, terminal lobes ovate, weakly cordate, spinose-toothed, lateral lobes remote, oblong, acuminate-spinose, five or six pairs; lower and middle cauline leaves crenate-lobate, sessile, short-decurrent, acuminate-spinose; upper leaves reduced, ovate, sessile, auriculate, large spinose-toothed; uppermost leaves strongly reduced. Capitula with many florets, flat-globose, somewhat constricted below corona, 20–25(30) mm wide (excluding cusps), weakly arachnoid-hairy. Involucral bracts numerous, grooved-carinate; outer bracts undivided, about 15–17 mm long, gradually acuminate into spine, decurved; middle bracts like outer but erect-spreading, more acuminate up to 25 mm long; subsequent bracts narrow-lanceolate, somewhat flat, 20–22 mm long; inner bracts 40 mm long, with long, broad-lanceolate, membranous appendages above, forming corona; innermost bracts membranous, linear, about 40 mm long; receptacular bristles scabrous. Corolla pink, not exerted from "corona." Achenes obovoid, glabrous, smooth, about 4 mm long. Flowering V–VI; fruiting VI–VII.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan (Mogoltau). Described from the Mogoltau Range, Spa town on the Uch-Bakh side. Endemic. Type in Tashkent.

206. *C. butkovii* Tschern. and Vved. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 16 (1916) 54.

Biennial. Stems erect, 35–40 cm high, striate-sulcate, tomentose, leafy, branched from base; branches one-headed. Leaves light green, very finely arachnoid-hairy above, grayish arachnoid-hairy beneath, spinose-toothed, acuminate-spinose; basal and lower cauline leaves short-petiolate, lanceolate, pinnatifid, terminal lobe not exceeding laterals, lateral lobes oblong, remote, alternating with smaller lobes; middle cauline leaves oblong lobed; upper leaves orbicular, semi-amplexicaul, auriculate, sometimes attenuate toward apex, acuminate-spinose, decurved; uppermost leaves strongly reduced or reduced to spines. Capitula flat-globose, (20)25–35 mm wide (excluding cusps),

densely arachnoid-hairy, with many florets. Involucral bracts numerous, scabrous, grooved-carinate, outer bracts falcately decurved, lanceolate, 20–22 mm long, acuminate-spinescent; middle bracts like outer, but divergent, 32–35 mm long; subsequent bracts somewhat flat, broadly lanceolate, 20–25 mm long, short-acuminate; inner bracts 25–30 mm long, with about 6 mm wide roundish, membranous appendage; innermost bracts linear, membranous, 30–35 mm long and about 2 mm wide; receptacular bristles scabrous. Corolla pink, not exerted from “corona.” Achenes oblong-ovoid, roundish above, about 4.5 mm long. Flowering V–VI–VII; fruiting VII–VIII.

305 Gravelly slopes and screes in lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Samarkand Mountains, Zeravshan Range). Endemic. Described from the Samarkand Mountains, vicinity of the village of Sazagan. Type in Tashkent.

207. *C. praestans* Tschern. and Vved. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 16 (1961) 57.

Biennial. Stem erect, up to 1 m high, flocculose-tomentose, striate-sulcate, leafy, spreadingly branched from base; branches long, leafy, one-headed. Leaves relatively soft, weakly spinose, finely arachnoid-hairy above, gray-tomentose beneath; lower cauline leaves sessile, semiamplexicaul, short-decurrent, broad-oblong, pinnatilobate, lateral lobes broadly triangular, acuminate, short-spinescent, irregularly short spinose-toothed; middle leaves sessile, short-decurrent, ovate, lobed, lobes broadly triangular, acute, short spinose-toothed; upper leaves sessile, short-decurrent, almost orbicular, acute, spinose-toothed, approximate. Capitula globose, about 30–35 mm wide (excluding cusps), somewhat truncate at base, densely arachnoid-hairy. Involucral bracts scabrous, carinate-grooved; outer bracts decurved, lanceolate, with stiff, about 25 mm long cusp; middle bracts divergent, lanceolate, with long and stiff cusp, about 45 mm long, up to 5 mm wide at base; subsequent bracts somewhat flat, erect, short-acuminate, about 25 mm long; inner bracts thin-coriaceous, lanceolate, about 30 mm long; apically broadened into membranous, 5–7 mm wide, usually purple, spinescent appendages forming short “corona;” innermost bracts membranous, linear, acuminate; receptacular bristles scabrous. Corolla scarcely exerted from “corona,” pink. Achenes obovoid, smooth, lustrous, roundish above, gray with dark spots, about 5 mm long. Flowering V–VI; fruiting VI.

Rocky cliffs in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Gissar Range). Endemic. Described from the Ayakchi River Valley in the Gissar Range. Type in Tashkent.

208. *C. strobilocephala* Tschern. and Vved. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, 16 (1961) 62.

Biennial. Stem erect, 30–50 cm high, striate-sulcate, flocculose-arachnoid hairy, leafy, branched from base; branches long, one-headed. Leaves grayish arachnoid-hairy on both sides; basal leaves petiolate, petioles broadened at base, oblong-lanceolate, pinnatisect, lateral lobes sessile, short-triangular, large spinose-toothed, approximate; lower cauline leaves like basal; middle leaves sessile, short-decurrent, lanceolate, pinnatipartite into triangular, spinose-toothed lateral lobes; upper leaves sessile, auriculate, oblong-ovate or ovate, acuminate-spinescent with small spinescent lobes. Capitula globose, large, about 30 mm wide (excluding cusps), densely arachnoid-hairy. Involucral bracts about 100, relatively weak, coriaceous, somewhat flat; outer and middle bracts narrow-lanceolate, acuminate-short spinescent, closely appressed at base, arcuately decurved from middle, 10–15 mm long, 3 mm wide at base; subsequent bracts erect, narrow lanceolate, acuminate-spinescent, about 25 mm long and 2.5 mm wide; inner bracts lanceolate, with large up to 15 mm long and 5 mm wide, membranous, acuminate-spinescent, apical appendages forming “corona;” innermost bracts membranous, linear, 27 mm long; receptacular bristles scabrous, gradually broadened toward apex. Corolla purple, usually not exerted. Achenes obovoid, weakly compressed, smooth, lustrous, roundish above, grayish with dark spots, about 6 mm long. Flowering V–VI; fruiting VI–VII.

Stony-gravelly slopes in the upper part of middle mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from the Angren River Basin, near the village of Baksuk. Type in Tashkent.

209. *C. rosea* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 17, cum tab.; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 558.—*C. schtschurowskiana* β . *polylepis* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 181.—*lc.*: Kult. op. cit. Plate 17.—*Exs.*: H.F.A.M. No. 486.

Biennial. Stem 15–35(45) cm high, striate-sulcate, branched from base, less often from middle; branches one-headed, leafy. Leaves green, with prominent veins, glabrous above, gray-tomentose beneath, spinose-toothed; basal leaves broad-petiolate, somewhat lyrate, with large ovate-orbicular terminal lobe and small, broadly sessile, with one or two pairs of lateral lobes; lower cauline leaves like basal but short acuminate; middle and upper leaves sessile, ovate-orbicular, with or without auricles, large spinose-toothed, short acuminate in stiff spine; uppermost leaves sometimes strongly reduced. Capitula flat-globose, arachnoid-hairy, 25–30–40 mm wide (excluding cusps). Involucral bracts numerous, more than 100, with long falcate cusp; outer and subsequent bracts carinate, subulate-triquetrous; middle bracts like outer but erect-spreading; inner bracts membranous, about 40 mm long, lanceolate, acuminate, purple,

forming "corona," exceeding adjacent bracts by 20–25 mm; receptacular bristles scabrous. Corolla purple, not exerted from corona. Achenes obovoid, glabrous, smooth, about 6 mm long. Flowering V–VI–VII; fruiting VII–VIII.

307 Outcrops of varicolored rocks from the foothills to middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (southwestern spurs of the Gissar Range). Endemic. Described from the vicinity of Yakkabag, Bovashada. Type in Tashkent.

210. *C. rhodantha* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 22; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 558.

Biennial. Stem 22–25 cm high, striate-sulcate, paritally arachnoid-hairy, branched from middle; branches one-headed leafy. Leaves light green, with prominent veins, glabrous above, fine tomentose beneath, large spinose-toothed; basal leaves petiolate, lanceolate, pinnatisect, with spinescent apical lobe, as large as lateral lobes; lower cauline leaves like basal; middle leaves pinnatipartite, sessile, reduced; upper leaves lobed, sessile, uppermost strongly reduced. Capitula ovoid-globose, somewhat compressed near "corona," arachnoid-hairy, 25–30 mm wide (excluding cusps). Involucral bracts numerous (more than 100), carinate, weak; outer bracts narrow lanceolate, 15 mm long, gradually attenuate into thin, decurved cusp; middle bracts like outer but falcately decurved, 25–27 mm long, about 2 mm wide at base; subsequent bracts more flat, lanceolate, acuminate, 15 mm long, erect; inner bracts about 40 mm long, lanceolate, membranous above, purple, forming "corona," exceeding adjacent bracts by 15–20 mm; receptacular bristles scabrous. Corolla pink, not exerted. Achenes obovoid, roundish above, glabrous, smooth, about 4 mm long. Flowering VI; fruiting VII.

Clayey slopes in foothills.—*Soviet Central Asia*: Pamiro-Alai (southwestern spurs of the Gissar Range). Endemic. Described from the vicinity of Baisun. Type in Tashkent.

Note. A poorly studied species, known only on the basis of type specimens.

211. *C. rotundifolia* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 579; XII, 252; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 558.—*C. rubrarenosa* Kult. in Sched. Herb. Fl. As. Med. 10 (1928) Nos. 486 nom. nud.; Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 18.—*C. kultiasowii* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 317; Juz. op. cit. 558.

Biennial. Stem 30–50 cm high, striate-sulcate, branched from base, less often from middle; branches one-headed. Leaves dark green, with prominent veins, glabrous above, gray-tomentose beneath, short spinose-

308 toothed; basal leaves long-petiolate, lyrate with large, rotund, cordate terminal lobe, and one or occasionally two pairs of almost rudimentary lateral lobes; lower cauline leaves either lyrate, with small terminal lobe and one or two pairs of remote, acuminate-spinescent lateral lobes, or somewhat lobed, only at base, upper part of leaf rotund, undivided, short spinose-toothed; middle leaves broadly ovate or obovate, sessile, almost cordate, weakly amplexicaul, auriculate, acuminate-spinescent; upper cauline leaves reduced, sessile, round above, spinescent, uppermost often reduced to spiny scales. Capitula flat-ovoid, constricted below "corona," arachnoid-hairy, 20–25 mm wide (excluding cusps). Involucral bracts relatively less numerous (about 60), with squarrose (decurved in outer bracts) short and broad cusp; outer bracts stiff, carinate, subulate-triquetrous; middle bracts like outer but two times as large and only somewhat decurved; subsequent bracts somewhat flat, erect, acuminate-spinescent; inner bracts membranous, lanceolate, acuminate, weakly carinate dorsally, purple, forming "corona," almost as long as florets; receptacular bristles scabrous. Corolla pale pink or white. Achenes obovoid, dark gray with light brown dots, glabrous, smooth. Flowering V–VI–VII; fruiting VII–VIII.

Clayey slopes with outcrops of gypsum in varicolored lower mountains.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the Tashbulak Mountains near Sangtud. Type in Leningrad.

212. *C. ferruginea* Kult. in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 8–9 (1924) 142; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 559.—*C. truncata* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 318; Juz. op. cit. 558.

Biennial. Stem erect, 20–40 cm high, usually branched from base or middle, leafy, arachnoid-hairy, glabrescent; branches one-headed. Leaves almost coriaceous, green, arachnoid-hairy on both sides, more densely beneath; basal leaves petiolate, lanceolate, pinnatifid in triangular, acuminate-spinescent lateral lobes; lower cauline leaves like basal but sessile; middle leaves oblong-ovate or ovate, gradually reduced toward stem apex, sessile, very short-decurrent, auriculate, large spinose-toothed, attenuate, cuspidate, almost horizontal; uppermost leaves strongly reduced. Capitula ovoid-globose, 15–30 mm wide (excluding cusps), densely rusty-tomentose, sharply truncate or even foveate at base. Involucral bracts numerous, about 100, all except inner narrow-lanceolate, short-acuminate, arcuately decurved; inner bracts membranous, whitish above, lanceolate, scabrous along margin, erect, about 20 mm long. Corolla purple; receptacular bristles scabrous. Achenes obovoid, smooth, about 4 mm long. Flowering VII–VIII; fruiting VIII–IX.

- 309 Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (eastern part of the Zeravshan and Gissar ranges, Peter the Great Range). Endemic. Described from Peter the Great Range from the Gardani-Kaftar Pass. Type in Leningrad.

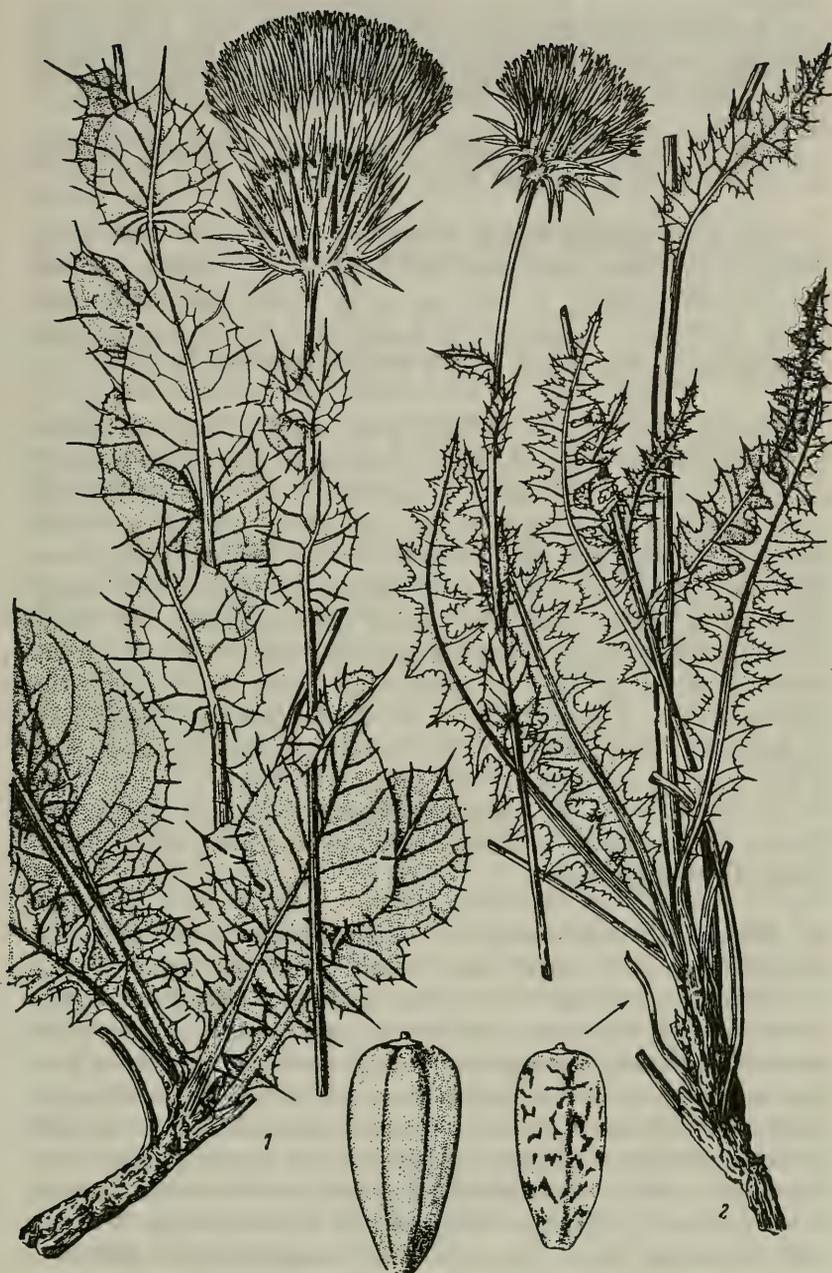
213. *C. dimoana* Kult. in Pochv. i Bot.-Geogr. Issl. Bass. rr Amu i Syr-Dari, 2 (1916) 79; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 558.—*lc.*: Kult. op. cit. Plate 25.

Biennial. Stem 30 cm high, erect, striate-sulcate, whitish, lustrous, branched from base; branches one-headed, leafy. Leaves coriaceous, glabrous above, finely arachnoid-hairy beneath with prominent veins, terminating in stiff spines; basal leaves obovate, short-petiolate, large spinose-toothed; lower cauline leaves like basal; middle and upper cauline leaves oval, sessile, broadly short-decurrent, spinose-toothed; uppermost leaves reduced. Capitula globose, 20–25 mm wide (excluding cusps), somewhat arachnoid-hairy. Involucral bracts numerous, weak, narrow-lanceolate, acuminate-spinescent, carinate, falcately recurved; inner bracts linear, long-acuminate, about 30 mm long, forming somewhat short (10–15 mm long) corona above capitulum. Corolla yellow; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, about 5 mm long. Flowering V; fruiting V.

Outcrops of varicolored rocks.—*Soviet Central Asia*: Pamiro-Alai (Kugitang). Endemic. Described from Kugitang (village of Khodzhafileta). Type in Tashkent.

214. *C. darwasica* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 249; XIV, 207; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 557.

- Biennial? Stem erect, striate-sulcate, arachnoid-hairy, leafy, branched from base, 30–35 high. Leaves greenish-gray or greenish above, finely flocculose-arachnoid hairy, gray-tomentose beneath; basal and lower cauline leaves petiolate, petioles broadened at base, oblong-lanceolate, almost pinnatisect, with remote, large spinose-toothed, broadly lanceolate lateral lobes, large, 20–30 cm long; other cauline leaves strongly reduced, lanceolate, sessile, semiamplexicaul, large spinose-toothed, acuminate-spinescent, 2–5 cm long; uppermost leaves strongly reduced. Capitula globose, 12–13 mm wide (excluding cusps), loosely arachnoid-hairy, with many florets. Involucral bracts about 50; outer bracts 6–7 mm long, deflexed, narrow-lanceolate, acuminate-spinescent; middle bracts erect-spreading, about 17 mm long, somewhat attenuate at deflection, carinate; inner bracts membranous, flat, lanceolate, erect, 17–20 mm long, short-acuminate; receptacular bristles scabrous. Corolla pale pink.
- 310 Achenes obovoid, light gray, glabrous, smooth, about 4 mm long, roundish above. Flowering VIII; fruiting IX.



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Plate XXIV.

- 1—*Cousinia pseudodshisakensis* Tschern. and Vved.;
 2—*C. ovczinnikovii* Tschern.

In middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Shugnan). *General distribution*: Afghanistan. Described from Afghanistan (near village of Omar on the left bank of the Pyandzh River). Type in Leningrad.

Note. A poorly studied species, known so far from three localities, two of which are in the Gunt River Basin.

215. *C. integrifolia* Franch. in *Ann. Sc. Nat.* 6 sér. 16 (1883) 322; Winkl. in *Tr. Peterb. Bot. Sada*, XII, 244; XIV, 228; Bornm. in *Beih bot. Centralbl.* XXXIV, 2, 162; Juz. in *Tr. Tadzh. Bazy Akad. Nauk SSSR*, 8, 559.—*C. integrifolia* β. *heterophylla* Bornm. l.c.—*Arctium integrifolium* O. Ktze. *Rev. Gen.* 1 (1891) 308.—*Exs.*: H.F.A.M. No. 482.

Biennial. Stem 15–50 cm high, erect, usually branched in upper half, striate-sulcate, arachnoid-hairy; branches one-headed, leafy, mostly glabrescent toward end of vegetative growth. Leaves soft, without spines, entire, decurrent, finely arachnoid-hairy above, finely tomentose beneath; basal leaves lyrate, less often undivided or lobed, lower cauline leaves like basal; middle leaves broad lanceolate, acuminate, less often obtuse; upper leaves oblong; uppermost reduced. Capitula globose, 18–20 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts numerous, relatively weak, up to 2 mm wide, with broad, linear basal cusp; outermost bracts slightly decurved, all others squarrose. Corolla pink; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, about 4 mm long. Flowering V–VI–VII; fruiting VII–VIII.

Loamy-stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Zeravshan River Valley, Chukalik. Type in Paris.

216. *C. divaricata* Winkl. in *Tr. Peterb. Bot. Sada*, XI (1892) 334; XII, 267; Juz. in *Tr. Tadzh. Bazy Akad. Nauk SSSR*, 8, 559.

Perennial (monocarpic?). Stem erect, 20–35 cm high finely flocculose-arachnoid hairy, divaricately dichotomous, leafy, branches and branchlets slender, one-headed. Leaves green and finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, lyrate, with ovate, small spinose-toothed terminal lobe and broadly triangular, acuminate-spinose, small spinose-toothed lateral lobes; cauline leaves sessile, semiamplexicaul, with roundish auricles, ovate-lanceolate, crenate-spinose-toothed, gradually reduced upward. Capitula ovoid-cylindrical, arachnoid-hairy, 7–11 mm wide (excluding cusps). Involucral bracts numerous (about 80); outer bracts ovate, basally appressed, somewhat attenuate above at transition to cusp, with small thickening on inner side, gradually narrowed in linear, somewhat flat, decurved, 5–7 mm long cusp; middle bracts like outer but longer, with wider and longer (15–22 mm long) decurved or

almost horizontal cusps; subsequent bracts with short (4–5 mm long) falcate cusps; inner bracts membranous, sometimes purple on outer side, broad-lanceolate, short-acuminate, smooth along margin; receptacular bristles glabrous, smooth. Corolla pale purple; anther tube purple. Achenes three-angled, thickened at angles, with barely noticeable teeth above, dark gray, 3 mm long and 1.5 mm wide. Flowering VII–VIII; fruiting VIII.

On gravelly slopes.—*Soviet Central Asia*: Pamiro-Alai (Darvaz). Endemic. Described from the Pyandzh River Basin, near Kalaikhumb. Type in Leningrad.

217. *C. centauroides* Fisch. and Mey. in Bull. Soc. Nat. Mosc. XII (1839) 159, (nomen) and ex Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 54; exclus. syn. *C. platyacantha*; Boiss. Fl. or. III, 493 exclus. syn. *P. platyacantha*; Winkl. in Tr. Peterb. Bot. Sada, XII, 236; Kult. in Fl. Turkm. VII, 206.—*Exs.*: H.F.A.M. No. 44.—*lc.*: Fl. Turkm. VII, Plate 31.

Perennial (rather monocarpic). Stem with remains of old petioles at base, distinctly tomentose in-between, erect, 40–50 cm high, usually divaricately branched from middle, striate-sulcate, partially tomentose below, slightly glossy, entirely glabrous above, repeatedly branched, branchlets one-headed. Leaves coriaceous, green and finely loose-arachnoid hairy above, gray-tomentose beneath, with prominent veins; basal and lower cauline leaves somewhat short-petiolate, oblong, 4–18 cm long and 2–4 cm wide, unequally pinnatipartite or pinnatilobate, with spinose-toothed and acuminate-spinescent lateral lobes; cauline leaves sessile, semiamplexicaul, gradually reduced, oblong-oval or lanceolate, auriculate, crenate-spinose-toothed, acuminate-spinescent; uppermost leaves strongly reduced. Capitula ovoid-cylindrical, 10 mm wide, arachnoid hairy. Involucral bracts about 50, all glandular and arachnoid-hairy dorsally; outer bracts closely appressed at base, broadened, gradually acuminate above in stiff triquetrous-subulate, decurved, 7–8 mm long cusp; middle bracts longest, about 30 mm long, broadened at base (5 × 4 mm), closely appressed, weakly attenuate above in carinate-grooved, linear, acuminate-spinescent, 22–24 mm long, 313 divergent cusps; inner bracts thin coriaceous, linear-lanceolate, acuminate, scabrous along margin and dorsally, 20–24 mm long; receptacular bristles smooth; somewhat broadened above. Corolla yellow; anther tube purple. Achenes obpyramidal, 5 mm long, distinctly ribbed, toothed above. Flowering VI–VII; fruiting VII.

Slopes in middle mountain zone.—*Soviet Central Asia*: mountainous Turkmenia (Great Balkans). Endemic. Described from the Great Balkans. Type in Leningrad.

Subsection 3. *Kokuria* Juz.—Involucral bracts numerous or comparatively less numerous, long or short acuminate; inner bracts often with membranous appendages, but not forming “corona;” achenes glabrous, smooth; receptacular bristles scabrous, less often smooth. Biennial plants with uniformly or discontinuously winged stems.

Series 1. *Pulchellae* Juz.—Capitula ovoid or globose-oblong; involucral bracts numerous, long-acuminate; receptacular bristles scabrous; basal leaves soft, undivided.

218. ***C. severtzovii* Rgl.** in Bull. Soc. Nat. Mosc. XI, 2 (1867) 151; Winkl. in Tr. Peterb. Bot. Sada, XII, 244 p. p.; XIV, 228; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 163; Juz. in Tr. Tadzh. Bazy Akad. Nauk. SSSR, 8, 560.—*Arctium severtzowii* O. Ktze. Rev. Gen. 1 (1891) 308.—**Exs.:** H.F.A.M. No. 487.

Biennial. Stem 30–80 cm high, erect, branched in upper half, more or less uniformly winged throughout or almost throughout, wings up to 5 mm wide, spinose-toothed. Leaves soft, undivided, very finely arachnoid-hairy above, finely-tomentose beneath, acuminate; basal leaves broadly lanceolate, narrowed toward both ends, petiolate; lower cauline leaves like basal; middle and upper cauline leaves sessile, decurrent, lanceolate, spinose-toothed; uppermost leaves reduced. Capitula globose-oblong, 12–15 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts very numerous, narrow, with thin subulate cusp, squarrose; inner bracts with narrow-ovate, up to 1 mm wide (in broadest part), gradually acuminate appendages, not exceeding adjoining middle bracts, usually dark-colored; receptacular bristles scabrous. Corolla pink. Achenes obovoid, blackish, glabrous, smooth, lustrous, 3.5–4 mm long. Flowering VI–VII; fruiting VII–VIII. (Plate XXV, Fig. 1.)

Stony-gravelly slopes in the foothills.—*Soviet Central Asia:* Tien Shan (western); Pamiro-Alai. Endemic. Described from the Chirchik River Valley, based on the collections of Severtsev. Type in Leningrad.

Note. A hybrid has been described under the name *C. cana* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 316.—*C. ninae* Juz. × *C. severtzovii* Rgl. from the Alai Range: Taldyk River between Mady and Lyangar.

314 Morphologically, it closely resembles *C. severtzovii* but has more densely pubescent leaves and stem, broader and less numerous outer and middle involucral bracts, and inner bracts broadened into ovate-lanceolate, usually purple, somewhat short appendages.

The numerous hybrids of *C. severtzovii* and *C. microcarpa*, as well as of *C. severtzovii* and *C. arachnoidea*, which approach one or the other species, do not have names.

219. *C. leiocephala* (Rgl.) Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 314.—*C. sewertzovii* var. *leiocephala* Rgl. in Tr. Peterb. Bot. Sada, VI (1880) 314; Winkl., *ibid.* XII (1892) 245; Winkl., *ibid.* XIV (1897) 228 p. p.; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 163.

Very similar to *C. sewertzovii* Rgl. but differs from it in the smaller capitula, almost entirely glabrous involucre and broader (up to 2.5 mm wide) and usually colored and white-bordered appendages of the inner involucre bracts. Flowering VI–VII; fruiting VII–VIII.

Stony or loamy mountain slopes, in juniper forests.—*Soviet Central Asia*: Tien Shan (central Tien Shan). *General distribution*: Dzhungaria-Kashgaria. Described from the Chirchik River Valley (?). Type in Leningrad.

Note. Since S.V. Juzepczuk did not designate the type while describing the species but included the variety of Regel among the synonyms, the plant of Krause should be considered the lectotype, since Regel established the variety. As indicated on the label, this plant was collected in the Chirchik River Valley. However, the range of the species, as presently described on the basis of numerous collections, provides a basis to conclude that the plant was collected in Mailisai (foothills of the Chatkal Range), where Krause also made collections.

220. *C. pulchella* Bge. in Delect. Sem. Hort. Dorpat. (1845) 3; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 44; Boiss. Fl. or. III, 494; Winkl. in Tr. Peterb. Bot. Sada, XII, 245; XIV, 228; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 163; Juz. in Tr. Tadh. Bazy Akad. Nauk SSSR, 8, 560.—*C. pulchella* var. *latifolia* Winkl. op. cit. (1892) 246.—*Arctium pulchellum* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial. Stem 25–60 cm high, erect, branched in upper half, more or less uniformly winged throughout: on cauline leaves 4–5 mm wide, on peduncles 2–3 mm wide, finely spinose-toothed. Leaves soft, undivided, finely spinose-toothed, subglabrous or very finely arachnoid-hairy on both sides, obtuse; basal leaves broadly lanceolate, petiolate; lower cauline leaves like basal; middle and upper leaves broadly lanceolate, decurrent; uppermost leaves oblong, reduced. Capitula ovoid, 8–10 mm wide (excluding cusps), arachnoid-hairy. Involucre bracts very numerous, narrow, with thin subulate cusp, squarrose, inner bracts with broad ovate, up to 4 mm wide, abruptly acuminate apical appendage, not exceeding adjacent middle bracts; receptacular bristles scabrous. Corolla pink. Achenes narrow-obovoid, light gray, glabrous, smooth, 3 mm long. Flowering VI–VII; fruiting VII–VIII.

Loamy slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Karatau Range, near Samarkand, i.e., from the southern slopes of the Gissar Range. Type in Paris; cotype in Leningrad.

Note. Hybrids of *C. outichaschensis* Franch. and *C. pulchella* Bge., have been described as *C. heterogenetos* Bornm.; cf. the note to *C. outichaschensis* Franch. about them.

Series 2. Pauciramosa Tschern.—Capitula almost globose; involucre bracts numerous, carinate-grooved, long acuminate-spinescent; receptacular bristles scabrous; basal leaves soft, pinnatisect.

221. *C. pauciramosa* Kult. in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 8–9 (1924) 139.

Biennial. Stem solitary, erect, 25–40 cm high, shallow-sulcate, flocculose-arachnoid hairy, densely leafy, discontinuously winged, more or less branched in upper half; branches short, divergent, leafy, one-headed. Leaves soft, without spines, early withering, but persistent, arachnoid hairy-tomentose on both sides, revolute, broadly lanceolate; basal leaves petiolate, pinnatifid, lateral segments very soft, unequal, alternate, linear, short-acuminate, sessile, two-toothed at base or slightly above, apically linear-excurrent, petiole wide-winged; cauline leaves gradually reduced, like basal but sessile, short-decurrent in crenate-toothed cauline wings. Leaves on branches oblong-narrow lanceolate. Capitula 40 mm long and 22 mm wide (excluding cusps), broadly ovoid or subglobose, densely arachnoid-hairy, with many florets. Involucre bracts numerous, carinate-grooved; outer bracts narrow-lanceolate, long acuminate into triquetrous spine, decurved, 17–18 mm long, up to 2 mm wide at base; middle bracts like outer, closely appressed at base, acuminate, divergent, up to 30 mm long; subsequent bracts more flat, erect, 23–25 mm long; inner bracts thin-coriaceous, somewhat flat, narrow-lanceolate, short-acuminate, up to 25 mm long; subsequent bracts almost scarious, with slightly broadened, acuminate, apical appendages; innermost bracts membranous, linear; receptacular bristles finely scabrous above. Florets exerted; corolla pink. Achenes oblong-obovoid, roundish above, without teeth, 4–4.5 mm long. Flowering VI–VII; fruiting VII–VIII.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan (Mogoltau). Endemic. Described from the Mogoltau Mountains. Type in Tashkent.

316 *Series 3. Regelianae* Juz.—Capitula flat-globose; involucre bracts less numerous, short-acuminate; receptacular bristles scabrous; basal leaves soft, undivided, entire.

222. *C. regelii* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 574; Winkl. in Tr. Peterb. Bot. Sada, XII, 252; XIV, 229; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 171; Juz. in Tr. Tadzh. Bazy Akad. Nauk

SSSR, 8, 560.—*C. centauroides* auct. non Fisch. and Mey.: Rgl. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 152.

Biennial. Stem 15–30 cm high, erect, branched almost from middle, arachnoid-hairy, more or less winged throughout, wings 3–7 mm wide, entire; branches leafy, one-headed. Leaves soft, undivided, gray-tomentose on both sides; basal leaves petiolate, with winged petioles; cauline leaves sessile, decurrent, oblong-ovate. Capitula flat-globose, 20–25 mm wide, arachnoid-hairy. Involucral bracts fewer, wide, 5–7 mm wide at base, broadly lanceolate, short cuspidate, somewhat flat, squarrose; inner bracts spatulate, with subobtuse or obtuse appendages forming corona; receptacular bristles scabrous. Corolla greenish-yellow. Achenes ovoid, roundish above, glabrous, smooth, lustrous, 3.5 mm long and 2 mm wide. Flowering V–VII; fruiting VII–VIII.

Gravelly slopes in foothills.—*Soviet Central Asia*: Syr-Darya, Tien Shan (western), Pamiro-Alai. Endemic. Described from western Tien Shan, between Boroldai and Bugun. Type in Leningrad.

Series 4. Arachnoideae Juz.—Capitula globose or broadly ovoid; involucral bracts numerous or relatively less numerous; lanceolate, short-acuminate; receptacular bristles scabrous; basal leaves withering early, pinnatisect, lyrate-pinnatifid or spinose-toothed.

223. *C. arachnoidea* Fisch. and Mey. in DC. Prodr. VI (1837) 553; Ldb. Fl. Ross. II, 677; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 44; Winkl. in Tr. Peterb. Bot. Sada, XII, 247 p. p.; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 167.—*C. arachnoidea* var. *typica* and var. *spiniosior* Rgl. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 151.

Biennial. Stem erect, 20–60 cm high, usually corymbosely branched above, arachnoid-hairy, usually winged throughout, wings 3–8 mm wide, crenate-spinose-toothed; branches often short, narrow-winged. Leaves and wings of main stem and branches finely arachnoid-hairy above, gray-tomentose beneath; basal and lower cauline leaves oblong-ovate, with narrow-winged petiole, sparsely short spinose-toothed, withering early; other cauline leaves oblong-lanceolate, sessile, decurrent, sparsely and short spinose-toothed, gradually reduced toward stem apex. Capitula globose, arachnoid-hairy, 10–15 mm wide (excluding cusps). Involucral bracts numerous, narrow-lanceolate, about 1 mm wide, short-acuminate; outer bracts usually decurved, others erect-spreading, 7–15 mm long; inner bracts 15–18 mm long, lanceolate, membranous, usually brownish, lighter in color and scabrous along margin, acuminate. Corolla pink, exerted; receptacular bristles scabrous; insignificantly broadened above. Achenes narrow obovoid, 3 mm long and 1.5 mm wide, glabrous, smooth, dark gray. Flowering V–VI.

Foothills, on clayey slopes, apparently as weed.—*Soviet Central Asia*: Balkhash Region, Tien Shan. Endemic. Described from the Urdzhar River Valley. Type in Leningrad.

The species is closest to *C. microcarpa* Boiss. Its characters are intermediate between the latter and *C. severtzovii* Rgl. Hybrids of this species with *C. severtzovii* Rgl. are known.

224. *C. microcarpa* Boiss. Diagn. pl. nov. 2 (1843) 59; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 44; Boiss. Fl. or. III, 496; Winkl. in Tr. Peterb. Bot. Sada, XII, 246; XIV, 228; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 165; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 560; Kult. in Fl. Turkm. VII, 190.—*C. xeranthemoides* Bge. l.c. in syn.—*Arctium microcarpum* O. Ktze. in Tr. Peterb. Bot. Sada, X (1887) 197.—**Exs.**: H.F.A.M. No. 47.

Biennial. Stem 25–60 cm high, erect, discontinuously broad-winged, often branched from middle; branches one-headed; stem wings 5–7 mm wide, spinose-toothed or almost pinnatifid. Leaves coriaceous, strongly spinose-toothed, green, finely gray-tomentose beneath, loosely arachnoid-hairy above; basal leaves lyrate-pinnatifid; cauline leaves long-decurrent, oblong, almost lobed; lobes finely short-spinescent; uppermost cauline leaves reduced. Capitula broad-ovoid, with many florets, 15–25 mm wide (excluding cusps), somewhat arachnoid-hairy. Involucral bracts green, coriaceous, carinate, acuminate in stiff, short spine; outermost bracts weakly decurved, 1 mm wide at base; outer and middle bracts erect, 2–3 mm wide at base; inner and innermost bracts with broadly ovoid or almost roundish, membranous, often pinkish-purple or pink appendages; receptacular bristles scabrous. Corolla purple or pink, exserted. Achenes oblong-obovoid, gray. Flowering V–VI; fruiting VI–VII.

Clayey and stony slopes in foothills and middle mountain zone, often as weed.—*Soviet Central Asia*: Syr-Darya, Tien Shan (very widely distributed in western Tien Shan), Pamiro-Alai, mountainous Turkmenia (Kopetdag, Badkhyz). *General distribution*: Iran, Afghanistan. Described from Kabul. Type in Geneva.

318 *Note*. The species is very widely distributed and often grows as a weed. It forms numerous hybrids with *C. outichaschensis*, *C. severtzovii*, *C. pulchella*, *C. submutica* and *C. coronata*. One of the hybrids was described as *C. atripurpurea* Juz. (in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3, 1936, 313 = *C. coronata* Franch. × *C. microcarpa* Boiss.) from the Kugitang Range (in the ravine opposite the village of Kugitang). These plants have short-excurrent leaves, with involucral bracts broader than in *C. coronata* and narrower than in *C. microcarpa*, the inner bracts widening into dark purple appendages, forming a short "corona." See notes to the above-named species for other hybrids.

225. *C. ninae* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 315; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 561.—*C. microcarpa* var. *parviceps* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 166, saltem p. max. p.

Biennial. The plant occupies intermediate position between *C. microcarpa* Boiss. and *C. arachnoidea* Fisch. and Mey. It differs from the former by the presence of gray-tomentose pubescence of the entire plant; narrower cauline leaves; smaller (often almost half), 18–28 mm long and 10–15 mm wide (excluding cusps) capitula; narrower and shorter involucre bracts, of which inner ones widening into an ovate whitish or pale brown thin short cuspidate appendage; from *C. arachnoidea* it differs by broader and less numerous (almost half) involucre bracts. Flowering V; fruiting VII.

Mountain slopes, pebble land.—*Soviet Central Asia*: Pamiro-Alai (Alai Range), Tien Shan (western). Endemic. Described from the left bank of the Taldyk River, between the villages of Mady and Lyangar. Type in Leningrad.

Note. The species needs to be studied further, as the boundaries of its range are still unclear.

Series 5. Platylepides Juz.—Capitula globose; involucre bracts less numerous, somewhat flat, short-acuminate; receptacular bristles smooth; basal leaves soft, with remote lobes.

226. *C. platylepis* Schrenk ex Fisch. and Mey. Ind. sem. hort. Petrop. 9 (1843) 10; Bull. phys.-math. Acad. Pétersb. 3, 108; Ldb. Fl. Ross. II, 681; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 38; Boiss. Fl. or. III, 466; Winkl. in Tr. Peterb. Bot. Sada, XII, 202; XIV, 219; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 150; Pavlov in Fl. Tsentr. Kazakhst. III, 296; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 561.—*Arctium platylepis* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial. Stem 30–85 cm high, erect, branched from middle, appressed arachnoid-hairy, more or less winged throughout, wings crenate-toothed, spinose, 3–7 mm wide, gray-tomentose; inflorescence 319 branches strongly elongate. Leaves soft, lanceolate, crenate-toothed, gray arachnoid-hairy above, gray-tomentose beneath; basal leaves oblong, petiolate, sparsely lobed; lower cauline leaves like basal, but sessile; middle and upper leaves narrow, reduced, sessile, with remote lobes, lobes acuminate-spinose; uppermost leaves strongly reduced. Capitula globose, small, 7–9 mm wide (excluding cusps), arachnoid hairy-woolly. Involucre bracts fewer, 31–36, green, short-lanceolate, carinate, squarrose, acuminate-spinose; middle bracts somewhat flat, roundish above, short-acuminate; inner bracts with obtusely broadened, unarmed

or with short-acuminate membranous, 5 mm wide appendages; innermost bracts with membranous, lanceolate, up to 2 mm wide appendages; receptacular bristles smooth. Corolla pink. Achenes obovoid or almost obpyramidal, with scarcely noticeable longitudinal ribs, roundish above, 3 mm long and 1.5 mm wide, light gray. Flowering VI–VII; fruiting VII–VIII.

Clayey mounds in foothills.—*Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region, Syr-Darya, Tien Shan, Pamiro-Alai. *General distribution*: Dzhungaria. Described from the Khantau Mountains. Type in Leningrad.

227. *C. ortholepis* Juz. ex Tschern. Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzSSR, XVII (1962) 99.

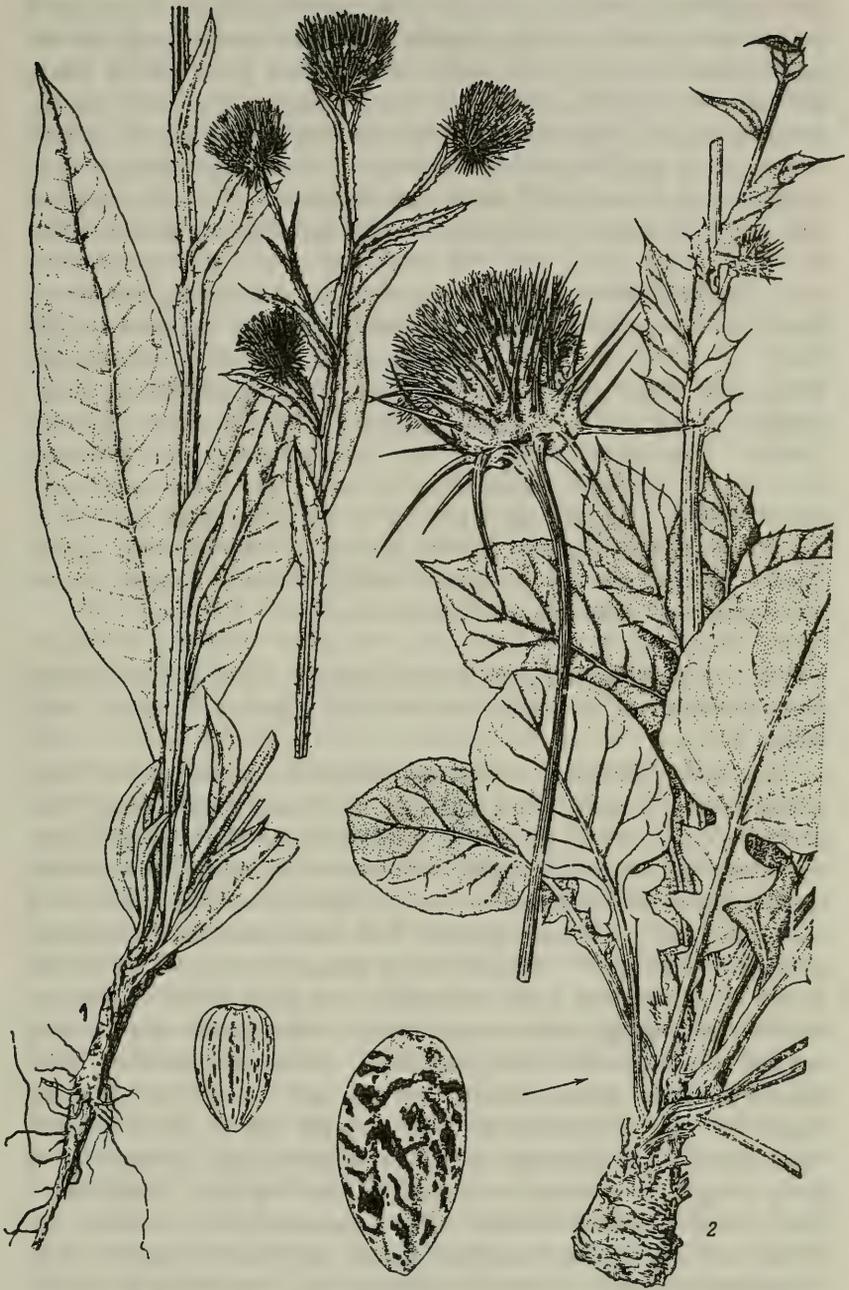
Biennial. Stem 70 cm high, erect, appressed arachnoid-hairy, branched from middle, more or less winged throughout, wings crenate-toothed, spinose, 5–7 mm wide, gray-tomentose; lateral branches short. Leaves oblong, finely spinose-toothed, gray-tomentose on both sides; middle and upper leaves sessile; uppermost leaves reduced. Capitula obconical, 10–12 mm wide (excluding cusps), arachnoid hairy-woolly. Involucral bracts less numerous, 25–30, carinate, squarrose acuminate-spinose; outermost bracts appressed, up to 10 mm long, outer bracts stiff, up to 20 mm long; middle bracts somewhat flat, acuminate; inner bracts with obtusely broadened, short cusp, membranous, up to 3 mm wide, innermost with lanceolate, up to 2 mm wide appendages; receptacular bristles smooth; corolla pink. Achenes obovoid, 4 mm long, light gray with dark spots. Flowering VII–VIII; fruiting VIII.

As weed.—*Soviet Central Asia*: Pamiro-Alai (western spurs of the Gissar Range). Endemic. Described from the vicinity of the town of Guzar. Type in Tashkent.

Subsection 4. Subappendiculatae Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzSSR, XVII (1962).—Involucral bracts less numerous, carinate, constricted in middle, short acuminate or broad above and short acuminate; inner bracts membranous, usually forming short "corona;" receptacular bristles smooth or scabrous. Biennial plants with wingless stems.

320 228. *C. ferganensis* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 195 ("*ferghanensis*").—*C. popovii* Kult. in Tr. Turk. Gos. Univ. 4 (1922) 66.

Biennial. Stem 30–50 cm high, erect, striate-sulcate, partially arachnoid-hairy, branched from base or middle; branches one-headed, leafy. Leaves coriaceous with prominent veins, large spinose-toothed,



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Plate XXV.

1—*Cousinia severtzovii* Rgl.; 2—*C. peduncularis* Juz.

gray-tomentose beneath, green and finely arachnoid-hairy above; basal leaves lyrate, with large ovate terminal lobe and rotund, broadly sessile lateral lobes alternating with smaller sessile lobes; lower cauline leaves oblong, almost lobate, lobes stiff spinescent; middle leaves sessile, semiamplexicaul, large spinose-toothed, terminating in long, stiff, weakly curved spine; upper leaves like middle but with more prominent midrib, attenuate into divergent stiff spine; uppermost leaves reduced, sometimes into spines. Capitula ovoid-globose, constricted below, corona of inner involucre bracts, 20–25 mm wide (excluding cusps), weakly arachnoid-hairy. Involucre bracts green, carinate, constricted in middle; outer bracts decurved, relatively long acuminate; subsequent bracts squarrose; middle bracts coriaceous, more flat, roundish above, abruptly acuminate into short spine, shorter than outer bracts; inner bracts membranous, linear-lanceolate, two times as large as adjacent middle bracts, forming “corona;” receptacular bristles scabrous. Corolla pink, usually not exerted from corona. Achenes oblong-obovoid, dark gray, glabrous, lustrous, roundish above, 5 mm long. Flowering V–VI–VII; fruiting VII–VIII.

Stony-gravelly slopes in foothills and lower mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Turkestan Range). Endemic. Described from the vicinity of Sultan-Murad. Type in Leningrad.

229. **C. subappendiculata** Kult. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, V, 8–9 (1924) 140; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 561.

Biennial? Stem erect, 35 cm high, herbaceous, branched from base, striate-sulcate, weakly arachnoid-hairy; branches simple, leafy, one-headed. Leaves almost coriaceous with prominent veins, green, finely arachnoid-hairy on both sides (more dense beneath); basal leaves petiolate (petioles somewhat broad, striate-sulcate), oblong-lanceolate, 18 cm long and 4 cm wide, attenuate towards both ends, acuminate-spinescent, pinnatisect into narrow triangular lobes, spinose-toothed; middle cauline leaves 10 cm long and 5 cm wide, sessile, like basal; leaves of branches 322 sessile, ovate-oblong, acuminate-spinescent, crenate-spinose-toothed along margin, upper leaves of branches linear, acuminate-spinescent, short spinose-toothed. Capitula globose, 4 cm long and 5–6 cm wide (including cusps; 2.5 cm wide excluding cusps), weakly and loosely arachnoid-hairy. Involucre bracts green, somewhat arachnoid-hairy, scabrous below along margin; outer bracts lanceolate, 13 mm long and 2 mm wide at base, carinate, acuminate-spinescent; subsequent bracts 21 mm long and 4 mm wide, divergent, lanceolate, closely appressed at base, weakly constricted in middle; next bracts 22 mm long, 2 mm wide in middle, 4 mm above, lanceolate, weakly constricted in middle, slightly broadened above, acuminate-spinescent, divergent; middle bracts 18 mm long,

2 mm wide in middle, 3 mm above, slightly carinate, narrowed at base, broadly linear, roundish-obtuse, acuminate-weakly spinescent; inner bracts linear, 27 mm long and 2–2.5 mm wide, subglabrous, scabrous along margin, membranous, dark brown above, acuminate with very short and thin spine; innermost bracts 26 mm long and 2 mm wide, membranous, narrow-linear; receptacular bristles scabrous above. Corolla pink, exserted from corona; anther tube pink. Achenes obovoid, roundish above, indistinctly striate, with dark spots, 4 mm long and 2 mm wide. Flowering VII; fruiting VIII.

On mountain slopes.—*Soviet Central Asia*: Pamiro-Alai (Alai Range). Endemic. Described from Akbasaga in the upper reaches of the Taldyk River. Type in Tashkent. (?)

Note. Material for this species is not available in the collections. The type specimen of the species is apparently lost. Its original description is presented here.

230. *C. simulatrix* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 573; XII, 271; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 194; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 561.

Biennial. Stem 25–50 cm high, striate-sulcate, arachnoid hairy-flocculose, branched mainly from middle; branches one-headed, leafy. Leaves whitish-woolly beneath, weakly arachnoid-hairy above, almost entire; basal leaves petiolate, lyrate or irregularly pinnatifid, with larger roundish terminal lobe; lower cauline leaves lyrate or lobed, sessile; middle and upper leaves sessile, amplexicaul, auriculate, short spinose-toothed, more or less obtuse, abruptly terminating into short spine; uppermost leaves reduced. Capitula globose, 25–35 mm wide (excluding cusps), weakly arachnoid-hairy. Involucral bracts stiff, carinate, with large apical spine, constricted in middle; outer and middle bracts squarrose, slightly decurved, 7–8 mm wide at base; subsequent bracts somewhat flat, somewhat shorter than middle, 6–7 mm wide at base, constricted apically, with small stiff apical spine; inner bracts coriaceous, lanceolate, acuminate, 5–6 mm wide at base; innermost bracts linear, 323 receptacular bristles smooth. Corolla pink, prominent, numerous. Achenes obovoid, roundish above, grayish-yellow, indistinctly ribbed, with very narrow and discontinuously winged ribs, sometimes developed only as discontinuously thickened ridges, 4–4.5 mm long and 2.5 mm wide. Flowering VI–VII; fruiting VII–VIII.

Stony-gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Gissar Range). Endemic. Described from the Karatag River Valley between Khoshgassan and Khakimi. Type in Leningrad.

231. *C. vvedenskyi* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 106.

Biennial. Stem 10–20(40) cm high, striate-sulcate, arachnoid-hairy, branched from base and middle; branches with one or rarely two capitula, leafy. Leaves whitish-woolly beneath, weakly arachnoid-hairy above, finely spinose-toothed; basal leaves petiolate, lyrate, with ovate-rotund, cordate terminal lobe, and remote ovate lateral lobes; lower cauline leaves like basal but sessile or short-petiolate; middle leaves sessile, oblong, semiamplexicaul, auriculate, finely spinose-toothed, acuminate-spinescent; upper cauline leaves like middle, but reduced; uppermost leaves sometimes reduced to spines. Capitula oblong-ovoid, narrowed above, weakly arachnoid-hairy, 15–25 mm wide (excluding cusps). Involucral bracts green, carinate, short-acuminate, constricted in middle; outer bracts decurved; middle bracts squarrose, up to 7 mm wide at base, constricted in middle, carinate, acuminate, spinescent; subsequent bracts somewhat flat, weakly carinate, 5–6 mm wide at base, somewhat constricted at apex, subobtuse, short-spinescent; inner bracts coriaceous, green, weakly carinate, lanceolate; innermost bracts linear-lanceolate, purple above; receptacular bristles smooth. Corolla pink, exserted from corona. Achenes obovoid, roundish above. Flowering VI–VII; fruiting VIII.

Gravelly-stony slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Chulbair and Baisuntau mountains). Endemic. Described from the Chulbair Mountains, vicinity of the village of Seena. Type in Tashkent.

Section 37. Microcousinia Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 86.—*Constrictae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 264 p. p.—*Dichotomae* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 8 p. p.—*Calcitrapae* Boiss. Fl. or. III (1875) 460 p. p.; Series *Minutae* Juz. in Tr. Tadzh. Bazy. Akad. Nauk SSSR, 8 (1940) 544.—Plants profusely dichotomously branched; capitula solitary; involucral bracts stiff, carinate, somewhat attenuate above in cusp; corolla yellowish; receptacular bristles smooth; achenes obovoid, striate-ribbed, finely toothed above. Annual plants with soft leaves, attenuate toward both ends and finely spinose-toothed.

Type of section: *C. minuta* Boiss.

232. *C. minuta* Boiss. Diagn. pl. or. 6 (1845) 117 and 10 (1849) 103 in adnot.; Bge. in Mém. Acad. Pétersb. 7, sér. 9, 2, 8; Boiss. Fl. or. III, 489; Winkl. in Tr. Peterb. Bot. Sada, XII, 265; XIV, 231; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 194; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 544; Kult. in Fl. Turkm. VII, 167.—*C. aralensis* Bge. in Mém. Acad. Pétersb. Sav. étrang. 7 (1851) 178.—*C. calcitrapaeformis* Jaub. and Spach, III, pl. or. 2 (1844–1846), tab. 158.—*Arctium minutum*

O. Ktze. in Tr. Peterb. Bot. Sada, X (1887) 197.—**lc.**: Jaub. and Spach op. cit. tab. 158.

Annual. Stems profusely dichotomously branched right from base, whitish, glabrous, lustrous, leafy; branches ascending, repeatedly branched dichotomously, forming somewhat roundish bush, branchlets one-headed. Leaves soft, sessile, ovate or oblong-ovate, attenuate toward both ends, short acuminate-spinescent, finely spinose-toothed, arachnoid-hairy above, gray-tomentose beneath. Capitula 6–7 mm wide (excluding cusps), subglobose, finely arachnoid-hairy. Involucral bracts less numerous (about 20), stiff, carinate; outer bracts up to 7 mm long, horizontal, narrow-lanceolate, acuminate; middle bracts lanceolate, 15–20 mm long and 3 mm wide, gradually acuminate into triquetrous stiff spine, almost horizontal; inner bracts 9–10 mm long, membranous, white, narrow-lanceolate, acuminate-spinescent. Corolla yellowish; receptacular bristles smooth. Achenes obovoid, 2.5 mm long, 1.5 mm wide, ribbed-striate, pitted, rugose, finely toothed above. Flowering IV–V; fruiting V–VI.

Clayey deserts, foothill plains, in oases.—*Soviet Central Asia*: Sverdarya, Pamiro-Alai, Kyzyl-Kum, Kara-Kum, mountainous Turkmenia, Aralo-Caspian Region. *General distribution*: Iran, Kashmir. Described from Tabriz. Type in Geneva.

Section 38. Jurineopsis (Juz.) Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 86.—*Nudicaules* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 191 p. p.—*Microcarpa* subsect. *jurineopsis* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 518, 554.—Capitula solitary terminal on long slender branches; involucral bracts long acuminate or abruptly short acuminate; corolla pink, whitish, or yellow; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth. Biennial plants with wingless stems and sessile cauline leaves.

Type of section: *C. hastifolia* Winkl.

223. **C. krauseana** Rgl. and Schm. in Izv. Obshch. Lyubit Estestv. Antrop. Etnogr. 34, 2 (1882) 48; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 554.—*Arctium krauseanum* O. Ktze. Rev. Gen. 1 (1891) 308.

325 Biennial. Stem erect, 50–80 cm high, glabrous, brown, sparsely branched in upper half, usually very sparsely leafy above with remote upper leaves; branches oblong; slender, one-headed. Leaves green, very finely arachnoid-hairy above, gray-tomentose beneath; basal and lower cauline leaves petiolate, unevenly pinnatisect in linear, entire lateral segments; petiole narrow-winged; other cauline leaves abruptly reduced toward stem apex, sessile, semiamplexicaul; in shape middle leaves like basal; upper cauline leaves and those on branches lanceolate, entire, with two or three pairs of finely spinose teeth only at base, strongly

reduced. Capitula ovoid-cylindrical, finely arachnoid-hairy, 6–7 mm wide (excluding cusps) and 20 mm long (with corolla), numerous. Involucral bracts except inner imbricate, with short recurved cusp; inner bracts erect, somewhat broadened above, membranous, with thin short cusp, scabrous along margin; receptacular bristles broadened above, weakly scabrous. Corolla pale yellow or whitish. Achenes obovoid, glabrous, smooth, about 3 mm long. Flowering V–VII.

Loamy slopes or outcrops of varicolored rocks, in higher foothills or lower mountain zone.—*Soviet Central Asia*: Tien Shan (foothills of the Fergana Valley). Endemic. Described from the vicinity of the Maili River in “Kokania.” Type in Leningrad.

234. *C. submutica* Franch. in Ann. Sc. Nat. Bot. 6 sér. 16 (1883) 314; Winkl. in Tr. Peterb. Bot. Sada, XII, 195; XIV, 192; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 555.—*C. krauseana* Rgl. and Schmalh. in Izv. Obshch. Lyubit. Estestv. Antrop. Etnogr., 34, 2 (1882) 48 quoad sp. ex Iskander.—*C. lancifolia* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 572; XII, 199; XIV, 219.—*C. krauseana* α . *genuina* f. *elata* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 141.—*C. krauseana* α . *genuina* f. *humilior* Bornm. Ibid. (1916) 141.—*C. krauseana* β . *submutica* Bornm. Ibid. (1916) 142.—*C. kokanica* f. *nowobadensis* Bornm. Ibid. (1916) 144.—*C. hastifolia* auct. non Winkl.: Bornm. Ibid. (1916) 143.—*C. krauseana* auct. non Rgl. and Schmalh.: Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 218.—*Arctium submuticum* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial. Stem erect, 20–60 cm high, brown, not glossy, subglabrous or very finely arachnoid-hairy, branched throughout, more frequently above, leafy; branches long, one-headed; basal rosettes lax, or entirely absent. Leaves coriaceous, finely arachnoid-hairy above, white-tomentose beneath; basal leaves petiolate, unevenly pinnatisect into lanceolate, almost entire lobes or almost lyrate, with narrow, oblong-ovate terminal lobe and lanceolate lateral lobes, usually narrowed at base; cauline leaves usually like basal, gradually reduced toward stem apex but all sessile.

326 Capitula broadly ovoid, finely arachnoid-hairy, 10–12(15) mm wide (excluding cusps). Involucral bracts numerous with short, mostly obtuse, subobtuse or short acuminate cusp; inner bracts with broad-ovate or almost roundish, dark brown, membranous apical appendage; receptacular bristles broadened above, scabrous. Corolla pink. Achenes obovoid, glabrous, smooth, 4–4.5 mm long. Flowering VII–VIII; fruiting VIII–IX.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan, Gissar, Peter the Great, and Alai ranges). Endemic. Described from the vicinity of the village of Voru. Type in Paris.

Note. Hybrids between *C. submutica* Franch. and *C. alpestris* Bornm. are known, for which see the note to *C. alpestris* Bornm.

Hybrids between *C. submutica* Franch. and *C. outichaschensis* Franch., described as *C. iskanderi* Bornm. (*B.B.C.* 34; 2 (1916) 168), are also known from the Iskander-Darya Valley.

This plant superficially is rather reminiscent of *C. outichaschensis* Franch., but is distinguished by the presence of more numerous, shorter and narrower outer and middle involucre bracts, and by the membranous appendages of the inner bracts.

235. *C. tamarae* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 297; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 555.—*C. krauseana* var. *microcephala* Winkl. in Tr. Peterb. Bot. Sada, XIV (1897) 218.

Biennial. Stem erect, 25–40 cm high, brownish, finely arachnoid-hairy, usually branched from base, leafy; branches long, one-headed. Leaves green, finely arachnoid-hairy above, gray-tomentose beneath; basal leaves petiolate, unequally pinnatisect in oblong segments usually attenuate toward both ends; cauline leaves gradually reduced, sessile, narrow-lanceolate, with two or three pairs of narrow lobes at base. Capitula broadly ovoid, 15–17 mm wide (excluding cusps), finely arachnoid-hairy. Involucre bracts numerous, closely appressed; outer and middle bracts with divergent, 3–5 mm long cusp; inner bracts with broadly lanceolate or almost roundish, membranous, usually pale pink appendages, exceeding florets; receptacular bristles broadened above, very weakly scabrous or almost smooth. Corolla pale pink or white. Achenes obovoid, glabrous, smooth, about 4 mm long. Flowering VII–VIII; fruiting VIII.

Gravelly and clayey slopes in middle mountain zone in ravines and along river banks.—*Soviet Central Asia*: Pamiro-Alai (Alai Range). Endemic. Described from the vicinity of the Gulcha River, between the mouth of the Shart River and the Kyzylbeles Pass. Type in Leningrad.

236. *C. omphalodes* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 98.—*C. krauseana* γ. *longispinella* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 142.—*Exs.*: H.F.A.M. No. 483.

327 Biennial. Stem erect, 80–90 cm high, very finely arachnoid-hairy, glabrescent, dark brown, profusely branched from base, branches long, spreading, slender, one-headed. Leaves coriaceous, green, glabrous above, gray-tomentose beneath; basal leaves petiolate, unequally pinnatisect, with narrow-lanceolate, finely toothed lateral segments; lower cauline leaves like basal but sessile; middle and upper leaves oblong-lanceolate, acuminate, usually spinose-toothed at base, sessile, semiamplexicaul;

uppermost leaves strongly reduced. Capitula globose, finely arachnoid-hairy, 11–12 mm wide (excluding cusps) and 22–25 mm long (with florets); strongly truncate, almost foveate at base. Involucral bracts numerous, all except inner with horizontal, subulate, 4–5 mm long cusp; inner bracts erect, slightly broadened above, membranous, acuminate; receptacular bristles broadened above, weakly scabrous. Corolla yellow. Achenes obovoid, glabrous, smooth, 3 mm long. Flowering VII–VIII. (Plate XXVI, Fig. 2).

Sandy and loamy slopes in foothills.—*Soviet Central Asia*: Tien Shan (foothills of the Fergana Range). Endemic. Described from Achi-Sai, vicinity of Dzhelalabad. Type in Tashkent.

Note. At the border with the range of *C. waldheimiana* Bornm., this species develops forms resembling *C. waldheimiana* Bornm.

237. *C. dubia* M. Pop. in Pop. and Andr. Rast. Zapovedn. Guralash (1937) 37; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 556.—*C. jassyensis* auct. non Winkl.: Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 142.

Biennial. Stem 40–60 cm high, erect, striate-sulcate, subglabrous, branched from middle; branches long, spreading, one-headed. Leaves glabrous above, finely grayish-tomentose beneath; basal leaves petiolate, lyrate, with large, ovate, entire terminal lobe and oblong lateral lobes; lower and middle cauline leaves like basal but middle leaves sessile, broad-lanceolate, with one or two pairs of basal lobes; upper leaves broad-linear, somewhat shorter than middle; uppermost leaves linear, reduced. Capitula ovoid, 10–12 mm wide (excluding cusps), weakly arachnoid-hairy. Involucral bracts stiff, squarrose, often slightly decurved, with stiff wide cusp; outer bracts carinate, up to 2 mm wide at base and 10–12 mm long; middle bracts coriaceous, somewhat flat, up to 15 mm long; inner bracts with membranous, oblong, acuminate, 2–3 mm wide appendages, not forming corona; receptacular bristles flattened above; weakly scabrous. Corolla pink. Achenes obovoid, glabrous, smooth, light brown. Flowering VI–VIII.

Gravelly slopes in upper mountain belt.—*Soviet Central Asia*: Pamiro-Alai (Turkestan, Gissar and Zeravshan ranges). Endemic. Described from the Guralash Ravine. Type in Tashkent.

328 *Note.* Plants somewhat different from true *C. dubia* are found within the Gissar Range; they have smaller capitula, shorter involucral bracts, and broader middle and upper cauline leaves.

238. *C. kokanica* Rgl. and Schmalh. in Izv. Obshch. Lyubit. Estestv. Antrop. Etnogr. 34, 2 (1882) 49; Winkl. in Tr. Peterb. Bot. Sada, XII, 198; XIV, 219; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 555.—*C.*

kokanica var. *virgata* Winkl. op. cit. (1897) 219; Bornm. in Beih. bot. Centralbl. XXXIV, 144.—*C. kokanica* α. *genuina* Bornm. Ibid. 143.—*Arctium kokanicum* O. Ktze. Rev. Gen. 1 (1891) 308.

Biennial. Stem erect, arachnoid hairy-tomentose, usually corymbosely branched above or from base, sparsely leafy, with dense rosette of leaves 20–35 cm high; branches slender, long, one-headed. Leaves finely arachnoid-hairy above, white-tomentose beneath, lanceolate, pinnatisect or almost bipinnatisect, petiole narrow-winged or almost wingless, lateral segments approximate, narrow-linear, almost entire, weak, usually weakly crispate in basal leaves; basal leaves petiolate, usually 7–8(13) cm long, with 8–12 pairs of segments; cauline leaves reduced, 2 to 5 mm long, sessile, like basal leaves but with two to five (seven) segments; leaves on branches strongly reduced. Capitula globose or somewhat flat-globose, weakly or distinctly foveate at base, 10–12 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts numerous, linear-subulate, all bracts closely appressed, only short bracts about 2–3 mm long, cusps arcuately recurved; inner bracts scarious, flat, short acuminate, not forming “corona,” about 15 mm long; receptacular bristles more or less broadened above, scaberulous. Corolla pale pink. Achenes narrow obovoid, glabrous, smooth, about 4 mm long. Flowering VII–VIII; fruiting VIII.

Stony-gravelly dry slopes from middle to upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Alai Range, Shugnan, Pamir). Described from Alai. Type in Tashkent.

239. *C. hastifolia* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 571; XII, 195; XIV, 208; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 555.—*C. taldykensis* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 299; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 555.

Biennial? Stem erect, 25–80 cm high, finely arachnoid-hairy, glabrescent; brownish, leafy, profusely branched from base; branches spreading in turn, branched in one-headed branchlets, entire plant with many capitula. Leaves coriaceous, green, glabrous above with network of prominent veins, white-tomentose beneath; basal leaves petiolate or pinnatisect in lanceolate, sparsely toothed, sessile lateral segments on winged rachis or almost lyrate, with large, oblong-ovate, acuminate, hastate, excurrent terminal lobe and rather small, narrow-lanceolate, usually slightly decurved, many (up to 10 pairs) lateral lobes, usually withering early; lower cauline leaves like basal but somewhat smaller; other leaves sessile, lanceolate or subovate, with roundish auricles, sparsely finely spinose-toothed, gradually reduced toward stem apex. Capitula ovoid, very finely arachnoid-hairy, 8–12 mm wide (excluding cusps) and 20–25 mm long (with florets). Involucral bracts numerous, all except

inner lanceolate, with somewhat short, 3–4 mm long, erect, subulate cusp; inner bracts slightly broadened above, with lanceolate, light brown, usually erect, membranous, somewhat acuminate appendages; receptacular bristles broadened above, scabrous. Corolla purple or pink, exserted. Achenes obovoid, glabrous, smooth, about 4 mm long. Flowering VII–VIII. (Plate XXVI, Fig. 1.)

Stony slopes and loamy screes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Alai, Gissar, Zeravshan, Peter the Great, and Vakhsha ranges, Roshan). Endemic. Described from Karategin, Pumbach. Type in Leningrad.

Note. The plants from the Peter the Great Range differ somewhat from typical *C. hastifolia* Winkl. by broader leaves (the lateral lobes of the basal leaves are broadly ovate or even round.) Further study of the material from this region is necessary.

The species was described from three localities. I propose to designate as lectotype the plant with the label: "Pumn-Baczi. 1878, 21, VIII. Newessky," preserved in Leningrad.

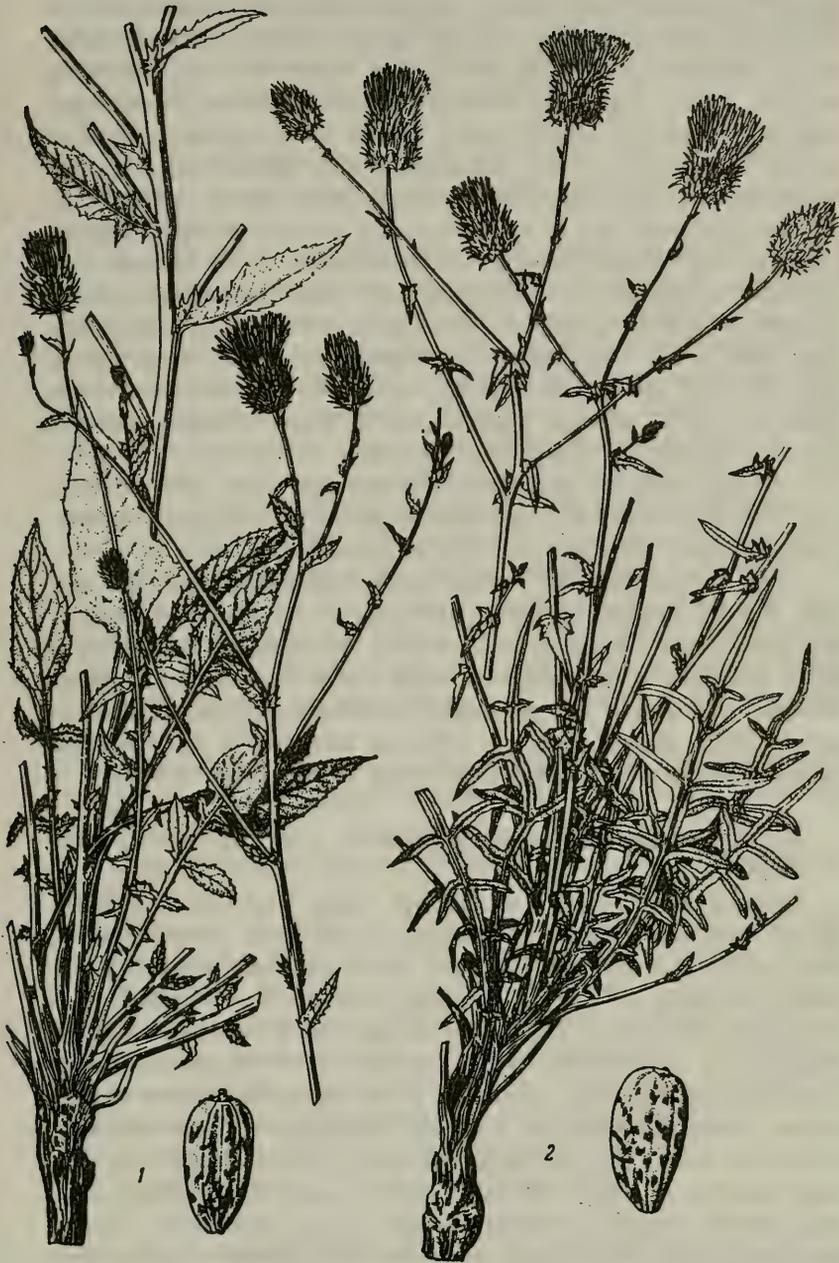
240. *C. transiliensis* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 298.

Biennial. Stem erect, 45–55 cm high, brownish, finely arachnoid-hairy, striate-sulcate, branched from base, more frequently in upper half; branches long, one-headed. Leaves thin-coriaceous, green, finely arachnoid-hairy above, finely tomentose beneath, sparsely finely spinose-toothed; basal leaves petiolate, almost lyrate, withering early; lower cauline leaves like basal but short-petiolate; other cauline leaves ovate or broadly ovate, sessile, gradually reduced toward stem apex. Capitula broadly ovoid, 17 mm wide (excluding cusps) and 30 mm long (with florets), finely arachnoid-hairy, weakly truncate at base or somewhat attenuate. Involucral bracts numerous, all except inner closely appressed, terminating in thin, subulate-triquetrous, 5–6 mm long erect cusp; inner
330 bracts membranous, erect, broadened above, lanceolate, acuminate in thin cusp, scaberulous along margin; receptacular bristles subglabrous, sometimes broadened above and weakly scabrous. Corolla pink. Achenes (immature) obovoid, glabrous, smooth, about 4 mm long. Flowering VI–VII.

In foothills.—*Soviet Central Asia*: Tien Shan (Trans-Ili Alatau). Endemic. Described from the Bakhtiar River. Type in Leningrad.

241. *C. waldheimiana* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 140.

Biennial. Stem erect, 30–80 cm high, leafy, subglabrous, finely arachnoid-hairy only below, somewhat brownish, corymbosely and



sparsely branched from middle branches long, one-headed. Leaves coriaceous, glabrous and green above, grayish-tomentose beneath; basal leaves petiolate, pinnatisect into narrow lanceolate, fast withering revolute, lateral segments, terminal segment lanceolate, acuminate, excurrent on narrow-winged rachis; cauline leaves gradually reduced toward stem apex, sessile, semiamplexicaul, narrow-lanceolate or lanceolate, attenuate toward apex, almost entire, usually with two to four pairs of teeth only at base; leaves on branches strongly reduced. Capitula ovoid-conical, weakly arachnoid-hairy, 10–12–15 mm wide (excluding cusps) and 25–30 mm long (with florets), somewhat truncate. Involucral bracts numerous, all except inner with more or less arcuate cusp; inner bracts erect, lanceolate, membranous above, acuminate in very thin and short spine, usually brownish; receptacular bristles broadened above, scabrous. Corolla pink or purple. Achenes obovoid, glabrous, smooth, 3.5–4 mm long. Flowering VI–VIII.

Gravelly-loamy dry slopes in middle mountain zone.—*Soviet Central Asia*: Tien Shan (Chatkal, Uzun-Akhmat and Fergana ranges). Endemic. Described from Uzun-Akhmat. Type in Leningrad.

Note. *C. waldheimiana* Bornm. and *C. margaritae* Kult. are very close species, differing mainly in the color of the corolla (whitish or pale yellow in *C. margaritae*). However, the color of the corolla is poorly preserved in the herbarium, which makes identification of plants difficult. This is why the geographic delimitation of these species is unclear at the present time. In collecting material for these species, special attention must be paid to the color of the corolla in nature.

242. *C. margaritae* Kult. in Tr. Sredneaz. Gos. Univ. Ser. 1, VIIIc, VI (1929) 5.

332 Biennial. Stem erect, 20–40 cm high, finely arachnoid-hairy, leafy, sparsely branched, branches one-headed. Leaves green, glabrous above, finely white-tomentose beneath; basal leaves petiolate, pinnatisect into narrow-lanceolate, early-withering lateral segments; lower cauline leaves like basal; other leaves gradually reduced toward stem apex, sessile, pinnatisect or pinnatilobate, lateral segments narrow-lanceolate, remote on narrow-winged rachis; uppermost leaves lanceolate, spinose-toothed at base, acuminate-spinose. Capitula ovoid-globose, arachnoid-hairy, truncate at base 11–18 mm wide (excluding cusps), 25–30 mm long (with exerted corollas). Involucral bracts numerous, all except inner with subulate, arcuately decurved or squarrose cusp; inner bracts scarious above and slightly broadened in somewhat short, almost ovate, brownish spinose appendages; receptacular bristles broadened above, weakly scabrous. Corolla whitish or pale yellowish. Achenes obovoid, glabrous, smooth, 4 mm long. Flowering VI.

Limestone screes or loamy slopes from foothills to middle mountain zone.—*Soviet Central Asia*: Tien Shan (Talass Alatau). Endemic. Described from the mouth of the Beshtash River. Type in Tashkent.

Note: Cf. note to the previous species.

243. **C. jassyensis** Winkl. in Tr. Peterb. Bot. Sada, X (1889) 472.—*C. kokanica* δ . *perapressa* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 144.

Biennial. Stem erect, 30–80 cm high, usually branched from base, leafy, finely arachnoid-hairy, brownish; branches long, one-headed. Leaves coriaceous, green above, gray-tomentose beneath; basal leaves petiolate, pinnatifid into narrow-lanceolate, acuminate terminal lobe, and almost linear, almost entire, acuminate, short-spinescent lateral lobes; lower cauline leaves usually like basal but sessile; other cauline leaves lanceolate, sessile, acuminate, entire, with two or three pairs of small teeth at base, auriculate, gradually reduced toward stem apex. Capitula narrow-lanceolate, 9–10 mm wide and 22 mm long (with florets), very finely arachnoid-hairy. Involucral bracts numerous, very closely appressed, short cuspidate or entirely without cusp; inner bracts with short, narrow-lanceolate, almost membranous, short acuminate appendages; receptacular bristles weakly broadened above, slightly scabrous. Corolla whitish or yellowish; anthers purple. Achenes broadly obovoid, glabrous, smooth, light gray, 3.5 mm long. Flowering VII–VIII.

Gentle slopes in foothills.—*Soviet Central Asia*: Tien Shan (Fergana Range). Endemic. Described from the Yassy River Valley near Uzgent. Type in Leningrad.

Note. Hybrids of this species with *C. ninae* Juz. are known.

333 *Section 39. Tenellae* Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 8.—*Psilacanthae* Boiss. Fl. or. III (1875) 461 p. p.—*Inermes* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 196 p. p.—Series *Tenellae* Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8 (1940) 544.—Capitula solitary, with many florets; involucral bracts narrowed into subulate, weakly divergent cusp; corolla pink; receptacular bristles scabrous; achenes obovoid, with scarcely noticeable longitudinal ribs, denticulate above.

Annual plants with soft, almost entire leaves.

Type of section: *C. tenella* Fisch. and Mey.

244. **C. tenella** Fisch. and Mey. Ind. sem. hort. Petrop. I (1834) 25; Ldb. Fl. Ross. II, 677; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 8; Boiss. Fl. or. III, 494; Winkl. in Tr. Peterb. Bot. Sada, XII, 197; XIV, 219; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 145; Grossh. Fl.

Kavk. IV, 165; Takht. in Tr. Arm. Fil. Akad. Nauk SSSR, Biol. Ser. 2, 177; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 544; Takht. in Fl. Erev. 317; Kult. in Fl. Turkm. VII, 163; Fl. Azerb. VIII, 362.—*Lappa tenella* Fisch. and Mey. ex DC. Prodr. VI (1837) 662.—*Arctium tenellum* O. Ktze. in Tr. Peterb. Bot. Sada, X (1887) 197.

Annual. Stem erect, 8–40 cm high, whitish, smooth, lustrous, leafy, dichotomously branched from very base; branches leafy, long, in turn dichotomously branched, branchlets one-headed. Leaves soft, sessile, very finely arachnoid-hairy above, almost smooth, gray-tomentose beneath, oblong-ovate or lanceolate, attenuate toward both ends, entire or with small teeth. Capitula 4 mm wide (excluding cusps), almost globose, glabrous. Involucral bracts numerous, all similar, narrow-linear, squarrose, finely cuspidate, weakly uncinata, 5–7 mm long. Corolla pink; receptacular bristles scabrous. Achenes obovoid, 2 mm long and 1 mm wide, with scarcely noticeable longitudinal ribs, gray, punctate, matty, with small teeth above. Flowering IV–V; fruiting V–VI.

Foothills and high deserts, as weed.—*Soviet Central Asia*: Pamiro-Alai, Syr-Darya, Tien Shan, Balkhash Region, Aralo-Caspian Region, Kara-Kum, mountainous Turkmenia (Kopetdag, Badkhyz); *Caucasus*: Southern and eastern Transcaucasia. *General distribution*: Iran, Afghanistan, Dzhungaria-Kashgaria, Armenia-Kurdistan. Described from the Nakhichevan District. Type in Leningrad.

Section 40. Glaphyrocephalae Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 87.—Capitula solitary, on short slender peduncles; involucral bracts carinate, gradually acuminate into thin, falcate cusp; receptacular bristles smooth; corolla pink; achenes obovoid, smooth, roundish above. Perennial plants with greatly incised leaves with linear, short, revolute lateral segments, on narrow-winged rachis.

Type of section: *C. glaphrocephala* Juz.

334 245. *C. glaphrocephala* Juz. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 94.

Perennial. Stems several, erect, short, 15–20 cm high, finely tomentose, branched from middle; branches slender, short, one-headed. Leaves arachnoid-hairy above, white-tomentose beneath; basal leaves short-petiolate, pinnatisect, lateral segments linear, short, revolute, acuminate, rachis narrow-winged, entire, revolute; cauline leaves gradually reduced, like basal sessile, very short-decurrent; leaves on branches lanceolate, with one or two pairs of teeth at base. Capitula ovoid, 20 mm long and 7 mm wide (excluding cusps), arachnoid-hairy. Involucral bracts about 40, carinate; outer bracts narrow-lanceolate,

acuminate into thin spine, falcately decurved, about 5 mm long; middle bracts narrow-lanceolate, acuminate-spinescent, falcate, 10–12 mm long; subsequent bracts lanceolate, short acuminate, erect, about 9 mm long; inner bracts almost scarious, lanceolate, slightly broadened toward apex and acuminate into thin spine, dark purple in middle, about 10 mm long; receptacular bristles smooth. Corolla exerted, pink. Achenes obovoid, smooth, roundish above. Flowering VI–VII; fruiting VII–VIII.

Middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Suzystau (Novo-Bulak). Type in Tashkent.

Section 41. Alpinae Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 45 p. p.—*Odontocarpae* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 253 p. p.—*Acanthotoma* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 522, 563.—*Alpinae* auct. non Bge.: Boiss. in Fl. or. III (1875) 461 p. p.—Capitula solitary terminal on stem and branches or aggregated in inflorescences; involucral bracts acuminate-cuspidate; receptacular bristles scabrous, occasionally smooth or weakly scabrous; corolla yellow, yellowish, whitish or less often pink; achenes obovoid, glabrous, smooth, with narrow-winged narrow ribs or almost triquetrous, with broad winged ribs. Perennial plants with many-headed root and pinnatisect basal leaves; leaf segments palmatipartite in linear lanceolate or almost linear entire lobes, seemingly forming whorl over almost entire length of uniformly winged leaf rachis.

Lectotype of section: *C. verticillaris* Bge.

246. *C. magnifica* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 319; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 563.

335 Perennial. Root thick, woody, with numerous remains of previous year's leaves at base. Stem 80–135 cm high, erect, glabrous in lower part, finely appressed-tomentose above, densely white-tomentose in inflorescence, sparsely branched from middle. Leaves with usual structure for the section, with narrow-winged, glabrous, weakly tomentose rachis in cauline leaves and long, linear, acuminate-spinescent, undivided, revolute lateral segments, bright green, scabrous above due to small spines, finely white-tomentose beneath; basal leaves petiolate; petioles glabrous, broadened at base, margin spinose; cauline leaves gradually reduced, sessile, semiamplexicaul, short-decurrent, with wider-winged rachis and wider lateral lobes; inflorescence almost racemose, with spreading many-headed branches. Capitula numerous, on short peduncles, broadly ovoid to almost turbinate, 25–30 mm long and 25–30 mm wide (at base), finely arachnoid-hairy. Involucral bracts numerous (100–120), somewhat flat, compactly imbricate; all bracts erect, dorsally scabrous due to dense spines, with weakly divergent cusp; outer bracts lanceolate,

up to 10 mm long, acuminate; middle bracts like outer, but up to 20 mm long; inner bracts thin-coriaceous, broadly linear, acuminate-spinescent, 25–30 mm long; receptacular bristles strongly scabrous. Corolla yellow, about 30 mm long (including anther tube). Achenes numerous, somewhat flat, obovoid, 12–14 mm long, 5–7 mm wide, two or three ribbed, with somewhat broad, fragile, two or three wings, and two or three obtuse teeth at apex. Flowering VII; fruiting VIII. (Plate XXVII, Fig. 1.)

Stony mountain zone.—*Soviet Central Asia*: Pamiro-Alai (south). Endemic. Described from the area between the Shurak and Kyzylsu rivers, on the western slopes of the Korimonak Mountain. Type in Leningrad.

247. *C. lanata* Winkl. in Tr. Peterb. Bot. Sada, XIII (1894) 238; Winkl. *ibid.*, XIV, 204; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 563.

Perennial. Root thick, woody, stems solitary, occasionally two or three, with numerous remains of previous year's leaves at base, erect, 100–135 cm high, thick, about 15 mm wide below, striate-sulcate, tomentose-arachnoid hairy, sericeous, less often arachnoid-hairy, occasionally glabrous, densely leafy, branched from base; branches short, sometimes reduced to peduncles; inflorescence long, spicate or subspicate. Leaves typical of the section, with narrow-winged, rather wide but strongly broadened toward base, densely woolly rachis due to long silky hairs and linear-subulate entire revolute lateral segments, reduced toward rachis base to thin spines, green, glabrous and smooth above or sericeous along midrib, white-tomentose beneath with long silky hairs; basal leaves short-petiolate; cauline leaves gradually reduced toward stem apex, sessile, short-decurrent. Capitula numerous, on short peduncles, young capitula almost sessile, broadly cylindrical, deflorate capitula almost obconical, up to 30 mm long and 20–25 mm wide, densely woolly. Involucral bracts numerous (about 100), somewhat flat, compactly imbricate, erect; outer bracts up to 10 mm long, lanceolate, short acuminate-spinescent, scabrous dorsally due to numerous spinules; middle bracts like outer but up to 20 mm long, 5 mm wide at base, attenuate from middle; inner bracts thin-coriaceous, linear, acuminate-spinescent, 25–30 mm long, 2 mm wide at base; receptacular bristles smooth or some weakly scabrous. Corolla yellow, about 15 mm long. Achenes numerous, obovoid, winged, 10–12 mm long and 6 mm wide (including wings), somewhat flat or almost triquetrous, wings 1.5 mm wide, weakly bulged at apex, forming pit lodging pappus bristles. Flowering VII–VIII; fruiting VIII–IX.

Outcrops of varicolored rocks, loamy slopes from the middle to the

lower boundary of the upper mountain zone.—*Soviet Central Asia: Pamiro-Alai*. Endemic. Described from Musabazar. Type in Leningrad.

248. **C. pseudolanata** M. Pop. ex Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 104.

Perennial. Root woody, thick. Stem erect, with numerous remains of previous year's leaves at base, usually tall, thick, striate-sulcate; tomentose, leafy; inflorescence oblong, narrow spicate. Rosette leaves glabrous beneath, glandular above or densely pubescent on both sides. Pinnatisect in numerous, almost acicular lateral segments, sessile on narrow-winged rachis, in whorl, rachis basally broadened, lateral segments reduced to thin spines. Capitula (previous year's) on short peduncles; almost turbinate, up to 20 mm wide (excluding cusps), numerous, pubescent. Involucral bracts numerous, somewhat flat, smooth, erect; outer bracts narrow-lanceolate, long acuminate, 22 mm long, up to 3 mm wide at base; middle bracts like outer but longer, 25 mm long; inner bracts thin-coriaceous, linear, acuminate-spinescent; receptacular bristles weakly scabrous. Achenes obovoid, almost triquetrous 5 mm long and 3 mm across, narrow-winged, apically terminating in three teeth.

Lower part of upper mountain zone.—*Soviet Central Asia: Pamiro-Alai* (town of Nuratau). Endemic. Described from Aktau. Type in Tashkent.

Note. We have the tip of an inflorescence with the previous year's capitula and numerous sterile rosettes of leaves. However, even from such inadequate material it is apparent that this is an entirely unique species of the section. Additional collections of this species are necessary to determine more precisely its position in the section.

337 249. **C. adenophora** Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 320.

Perennial. Roots thick, woody, many-headed, bearing sterile rosettes of leaves and stems, caudices densely covered with remains of previous year's leaves, usually gray-tomentose. Stems erect, 40–50 cm high, almost smooth, glabrous or sparsely glandular, spreadingly branched, rather densely leafy. Leaves green, scabrous above due to glandular hairs, grayish-tomentose beneath, pinnatisect in numerous, linear-acicular, revolute segments, on almost wingless leaf-rachis, whorled, rachis broadened at base and lateral segments reduced to thin spines; cauline leaves gradually reduced toward stem apex, sessile, short-decurrent. Capitula on glandular-hairy peduncles, narrow ovoid, 10–15 wide (excluding cusps), without arachnoid-hairy indumentum. Involucral bracts about 30–40, somewhat flat, coriaceous, scabrous due to dense cover of glandular hairs; outer bracts 8–15 mm long, divergent, lanceolate, with prominent midrib, terminating into stiff spine; middle bracts erect,

20–30 mm long, with prominent midrib, terminating into stiff cusp; inner bracts membranous, lanceolate, acuminate-spinescent. Corolla yellow; receptacular bristles scabrous. Achenes obovoid, almost three-angled, narrow winged, 2–3 dentate above, 6–7 mm long. Flowering VII–VIII; fruiting VIII–IX.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Samarkand Mountains). Endemic. Described from Manys Pass. Type in Leningrad.

Note. The species was described with an indication of its having originated from Manas Mountain in the Talass Alatau. This report is erroneous because the plant was collected, as is clear now, in Manys Pass in the Samarkand Mountains.

250. *C. splendida* Winkl. in Tr. Peterb. Bot. Sada, XIII (1894) 240 (incl. var. *komarovii*); XIV, 234; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 198; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 563.—*C. lipskyi* Winkl. op. cit. XIV (1897) 237 excl. var. *approximata*.

Perennial. Root woody, many-headed; caudices with numerous remains of previous year's leaves. Stem erect, 50–70 cm high, finely striate-sulcate, glabrous, leafy, sparsely branched; branches and stem one-headed. Leaves coriaceous, glabrous and bright green above, white-tomentose beneath; basal leaves lanceolate, pinnatisect, 4–7 mm wide, somewhat flat, lateral segments on broad-winged 3–6 mm wide rachis with flat wings as if in whorl, petiolate, petioles thickened at base, somewhat flat, ciliate; lower cauline leaves like basal, but with short petioles, semiamplexicaul; other cauline leaves like basal but gradually reduced toward stem apex, sessile, semiamplexicaul, short-decurrent. Capitula broadly cylindrical, 18–25 mm wide (excluding cusps), glabrous. Involucral bracts numerous, up to 100, all except inner very similar; outer bracts light green, squarrose, with prominent vein on dorsal surface, broadly lanceolate, acuminate-spinescent, ciliate, cilia 12–15 mm long; middle bracts similar but wider and longer, up to 18 mm long and 6 mm wide, more densely ciliate; inner bracts somewhat flat, 20–23 mm long, with membranous appendage above, unevenly divided along margin, acuminate-spinescent. Corolla yellow; receptacular bristles scabrous. Achenes obovoid, 7 mm long, ribbed, narrow-winged along ribs. Flowering VIII–IX; fruiting IX. (Plate XXVIII, Fig. 1.)

Gentle and loamy slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan and Gissar ranges). Endemic. Described from the vicinity of Lake Iskanderkul. Type in Leningrad.

Note. Three plants were cited in the description of this species; I propose to consider as the lectotype the plant with the label: "Iskander kul. alt. 7000 pd. 1893 10 VII legit. V.L. Komarov."

251. *C. xanthina* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 190; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 563.—*C. curviloba* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 321; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 563.—*C. acanthophylla* Kult. ex Zak. in Tr. Uzb. Gos. Univ. Nov. Ser. 89 (1958) 158, nomen et in herb.

Perennial. Root thick, woody, many-headed, caudices covered with numerous remains of previous year's leaves. Stem several, erect, 25–40 cm high, shallow striate-sulcate, finely arachnoid-hairy above, almost always one-headed, very sparsely branched in upper one-third part, leafy. Leaves coriaceous, green above, scabrous due to glandular hairs, green beneath or white-tomentose only along margin; basal leaves short-petiolate, petioles sheath-like broadened, lanceolate, pinnatisect in lanceolate, somewhat flat, rather broadened, 3–6 mm wide, gradually acuminate-short spinescent, sessile lateral segments, in whorls on somewhat flat, broad winged, 2–3 mm wide rachis, less often lateral segments and leaf rachis, somewhat narrower; cauline leaves gradually reduced toward stem apex, like basal leaves, but sessile, short-decurrent; uppermost leaves reduced. Capitula broadly lanceolate, 15–23 mm wide (excluding cusps), finely white arachnoid-hairy. Involucral bracts about 50, somewhat flat, sparsely glandular; outer bracts horizontal, slightly decurved; lanceolate, 3–4 mm wide at base, 17 mm long, gradually acuminate-short spinescent; middle bracts erect-spreading, lanceolate, short acuminate, up to 20 mm long and up to 5 mm wide at base; inner
339 bracts almost membranous, lanceolate, dorsally scabrous due to spinules, broadened above in appendages up to 4 mm wide, usually short and unevenly divided along margin. Corolla pale yellow; receptacular bristles scabrous. Achenes oblong-obovoid, 6–7 mm long, with scarcely noticeable ribs, with small teeth above. Flowering VIII–IX; fruiting IX.

Loamy slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Alai Range, northern slopes of Turkestan Range; Zeravshan Range; in the upper reaches of the Pasrut River). Endemic. Described from the vicinity of Kalai-Makhmud (the Sokh River system), climbing from the Kul area to Kyzyl-Uchuk. Type in Leningrad.

Note. True *C. xanthina* Bornm. is known from the region from where *C. curviloba* Juz. was described. Considering that *C. curviloba* differs from *C. xanthina* only by narrower, somewhat recurved lateral leaf segments, it is difficult to recognize it as a separate species.

The hybrid of *C. xanthina* Bornm. × *C. laetevirens* Winkl. is known from the upper course of the Pasrut River (a tributary of the Fandarya River).

252. *C. trachyphylla* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 524, 563.

Perennial. Root thick, woody, many-headed; caudices with numerous remains of previous year's leaves. Stem erect, about 50 cm high, striate-sulcate, sparsely glandular, glandular-arachnoid-hairy above, leafy, usually branched in upper one-third part. Leaves coriaceous, green and scabrous above due to glandular hairs, white-tomentose beneath; basal leaves petiolate, with thickened wide petioles, lanceolate, pinnatisect in lanceolate, somewhat flat, 5–6 mm wide, gradually acuminate-short spinescent, lateral segments in whorls on somewhat flat, broad-winged, 2–4 mm wide rachis; cauline leaves gradually reduced toward stem apex, like basal, but sessile, semiamplexicaul, short-decurrent; uppermost leaves almost pinnatilobate, lobes lanceolate, with wider wings of rachis and wider lateral segments. Capitula broadly ovoid, about 17 mm wide (excluding cusps), rusty-arachnoid-hairy. Involucral bracts about 50, somewhat flat, glandular; outer bracts slightly decurved, 15–17 mm long, oblong-lanceolate, acuminate-spinescent, with prominent midrib on dorsal side; middle bracts oblong-lanceolate, erect, about 25–30 mm long, with prominent midrib on dorsal side, acuminate-spinescent, usually exceeding inner bracts; inner bracts membranous above, broadly lanceolate, short acuminate-spinescent, scabrous along dorsal surface and margin, about 18–20 mm long. Corolla whitish; receptacular bristles scabrous. Flowering VIII–IX; fruiting IX.

Loamy slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (town of Kugifrush). Endemic. Described from Kugifrush, Alchakhon area. Type in Leningrad.

340 *Note.* The species is quite close to *C. xanthina* Bornm., from which it differs by having a whitish corolla, rusty-pubescent capitula, and leaves that are whitish-tomentose on the lower surface.

253. **C. chrysantha** Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 25 incl. var. *aspera*.—*C. xanthina* β . *subvestita* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 191.

Perennial. Root thick, woody, many-headed; caudices with remains of previous year's leaves. Stems several, erect, 20–50 cm high, glabrous or sometimes, especially in upper part, sparsely glandular, simple or branched in upper one-third part; branches one-headed, leafy. Leaves coriaceous, green and glabrous above, or sometimes with sparse and fine sessile glandular hairs, white-tomentose beneath; basal leaves lanceolate, pinnatisect in 4–7 mm wide, somewhat flat lateral segments, on wide winged 3–5 mm wide rachis with somewhat flat wings, as if in whorl, petiolate, petioles somewhat flat, broadened at base; lower cauline leaves like basal but with short, semiamplexicaul, usually ciliate petioles; other cauline leaves like basal but gradually reduced, sessile, short-decurrent. Capitula broadly cylindrical, sparsely arachnoid-hairy, 15–25



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Plate XXVII.

1—*Cousinia magnifica* Juz.; 2—*C. chlorantha* Kult.

mm wide (excluding cusps). Involucral bracts about 90; outer bracts slightly decurved, 7–19 mm long, lanceolate, short-acuminate; middle bracts erect, 12–23 mm long, somewhat flat, broadly lanceolate, with somewhat prominent midrib on dorsal side, terminating in cusp; inner bracts with membranous, almost roundish, short and unevenly divided appendage, usually recurved at anthesis. Corolla yellow; receptacular bristles scabrous. Achenes obovoid, about 6 mm long, indistinctly ribbed, very narrow-winged along ribs. Flowering VIII–IX; fruiting IX.

Gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from the vicinity of Karatyube. Type in Tashkent.

Note. Two plants were mentioned in the description of this species; I consider as the lectotype the first of these with the label: "In distr. Czimkent, in montibus prope Kara-Tjube. 22 IX 1921. Kultiassov."

254. *C. stephanophora* Winkl. in Tr. Peterb. Bot. Sada, X (1887) 575; XII, 260; XIV, 230; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 563.—*C. lipskyi* var. *approximata* Winkl. op. cit. (1897) 237.—*C. xanthina* γ. *approximata* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 192. *C. xanthina* β. *subvestita* auct. nom. Bornm.: Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 290.

- 342 Perennial. Roots thick, woody, many-headed; caudices with numerous remains of previous year's leaves. Stem numerous, 20–40 cm high, erect, simple or sparsely branched above, usually appressed gray arachnoid-hairy throughout, glabrescent, less often glabrous below, appressed-hairy above, leafy; branches and stems one-headed. Leaves not glandular above, usually finely appressed-hairy or almost glabrous, white-tomentose beneath; basal leaves petiolate, usually with weakly broadened, somewhat flat petioles, pinnatisect, with 3–6 mm wide segments, in turn, palmatipartite in linear-lanceolate entire lobes, as if forming whorl almost throughout on uniformly winged rachis with flat wings; lower cauline leaves like basal but sessile, short-decurrent; other cauline leaves gradually reduced toward apex, sessile, short-decurrent, with wider leaf segments and rachis wings. Capitula cylindrical, (10)15–18(20) mm wide (excluding cusps), very finely arachnoid-hairy. Involucral bracts about 50–60; outer bracts lanceolate, recurved, 10–16 mm long, carinate, short-acuminate; middle bracts lanceolate, almost horizontal, 15–20 mm long, acuminate; subsequent bracts somewhat flat, broadly lanceolate, short-acuminate, usually dark-colored dorsally, 12–20 mm long, erect; inner bracts membranous, broadened above, scabrous along margin, 15–18 mm long, terminating in short spine. Corolla white or pale yellow; anther tube pink; receptacular bristles scabrous. Achenes obovoid, 5–7 mm

long, longitudinally ribbed, narrow-winged along ribs, with four teeth above. Flowering VII–VIII; fruiting VIII–IX.

Stony loamy slopes, in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the region between Tavildar and Sagyrdasht. Type in Leningrad.

Note. Three plants from different places were mentioned in the description of this species; I consider as the lectotype the plants with the following label: “Darwas: nördl. Pass. zw Tevildara et Sagridascht an einem sudl. Zufluss des Wakisch. 8–9000’ 30 VIII–9 IX 1881. Regel.”

255. *C. semilacera* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 322; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 564.—*C. lachnopoda* Juz. op. cit. (1940) 525, 564.—*C. jacea* Rech. f. and Edelberg in Dan. Biol. Skr. 8, 2 (1955) 104, fig. 74, 78F.—*Ic.*: Rech. f. and Edelberg. op. cit.

343 Perennial. Root thick, woody, many-headed, bearing stems and rosettes; caudices densely covered with remains of previous year’s leaves, usually white-tomentose. Stem erect, 30–55 cm high, white-tomentose below, especially near base, glabrous above, smooth or fine-tomentose, leafy throughout, usually sparsely branched in upper half; branches one-headed. Leaves typical of section, with almost wingless or very narrow-winged rachis, lateral segments narrow-lanceolate, acuminate-spinescent, revolute, glabrous and green above or finely arachnoid-hairy, then grayish-green, white-tomentose beneath, leaf rachis gray-tomentose; basal leaves petiolate, petioles ciliate; cauline leaves gradually reduced, sessile, semiamplexicaul, very short-decurrent, rachis of upper leaves narrow-winged. Capitula almost broadly cylindrical, turbinate at fruiting, glabrous or finely arachnoid-hairy, 12–15(20) mm wide (excluding cusps). Involucral bracts about 60, outer and subsequent bracts 7–12–15 mm long, coriaceous, green, somewhat flat, divergent, broadly lanceolate, almost ovate, with prominent midrib on dorsal side, terminating in short stiff spine, entire or slightly divided with narrow scarious border; middle and inner bracts erect, 15–20(22) mm long, with membranous, broadly ovate, pale brown, yellowish or finely and unevenly toothed appendages with prominent midrib dorsally, cuspidate. Corolla pink, sometimes (less often) whitish, about 17 mm long; receptacular bristles broadened above, scabrous. Achenes obovoid, 6–7 mm long, glabrous, smooth. Flowering VIII; fruiting VIII–IX.

Gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai. *General distribution*: Iran, Afghanistan. Described from Dabasta. Type in Leningrad.

Note. The species has quite constant characters; only the degree of pubescence of the plant varies. The most pubescent plants were described

as *C. lachnopus* Juz., which were also found to have longer outer involucre bracts. Study of extensive herbarium material showed variation in these characters throughout the range, and I do not consider it possible to separate these species. In the region of its contact with *C. rubiginosa* Kult., this species forms hybrids with it, which have characters that are closer to one or the other parent species. In the original description it is said that the flowers apparently are pale yellow. Numerous collections from the classic localities have helped to correct this error, as the corollas of this species are pink, a fact reported incidentally by the author himself in a later publication (1940).

256. *C. allopepis* Tschern. and Vved. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 91.

344 Perennial. Roots woody, many-headed, bearing relatively lax sterile rosettes of leaves and stems; caudices densely covered with remains of previous year's leaves. Stem erect, 20–55 cm high, shallow-sulcate, glandular-hairy, finely tomentose at base, branched from middle; branches slender, further branched in one-headed branchlets. Leaves green, strongly scabrous above due to numerous glandular hairs, gray-tomentose beneath, pinnatisect with narrow-lanceolate revolute acuminate-spinescent segments, on narrow-winged rather densely pubescent rachis not in one plane, appearing in whorls; outer basal leaves with sheath-like broadened petioles and short, linear-cristate lamina; inner basal leaves petiolate, petioles flattened toward base, with numerous thin spines along margin; cauline leaves gradually reduced upward, like basal but sessile, semiamplexicaul, short-decurrent, with wider rachis wings. Capitula less numerous, on densely glandular-hairy peduncles, broadly cylindrical, 17 mm wide (excluding cusps). Involucre bracts crisped-glandular-hairy, about 35, weakly carinate, usually dark colored above; outer bracts horizontal, lanceolate, up to 17 mm long, acuminate-spinescent, broad at base, 3–5 mm wide, sometimes with one to three pairs of lateral spines along margin; middle bracts erect-spreading, lanceolate, cuspidate-spinescent, 17–18 mm long, up to 4 mm wide at base; inner bracts membranous, linear, acuminate, very short and stiff spinescent. Corolla yellow, 14–15 mm long; anther tube pale purple; receptacular bristles scabrous. Achenes oblong-obovoid, glabrous, smooth, 5–6 mm long. Flowering VIII; fruiting IX.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Tamshush River Basin. Type in Tashkent.

257. *C. newesskiana* Winkl. in Tr. Peterb. Bot. Sada, XI (1890) 333; XII, 258; XIV, 209; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 564.

Perennial. Root thick, woody, many-headed; caudices with numerous remains of previous year's leaves. Stem erect, 20–40 cm high, striate-sulcate, arachnoid-hairy, sparsely branched in upper one-third part; branches sparsely leafy, one-headed; inflorescence lax paniculate. Leaves appressed arachnoid-hairy, grayish-green, and sparsely glandular above, white-tomentose beneath; outer (lower) basal leaves strongly reduced, with sheath-like broadened petioles; inner (upper) basal leaves short-petiolate, with somewhat flat, finely spinose petioles, lanceolate, pinnatisect in narrow linear, 1–1.5 mm wide, subulate, revolute lateral segments, as if in whorl on very narrow-winged, densely sericeous rachis; cauline leaves gradually reduced toward stem apex, like basal leaves but sessile, short-decurrent, with wider winged leaf-rachis; uppermost leaves strongly reduced. Capitula hemispherical-cylindrical, 345 about 12–15 mm wide (excluding cusps), sparsely arachnoid-hairy. Involucral bracts about 60, carinate; outer bracts horizontal or weakly decurved, lanceolate, acuminate-spinescent, 12–15 mm long; other bracts erect, closely appressed, slightly divergent only in upper one-third part; middle bracts lanceolate, acuminate-short-spinescent, 12 mm long; inner bracts almost membranous, lanceolate, acuminate, finely toothed, scabrous dorsally, not exceeding middle bracts, corolla yellow; receptacular bristles broadened above, scabrous. Achenes obovoid. Flowering VII–VIII; fruiting IX.

Stony screes from middle to upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Chakmankuidy Ravine and Lagorimurd (Neveskii). Type in Leningrad.

258. **C. trichopora** Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 26; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 566.

Perennial. Roots woody, many-headed; caudices with numerous remains of previous year's leaves. Stem erect, 25–40 cm high, densely sericeous, branched in upper half; branches short, densely leafy, branched further in short one-headed branchlets; inflorescence paniculate. Leaves covered above with papilliform glandular hairs, alternating with long, silky simple hairs, gray-tomentose beneath; outer basal leaves with sheath-like broadened petioles, with numerous thin spines along margin, pinnatisect in considerably smaller lateral segments, borne in whorl on leaf rachis; inner basal leaves short-petiolate; pinnatisect in narrow-linear, up to 1.5 mm wide, revolute lateral segments, as if in whorl on narrow-winged revolute rachis, densely sericeous below; cauline leaves gradually reduced upward, like basal leaves but sessile, short-decurrent. Capitula ovoid-globose, about 12–18 mm wide (excluding cusps), very densely pubescent with rusty, silky hairs. Involucral bracts about 50, carinate; outer bracts horizontal, lanceolate, usually as long as middle; middle

bracts erect, divergent above, lanceolate, acuminate-spinescent, 7–15 mm long; inner bracts almost membranous, narrow-lanceolate, acuminate, not exceeding middle bracts. Corolla yellow; receptacular bristles broadened above, scabrous. Achenes oblong-obovoid, 5 mm long, usually not ribbed. Flowering VII–VIII; fruiting VIII–IX.

Stony and gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from mountain slopes in the vicinity of Yakkabag. Type in Tashkent.

Note. This species is very close to *C. newesskiana* Winkl. and forms hybrids with it where the species are sympatric.

- 346 259. *C. schugnanica* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 525, 564.—*C. newesskiana* auct. non Winkl.: Rech. f. in Dan. Biol. Skr. 8, 2 (1955) 132 (?).

Perennial. Root thick, woody, many-headed; caudices densely covered with numerous remains of previous year's leaves. Stems erect, relatively weak, 20–30 cm high, finely arachnoid-hairy, leafy, usually sparsely branched from middle or above; branches one-headed. Leaves typical of section, with almost wingless, densely gray arachnoid-hairy rachis; lateral segments almost linear, terminating in yellowish, short, stiff cusp, sparsely arachnoid-hairy and grayish-green above, almost white-tomentose beneath; basal leaves short-petiolate, others sessile, short-decurrent. Capitula cylindrical, 15–18 mm wide (excluding cusps), finely rusty-tomentose. Involucral bracts about 80, all except inner very similar, narrow-lanceolate, weakly erect spreading, coriaceous, rather weak, slightly carinate, terminating in thin yellowish cusp, 7–11 mm long, usually dark colored; inner bracts flat, narrow-lanceolate, membranous, short acuminate, scabrous along margin, sparsely scabrous dorsally. Corolla yellow, about 17 mm long; anther tube pale pink; receptacular bristles strongly scabrous. Achenes obovoid, narrow-ribbed, 6 mm long. Flowering VIII; fruiting VIII–IX.

Gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. *General distribution*: Afghanistan. Described from the Vakhani-Ishkashim District, slopes of the Nishgor River. Type in Leningrad.

Note. The species was described without specific citation of the type; therefore, Juzepczuk's reference to the "Slopes of the Nishgor and Mats rivers" pertains to the two plants collected by P.N. Ovczinnikov. I am selecting as the lectotype the specimen with the label "Vakhani-Ishkashim District, eastern slope of the Nishgor River, 5–6 km from its mouth, 14 VIII 1935. Ovczinnikov and Afanas. ev No. 1955," because a careful study of the characters, given in the key, leads to the conclusion that the plants particularly from the mouth of the Nishgor River should

be considered as *C. schugnanica*. The plants from the vicinity of Mats River have a whitish corolla, and it is better to refer them to *C. rubiginosa*.

260. *C. sororia* Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8 (1940) 525, 564.

347 Perennial. Root woody, many-headed; caudices densely covered with remains of previous year's leaves. Stem erect, about 50 cm high, finely tomentose, glabrescent, leafy, sparsely branched above, with short one-headed branches. Leaves typical of section, with narrow-winged white-tomentose rachis, lateral segments almost linear, acuminate into stiff short spine, revolute, green and glabrous above, gray-tomentose beneath; basal leaves petiolate; cauline leaves gradually reduced, sessile, semiamplexicaul, short-decurrent. Capitula almost cylindrical, turbinate at fruiting, 12–15 mm wide (excluding cusps), subglabrous. Involucral bracts about 60; outer bracts lanceolate, coriaceous, weakly carinate, acuminate, almost horizontal or slightly decurved, 7–15 mm long; middle bracts erect, somewhat flat, 12–15 mm long, broadly lanceolate, obtuse, spinescent, with membranous border; inner bracts erect, up to 20 mm long, with compact scarious, pale straw-colored appendages at apex, unevenly divided along margin and short spinescent. Corolla yellow, 16–18 mm long; receptacular bristles broadened, scabrous. Flowering VIII.

Gravelly slopes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Bogushdar. Type in Leningrad.

Note. Only one location of this species is known, whose separate status is somewhat doubtful. This plant is very similar in its characters to *C. semilacera* Juz., from which it differs only by the color of the corolla (yellow!). The discovery of taller *C. schugnanica* Juz. around Pyandzh, which also has deep yellow corollas, leads to the hypothesis that *C. sororia* Juz. is of hybrid origin, which can be confirmed only by further study of plants from this region. At Gunt we find plants that very much resemble *C. sororia*, but have smaller capitula and a pale yellow corolla. Could this also be a hybrid of *C. semilacera* with some other yellow-flowered cousinia from the Shugnan Range? The paucity of material makes it impossible at present to solve this question.

261. *C. abbreviata* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 87.

Perennial. Roots woody, many-headed, bearing sterile rosettes of leaves and stems; caudices densely covered with remains of previous year's leaves. Stem erect, finely tomentose, 20–30 cm high, leafy, branched above, with short one-headed branches. Leaves typical of

section, with almost wingless rachis and numerous narrow-lanceolate, convolute, acuminate-spinescent lateral segments, green and very finely and sparsely arachnoid-hairy above with fine glandular hairs, white-tomentose beneath; basal leaves short-petiolate; cauline leaves gradually reduced, sessile, semiamplexicaul, short-decurrent. Capitula narrow-cylindrical, 13–14 mm long (excluding corolla) and 8–10 mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts somewhat flat, with erect-spreading cusp, dark-colored; outer and middle bracts similar, 5–11 mm long, lanceolate, acuminate; inner bracts up to 14 mm long, scariously broadened above and acuminate-short spinescent, dorsally glabrous. Corolla yellow, 12–13 mm long; receptacular bristles scabrous. Flowering VIII.

348 Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Pamir). Endemic. Described from the slopes of the pass into Garm-Chashma. Type in Leningrad.

262. **C. ramulosa** Rech. f. in Dan. Biol. Skr. 8, 2 (1955) 149, fig. 101, 103F.—**Ic.**: Rech. f. *Ibid*.

Perennial. Roots woody, many-headed; caudices with few remains of previous year's leaves. Stem erect, finely flocculose-tomentose, 40–55 cm high, profusely branched; branches slender, spreading, usually exceeding main stem and further branched into one-headed branchlets, forming lax, almost corymbose inflorescence. Leaves typical of section, with narrow-winged, rather weak rachis and relatively less numerous narrow-lanceolate, short and thin acuminate lateral segments, green and glabrous above, white-tomentose beneath; basal leaves petiolate, petioles broadened at base; cauline leaves reduced, with wider winged rachis and wider lanceolate lateral segments, sessile, short-decurrent, leaves on branches strongly reduced, sessile, with wide and large terminal segment. Capitula narrow-cylindrical, 15–17 mm long (excluding corollas) and 8–9(11) mm wide (excluding cusps), finely arachnoid-hairy, glabrescent; capitula on main stem usually larger than those on branches. Involucral bracts about 40–50, all coriaceous, compactly imbricate, with somewhat short, about 2–3 mm long, divergent cusp; outer and middle bracts 3–10 mm long; inner bracts 12–15 mm long, strongly scabrous due to dense spinules; involucral bracts of capitula larger on main stem, outer divergent, 14–16 mm long, middle 12–13 mm long, erect, inner up to 17 mm long, strongly scabrous due to dense spinules. Corolla sulfur-yellow; anther tube pink, about 16 mm long; receptacular bristles scabrous. Achenes obovoid, 5–6 mm long, narrow-ribbed, finely toothed above, gray. Flowering VIII; fruiting VIII–IX.

Stony-loamy slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Pamir). *General distribution*: Afghanistan. Described from Afghanistan (Kash). Type in Vienna.

Note. Our plants differ somewhat from the type specimen of *C. ramulosa* by the sparser pubescence of capitula.

263. *C. acrodroma* Tschern. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XVII (1962) 89.

349 Perennial. Roots woody, many-headed, bearing sterile rosettes of leaves and stems; caudices densely covered with remains of previous year's leaves. Stems numerous, erect, simple, one-headed, less often two-headed, leafy, flocculose-arachnoid, 27–40 cm high. Leaves typical of section, with stiff, narrow-winged, gray-tomentose rachis and narrow-lanceolate, almost linear, acuminate-spinescent, revolute lateral segments, finely appressed arachnoid-hairy and grayish-green above, white-tomentose beneath; basal leaves petiolate, petioles short, broadened basally, ciliate; cauline leaves sessile, very short-decurrent, gradually reduced upward. Capitula globose, weakly truncate, 12–15 mm wide (excluding cusps) and 12–15 mm long (excluding corolla), arachnoid-hairy. Involucral bracts dark-colored, somewhat flat, with prominent midrib, short-acuminate; outer and middle bracts similar, lanceolate, slightly divergent, 7–9 mm long; inner bracts erect, broadened above in membranous, brownish, up to 15 mm long appendage somewhat incised along margin. Corolla yellow, about 15 mm long, receptacular bristles scabrous. Flowering VII. (Plate XXVIII, Fig. 2.)

Stony slopes.—*Soviet Central Asia*: Pamiro-Alai (Pamir). Endemic. Described from the Sharf-Dara Valley. Type in Leningrad.

Note. This species is quite close to *C. schugnanica*, but is well distinguished by the strong, erect, one-headed stems and by the presence of the membranous appendages of the inner involucral bracts.

264. *C. rubiginosa* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 23; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 564.

Perennial. Roots thick, woody, many-headed, bearing sterile leaf rosettes and stem; caudices white-tomentose, densely covered with remains of previous year's leaves. Stem erect, 30–40 cm high, striate-sulcate, finely flocculose-tomentose, white-tomentose below; sparsely glandular under pubescence, leafy. Leaves green above, sparsely glandular, white-tomentose beneath, pinnatisect in narrow-lanceolate or almost linear, revolute, acuminate-spinescent segments, in turn, palmatisect, on narrow-winged petiole not in one plane, as if in whorl, petioles ciliate along margin; other leaves sessile, semiamplexicaul. Capitula globose, 2 cm wide (excluding cusps), usually densely rusty-tomentose, somewhat truncate basally. Involucral bracts numerous; outer bracts 15 mm long, deflexed from deltoidly broadened appressed base, terminating in short triquetrous spine; middle bracts 18 mm long, 4–6 mm wide at base, divergent from appressed base, terminating in stiff,

somewhat short, triquetrous spine, dorsally scabrous, densely rusty-tomentose; subsequent bracts erect, acuminate-spinescent, scabrous along margin, about 20 mm long; inner bracts about 20 mm long, erect, scariously broadened above, erose, densely scabrous dorsally and along
 350 margin up to scarious border, scarious part glabrous dorsally with prominent vein, terminating in very short spine. Corolla whitish (?), 17–18 mm long; anther tube purple; receptacular bristles scabrous. Achenes obovoid, ribbed, narrow-winged along ribs. Flowering VII–½ VIII; fruiting VIII.

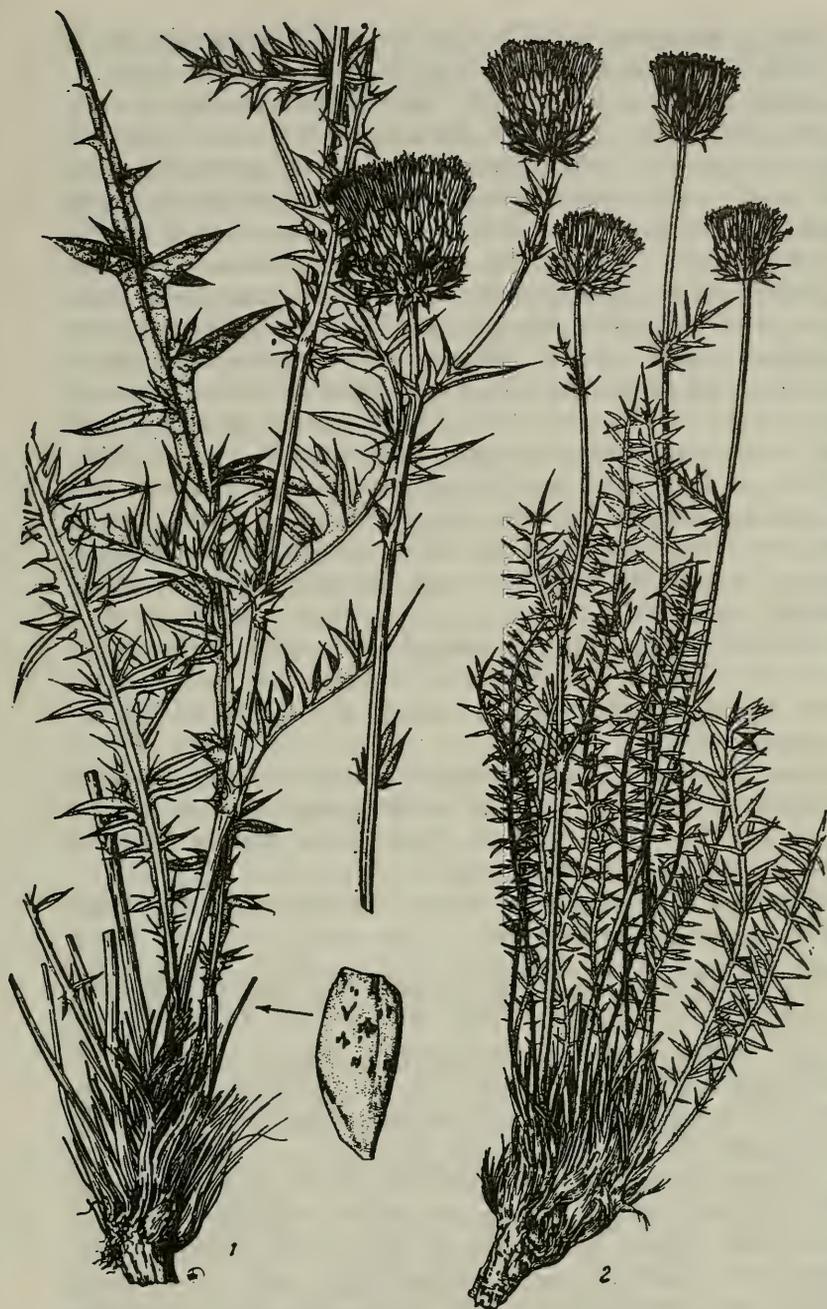
Stony and gravelly slopes in middle mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Vakhsh, Rushan, Shugnan). Endemic. Described from the region of the Odudi Pass (slope of Kala-i-Vamar). Type in Tashkent.

Note. Forms hybrids with *C. semilacera* Juz.

265. *C. multiloba* DC. Prodr. VI (1837) 554; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2 (1865) 46; Boiss. Fl. or. III, 499 p. p. (excl. syn. *C. pycnoloba* Boiss.); Winkl. in Tr. Peterb. Bot. Sada, XI (1890) 136; XII, 260; XIV, 231.—*C. palmatiloba* Jaub. and Sp. Ill. or. (1844–1846) tab. 162.—*Arctium multilobum* O. Ktze. in Rev. Gen. 1 (1891) 308.—*lc.*: Jaub and Sp. op. cit. tab. 162.

Perennial. Roots woody, many-headed; caudices densely covered with remains of previous year's leaves. Stem erect, appressed white-tomentose, leafy, 50–60 cm high, weakly branched in upper half, leafy; branches one-headed. Leaves typical of section, with narrow-winged, white-tomentose petioles and almost linear, acuminate-spinescent, revolute lateral segments, appressed arachnoid-hairy and grayish green above, appressed white-tomentose beneath; basal leaves petiolate, petioles white-tomentose, somewhat broadened at base and spinose; lower cauline leaves like basal but with short and wider petioles; other cauline leaves sessile, semiamplexicaul, short-decurrent, gradually reduced toward apex; uppermost leaves strongly reduced, with long, acuminate spinescent terminal lobe. Capitula ovoid, 13–15 mm wide (excluding cusps), densely white arachnoid-hairy. Involucral bracts about 70; outer bracts almost horizontal, 12–16 mm long, lanceolate, scabrous dorsally above, acuminate; middle bracts about 20 mm long, erect-spreading, otherwise like outer; inner bracts narrow-lanceolate, 15–17 mm long, short-acuminate, scabrous dorsally above. Corolla pink; receptacular bristles scabrous; achenes obovoid, 6 mm long, longitudinally narrow-ribbed, dentate above. Flowering VII–VIII; fruiting VIII–IX.

Stony slopes.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag). *General distribution*: Afghanistan, Iran. Described from Iran. Type in Paris.



352 266. *C. eriotricha* Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 321; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 564.

Perennial. Roots thick, woody, many-headed; caudices densely covered with remains of previous year's leaves. Stem erect, 25–40 cm high, striate-sulcate, finely white-tomentose, with long entangled hairs, leafy, usually weakly branched above; branches short, one-headed. Leaves typical of section, green above, white-tomentose beneath, densely covered on both sides with fine, long, silky, entangled, divergent hairs, especially on petiole; petiole almost entirely wingless with linear, acuminate-spinescent, revolute, lateral segments; basal leaves short-petiolate; cauline leaves sessile, short-decurrent. Inflorescence less-branched, corymbose-paniculate; capitula oblong-ovoid, 12–14 mm wide (excluding cusps), arachnoid-hairy or more or less finely white-tomentose. Involucral bracts 80–90, linear-subulate, erect-spreading; outer bracts 10–12 mm, middle up to 18 mm long; inner bracts flat, membranous, linear-lanceolate, 20–22 mm long, acuminate, scabrous dorsally and along margin. Corolla pink, about 20 mm long; receptacular bristles somewhat broadened above, scabrous. Achenes obovoid, 7 mm long, glabrous, smooth. Flowering VII–VIII; fruiting VIII.

Gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Turkestan Range). Endemic. Described from the north slope of the Turkestan Range, near the village of Bachmazar. Type in Leningrad.

Note. Several plants from different localities were mentioned in the description of this species. I consider as the lectotype the plant with the label "North slope of the Turkestan Range, ravine near the village of Bachmazar. 1914, VII, 2. Michelson."

Hybrids of *C. eriotricha* Juz. with *C. verticillaris* Bge. are known from the eastern part of its range.

267. *C. laetevirens* Winkl. in Tr. Peterb. Bot. Sada, X (1887) 576; XII, 261; XIV, 231; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 188; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 564.—*C. laetevirens* var. *monocephala* Winkl. op. cit. (1887) 576.—*C. polyothrix* Winkl. ibid. (1887) 577; XII, 260.—*C. bonvalotii* var. *poliotrichodes* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 185–186.

Perennial. Roots woody, many-headed, bearing sterile rosettes of leaves and stems; caudices densely covered with numerous remains of previous year's leaves. Stems numerous, erect, 30–50 cm high, striate-sulcate, finely arachnoid hairy-pubescent below, leafy, very sparsely branched above; branches usually short. Leaves green, sparsely glandular, or finely arachnoid-hairy and not glandular above, gray-tomentose beneath, pinnatisect with many narrow-linear, acuminate-spinescent,

353 revolute lateral segments, as if in whorl on almost wingless rachis; basal leaves petiolate; cauline leaves gradually reduced, sessile, short-decurrent. Capitula cylindrical, 10–15 mm wide (excluding cusps), pubescent. Involucral bracts 30–40, green, sometimes dark-colored; outer and subsequent bracts distinctly different from others, carinate, usually divergent, often horizontal, acuminate into short cusp, 15–20(30) mm long, 2–3 mm wide at base, 1–1.5 mm in middle; middle bracts coriaceous, somewhat flat, short-acuminate, 8–10(12) mm long; inner bracts membranous, lanceolate, acuminate-spinescent, scabrous dorsally and along margin, 10–12(15) mm long. Corolla pink, 16–18 mm long, exerted; receptacular bristles slightly broadened above, scabrous. Achenes obovoid, 6–7 mm long, glabrous, smooth. Flowering VII–VIII; fruiting VIII–IX.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan Range, Gissar Range and its southwestern spurs up to Kugitang, Peter the Great Range). Endemic. Described from Malguzar (Rgl.). Type in Leningrad.

Note. The species is very close to *C. verticillaris* Bge., from which it differs only by smaller capitula and quite long, horizontally spreading outer involucral bracts, equaling or exceeding the diameter of the capitulum.

It forms hybrids with this species where they are sympatric.

The species was based on plants collected from two localities; I propose to designate as the lectotype of *C. laetevirens* Winkl. the plant with the label "Sarawschan-Gebiet: Margusar am Pasrut. 9000' 21, VI–8 VII, 1882. Regel."

The plants from Kugitang and the southwestern spurs of the Gissar Range differ somewhat from typical *C. laetevirens* Winkl. by more densely pubescent capitula and strongly rugose outer involucral bracts; it is possible that further study of additional material from these regions will permit us to separate them as independent species.

268. *C. verticillaris* Bge. in Mém. Acad. Pétersb. sav. étrang. 7 (1851) 357; Bge. in Mém. Acad. Pétersb. 7 sér. 9, 2, 46; Boiss. Fl. or. III, 500 (excl. *C. verticillaris* var. *major* Boiss.); Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 259 (quoad sp. Lehmann); XIV, 230; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 186; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 566.—*C. hissarica* Winkl. op. cit. (1887) 92; XII, 259; XIV, 209; Juz. in Tr. Tadjh. Bazy Akad. Nauk SSSR, 8, 565.—*C. verticillaris* var. *leiocephala* Bornm. op. cit. (1916) 187.—*C. poliothrix* Winkl. op. cit. (1897) 230.—*C. pseudo-bonvalotii* Juz. op. cit. (1940) 525, 565.—*C. poliothrix* f. *albiflora* Bornm. op. cit. (1916) 187.—*Arctium verticillare* O. Ktze. Rev. Gen. 1 (1891) 308.—*Cousinia*

laetevirens auct. non Winkl.: Winkl. op. cit. (1897) 231 (quoad pl. e Revout).—*C. verticillaris* var. *major* auct. non Boiss.: Bornm. op. cit. (1916) 187.—*C. poliothrix* var. *robusta* auct. non Winkl.: Bornm. Ibid. 187.

354 Perennial. Roots woody, many-headed, bearing sterile rosettes of leaves and stems; caudices densely covered with numerous remains of previous year's leaves. Stem erect, 10–40 cm high, striate-sulcate, pubescent, sparsely branched above, leafy. Leaves green and appressed arachnoid-hairy above, gray-tomentose beneath, pinnatisect in many, narrow-linear, acuminate-spinescent, revolute, lateral segments in whorl on almost wingless rachis; basal leaves petiolate; cauline leaves gradually reduced upward, like basal but sessile, short-decurrent. Capitula broadly cylindrical, 15–22 mm wide (excluding cusps), pubescent. Involucral bracts 50–60, carinate; outer bracts squarrose, sometimes weakly decurved, 7–15 mm long and 2 mm wide at base; middle bracts like outer, 10–15 mm long, up to 3 mm wide at base, spinescent like outer; inner bracts membranous, narrow-lanceolate, scabrous dorsally and along margin, terminating in thin short cusp, 15–17 mm long. Corolla pink, somewhat exserted, 15–17 mm long; receptacular bristles weakly broadened above, scabrous. Achenes obovoid, 6–7 mm long, glabrous, smooth. Flowering VII–VIII; fruiting VIII–IX.

Gravelly slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Zeravshan River basin (Karatau). Type in Paris.

Note. Until recently, *C. verticillaris* Bge., described from Lehmann's collections from the Karatau Range, was considered a doubtful species. S.V. Juzepczuk expressed the view that *C. hissarica* Winkl. was described under this name, which is fully confirmed by study of the photograph of the type specimen sent from Paris.

Hybrids of *C. verticillaris* Bge. and *C. laetevirens* Winkl. are known from the areas where they are sympatric.

269. **C. bonvalotii** Franch. in Ann. Sc. Nat. 6 sér., 16 (1883) 320; Winkl. in Tr. Peterb. Bot. Sada, XII, 258.—*Arctium bonvalotii* O. Ktze. Rev. Gen. 1 (1891) 307.—*Exs.*: H.F.A.M. No. 42.

Perennial. Roots woody, many-headed; caudices with numerous remains of previous year's leaves. Stems several, erect, 20–40 cm high, finely tomentose, arachnoid-hairy above, weakly branched; branches short, one-headed. Leaves typical of section, with broadly lanceolate, broadly excurrent lateral segments on narrow-winged rachis (wings 1–1.5 mm wide); finely appressed-pubescent or sparsely glandular above, gray-tomentose beneath; basal leaves short-petiolate; cauline gradually reduced upward, sessile, short-decurrent, with wide-winged rachis.

Capitula cylindrical, 8(12) mm wide (excluding cusps), finely arachnoid-hairy. Involucral bracts relatively less numerous, about 40, carinate; outer
355 bracts horizontal, narrow-lanceolate, up to 7 mm long, sometimes up to 2 mm wide at base; middle bracts erect-spreading, narrow-lanceolate, 10–12 mm long; inner bracts almost membranous, linear, acuminate, sometimes blackish dorsally in middle, 10–12 mm long. Corolla pink; receptacular bristles somewhat broadened above, weakly scabrous. Achenes oblong-obovoid, compressed dorsally, roundish above, about 5 mm long. Flowering VII–VIII; fruiting VIII.

Gravelly-stony slopes in upper mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from the vicinity of Ona-Oulgan. Type in Paris.

270. *C. ceratophora* Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIc, VI (1929) 24; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 565.

—Perennial. Roots thick, woody, many-headed, bearing sterile rosettes of leaves and stems. Stem erect, 35–40 cm high, glabrous, leafy, very sparsely branched above, branches one-headed. Leaves typical of section, with almost wingless, rather strong rachis and more or less linear, short-acuminate, revolute lateral segments, green, very finely glandular above, gray-tomentose beneath; basal leaves petiolate, petioles robust, armed, slightly thickened at base; cauline leaves sessile, gradually reduced, short-decurrent. Capitula 12–20 mm wide (excluding cusps), about 20 mm long (excluding corolla), globose, glabrous. Involucral bracts less numerous, 25–30, flat; outer bracts lanceolate, about 15 mm long and 5–8 mm wide at base, decurved; middle bracts broadly lanceolate, carinate above, 20–25(28) mm long and 7–10 mm wide at base, more or less erect-spreading; inner bracts with brownish, membranous, scabrous on margin apical appendage, lanceolate, erect, acuminate-short cuspidate. Corolla whitish (?); anther tube purple; receptacular bristles scabrous. Achenes obovoid, light gray, with dark spots, 7 mm long, slightly compressed dorsally, longitudinally narrow-ribbed. Flowering VIII; fruiting IX.

Stony-loamy slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai (Darvaz). Endemic. Described from the Viskharvi Pass. Type in Tashkent.

271. *C. serawschanica* Winkl. in Tr. Peterb. Bot. Sada, IX (1886) 424; XII, 261; XIV, 210; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 188; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 565.—*C. sarawschanica* β . *elegantula* Bornm. op. cit. (1916) 188.—*C. laetevirens* var. *flava* Winkl. op. cit. (1897) 231.—*C. flava* Bornm. op. cit. (1916) 280; Juz. op. cit. 565.

356 Perennial. Roots thick, woody, many-headed, bearing rosettes of sterile leaves and stems; caudices densely covered with remains of previous year's leaves. Stem erect, 15–40 cm high, shallow striate-sulcate, glandular above, gray-pubescent below, sometimes white-tomentose, leafy. Leaves usually green and sparsely glandular above, less often finely gray-pubescent, gray-tomentose beneath, especially along midrib, pinnatisect in narrow-lanceolate, revolute, acuminate-spinescent, almost linear segments on very narrow-winged rachis, not in one plane, but as if in whorl; basal and lower cauline leaves on short, weakly sulcate, ciliolate, usually gray-pubescent petioles; other leaves gradually reduced toward apex, semiamplexicaul, uppermost leaves decurrent. Capitula numerous, on glandular-hairy peduncles, oblong-cylindrical, 8–12(15) mm wide (excluding cusps). Involucral bracts glandular, pubescent; outer bracts carinate, 10–30 mm long, horizontal, gradually acuminate from closely appressed base to grooved cusp, terminating in short yellowish spine; middle bracts like outer but slightly shorter and usually somewhat erect, sometimes only slightly divergent; inner bracts somewhat flat, 11–16 mm long, broadly lanceolate, acuminate-spinescent. Corolla yellow, 12–15 mm long; anther tube pale purple; receptacular bristles scabrous. Achenes obovoid, glabrous, smooth, 6–7 mm long. Flowering VII–VIII; fruiting IX.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Santuruch near the pass from Kshtut to Lake Kulikalon. Type in Leningrad.

Note. Pink florets are mentioned in the original description of *C. serawschanica*, which is definitely wrong. This error was committed apparently, because Winkler saw only young plants and determined the color of the corolla from buds, which, probably, because of the purple anther tubes, appeared pinkish. Numerous specimens from the region of origin of the type specimen confirm the presence not of pink but yellow corollas in *C. serawschanica*.

272. *C. caespitosa* Winkl. in Tr. Peterb. Bot. Sada, X (1887) 93; XII, 259; XIV, 230; Bornm. in Beih. bot. Centralbl. XXXIV, 2, 186; Juz. in Tr. Tadz. Bazy Akad. Nauk SSSR, 8, 565.—*Exs.*: H.F.A.M. No. 43.

Perennial. Roots woody, many-headed; caudices with remains of previous year's leaves. Stems few, erect, white arachnoid-hairy or white-tomentose, 15–40 cm high, usually simple, one-headed. Leaves soft, gray appressed-arachnoid hairy on both sides, sometimes upper surface more sparsely arachnoid-hairy, greenish; basal leaves short-petiolate, pinnatisect in narrow-lanceolate, acuminate-spinescent, decurved lateral segments in one plane, leaf rachis narrow-winged, wings about 2 mm

357 wide, revolute; cauline leaves gradually reduced toward stem apex, sessile, semiamplexicaul, short-decurrent, almost pinnatifid with entire, broadly lanceolate lateral lobes. Capitula cylindrical or almost ovoid, 10–15 mm wide (excluding cusps), densely pubescent, less often finely arachnoid-hairy. Involucral bracts about 100, all except inner similar, narrow-lanceolate, weakly divergent; outer bracts usually decurved, 7–17 mm long, inner bracts erect, 16–18 mm long, narrow-lanceolate, compact-scarious above, whitish, glabrous dorsally, smooth, weakly scabrous along margin. Corolla pink; receptacular bristles somewhat broadened above, more or less scabrous. Achenes obovoid, 6 mm long, with filiform longitudinal ribs. Flowering VII–VIII; fruiting VIII.

Gravelly and stony slopes in upper mountain zone.—*Soviet Central Asia*: Tien Shan (predominantly western Tien Shan), Pamiro-Alai (Alai Valley). Endemic. Described from the Susamyr Mountains. Type in Leningrad.

DOUBTFUL SPECIES

1. *C. bucharica* Winkl. in Tr. Peterb. Bot. Sada, X (1889) 477; Winkl. *ibid.*, XII, 196; Juz. in Tr. Tadzh. Bazy Akad. Nauk SSSR, 8, 555.—*Arctium bucharicum* O. Ktze. Rev. Gen. 1 (1891) 307.

Described from the region between the city of Kabadian and Kurganbulak spring. Type in Leningrad.

This species is based on the tip of a stem of a very young plant and even now, when we lay out the extensive herbarium material accumulated during recent years from the range of this species, it is difficult to judge from the description and type specimen to which species this name applies. Its inclusion under the subsection *Jurineopsis*, as done by S.V. Juzepczuk, also seems doubtful.

2. *C. trachylepis* var. *integrifolia* O. Ktze. in Tr. Peterb. Bot. Sada, X (1887) 197.

Described from Kopetdag, vicinity of Ashkhabad. This plant is not in the herbaria of Leningrad. Winkler also did not see it; therefore, it is difficult to express a definite opinion about it.

3. *C. xiphiolepis* Boiss. Diagn. pl. or. nov. ser. 1, 6 (1845) 121; O. Ktze, in Tr. Peterb. Bot. Sada, X, 197.

This species was described from Iran. We could not ascertain which material from Turkmenia was reported under this name by Kuntze because the plant is not in the herbarium and Winkler also did not see it.

GENUS 1579. *Lipskyella* Juz.^{1, 2}

Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 323.—*Cousinia* sect. *Dichacantha* Lipsky. Bot. Eksk. za Kaspii (1889) 13.—*Cousinia* subgen. I *Dichacantha* Winkl. in Tr. Peterb. Bot. Sada, XII, 2 (1892) 184.

358 Capitula homogamous, all florets bisexual, tubular; involucre bracts imbricate, usually all membranous, very short-spinescent, divergent at fruiting; receptacle flat, setose, achenes several times as large as receptacular bristles; filaments glabrous, smooth; basal appendages of anthers barbed; achenes with straight attachment, narrow-prismatic, transversely alveolate-reticulate, two or three winged, terminating into two or three teeth above; pappus bristles scabrous, all equal, persistent in fruits or subsequently shedding individually.

Annual herb with almost undivided leaves, usually spiny throughout, mainly along veins.

Type species: *L. annua* (Winkl.) Juz.

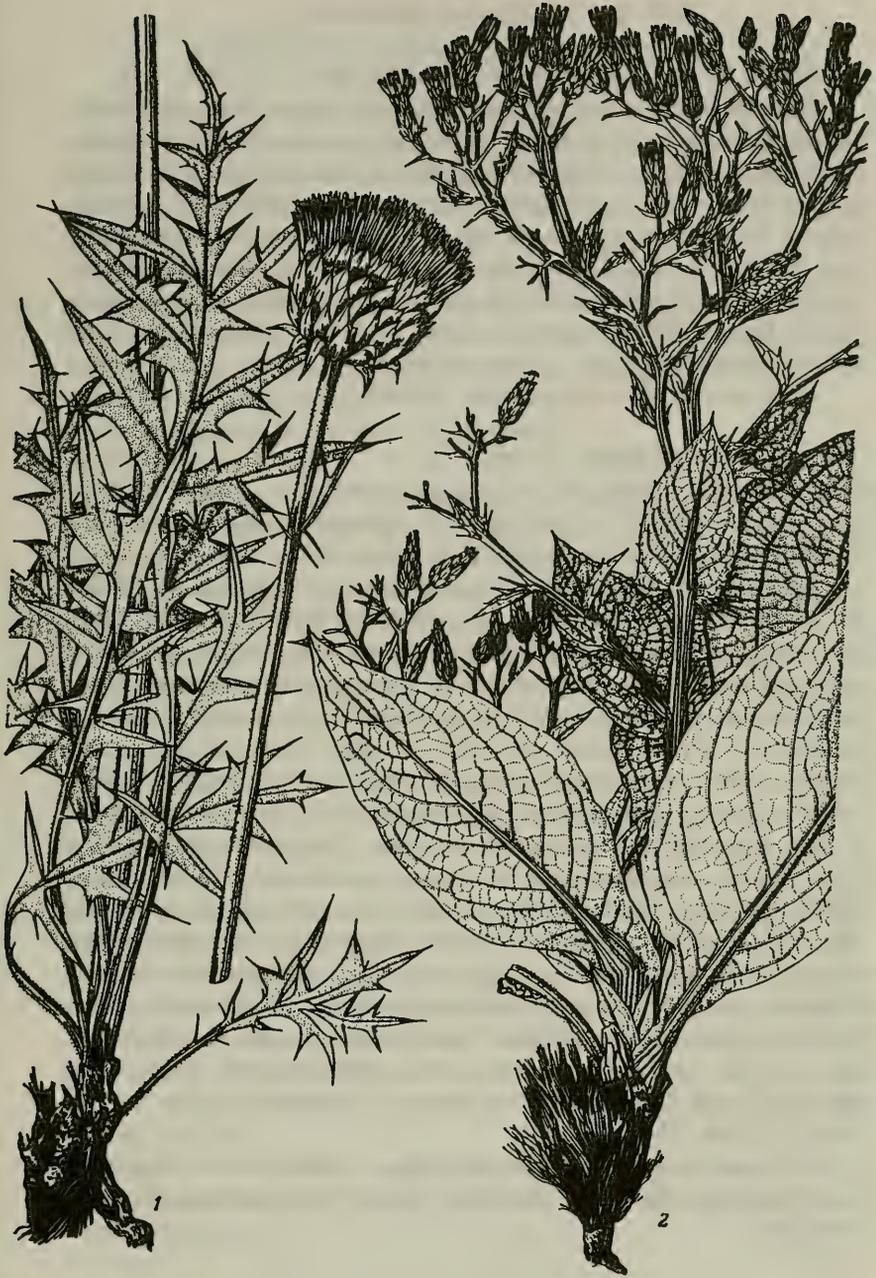
1. *L. annua* (Winkl.) Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 324.—*Cousinia annua* Winkl. in Tr. Peterb. Bot. Sada, X (1887) 88; XII, 184; Kult. in Fl. Turkm. VII, 163.—*C. dichacantha* Lipsky, Bot. Eksk. za Kaspii (1889) 12.—*lc.*: Kult. op. cit. Plate 24.

Annual. Stem solitary, erect, 15–30 cm high, whitish, glabrous, leafy, branched; branches short, bearing numerous capitula in almost spicate inflorescence. Leaves green, broadly lanceolate or almost ovate, attenuate toward both ends, with isolated 3–4 mm long spines along veins on upper surface, slightly arachnoid-hairy beneath, almost undivided, with spines in pairs along margin; basal leaves short-petiolate; cauline leaves sessile. Capitula on very short peduncles, campanulate-cylindrical, 8–10 mm wide, 12–15 mm long; involucre bracts membranous, lanceolate, transparent-fimbriate, obtuse, abruptly acuminate into thin, 3–5 mm long, divergent cusp, sometimes almost horizontal; receptacular bristles smooth, 1–1.5 mm long; corolla whitish (?), with very short limb; achenes 7 mm long, narrow-prismatic, with 1–1.5 mm wide wings. Flowering V; fruiting VI.

On loose sand.—*Soviet Central Asia*: Kyzyl-Kum, Kara-Kum. Endemic. Described from the Rafatak Well in the Chardzhon Region. Type in Leningrad.

¹Treatment by O.V. Tscherneva.

²Named after the famous Russian botanist V.I. Lipsky.



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Plate XXIX.

1—*Hypacanthium echinopifolium* (Bormm.) Juz.; 2—*Anura pallidivirens* (Kult.) Tschern.

GENUS 1580. *Hypacanthium* Juz.^{1, 2}

Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 324.

Capitula homogamous, all florets bisexual, tubular; involucre bracts imbricate, many-rowed; acuminate-spinescent; receptacular setose, bristles shorter than achenes, finely serrate-scabrous; filaments glabrous, anther tube exerted, basal appendages of anthers short, broadened, apically pointed, fimbriate along margin; styles strongly exerted, deeply bifid, with weakly divergent branches; achenes with straight attachment, glabrous, obovoid, almost roundish above; pappus bristles unequal, inner bristles long, flattened, serrulate, outer gradually reduced, somewhat scabrous, shedding singly. A perennial herb.

Type species: *H. echinopifolium* (Bornm.) Juz.

1. *H. echinopifolium* (Bornm.) Juz. in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 3 (1936) 324.—*Cousinia echinopifolia* Bornm. in Beih. bot. Centralbl. XXXIV, 2 (1916) 192.—*Alfredia?* *talassica* Korov. ex Iljin in Byull. Glavn. Bot. Sada, 23, 2 (1924) 136.

Perennial. Stems thick, 10–12 mm in diameter, longitudinally ribbed, flocculose-tomentose, distinctly tall, leafy, sparsely branched in upper half, with rather long, one-headed branches. Leaves grayish-green and arachnoid-hairy above, white-tomentose beneath with prominent veins; basal leaves petiolate, up to 60 cm long (with petiole), oblong, bipinnatisect, pinnae sessile, decurrent on rachis, acuminate-spinescent, pinnules narrow-lanceolate, acuminate-spinescent; cauline leaves like basal but sessile, semiamplexicaul, with few stiff spines on both sides at base, gradually reduced toward stem apex. Capitula flat-globose, 25–35 mm wide (excluding cusps), strongly foveate at base, with many florets. Involucre bracts numerous, outer (one row) pinnate-spinulose, with stiff lateral spines and stiff subulate-triquetrous cusp; other bracts, except inner, coriaceous, closely appressed, abruptly attenuate at divergence into stiff, subulate-triquetrous cusp; inner bracts membranous, brownish above, short-acuminate. Corolla violet-purple, about 18 mm long. Achenes obovoid, indistinctly three-ribbed, roundish above, dark gray, 5–5.5 mm long, transversely rugose. Flowering VII–VIII; fruiting VIII–IX. (Plate XXIX, Fig. 1.)

Stony screes in upper mountain zone.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the vicinity of Namangan. Type in Leningrad.

¹Treatment by O.V. Tschemeva.

²From Greek words: *hypo*—under, and *acantha*—spine.

GENUS 1581. *Schmalhausenia* Winkl.^{1, 2}

Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 281.

361 Capitula homogamous, all florets bisexual, tubular cupuliform; involuclral bracts imbricate, densely tomentose, acuminate-spinescent; receptacle flat, setose, bristles smooth, two-fifths as long as achene; filaments free, glabrous; anthers with short basal appendages; achenes with straight attachment, five or six ribbed, glabrous, five or six-toothed at apex; pappus bristles unequal, readily shedding singly, outer bristles thinner and shorter, two times as long as achene, short-plumose, inner wider, slightly grooved, three times as long as achene, short-plumose. A prickly perennial herb.

Type species: *S. nidulans* (Rgl.) Petrak.

1. *S. nidulans* (Rgl.) Petrak in Allg. Bot. Zeitschr. 20 (1914) 117.—*Cirsium nidulans* Rgl. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 160.—*Jurinea horrida* Rupr. in Mém. Acad. Pétersb. 7 sér. 14, 4 (1869) 57.—*Cousinia eriophora* Rgl. and Schmalh. in Tr. Peterb. Bot. Sada, VI (1880) 313; Hoffm. in Pflanzenfam. IV, 4–5 (1897) 319.—*Schmalhausenia eriophora* Winkl. in Tr. Peterb. Bot. Sada, XII (1892) 281.—*Arctium eriophorum* O. Ktze. Rev. Gen. 1 (1891) 307.—*Carduus horridus* B. Fedtsch. in O. and B. Fedtsch. Perech. Rasf. Turk. IV (1911) 278.

Perennial. Root vertical, black-fibrous. Stems erect, 20–40 cm high, with blackish remains of old petioles at base; densely arachnoid hairy-tomentose, striate-sulcate, densely leafy, bearing 5–10 capitula in dense heads. Leaves gray-tomentose on both sides, especially dense along usually dirty purple midrib; basal leaves oblong-lanceolate, petiolate, petioles spinose, bipinnatisect, with lanceolate, acuminate-spinescent pinnules often modified into stiff purple spines at base; cauline leaves sessile, otherwise like basal. Capitula 4–5 cm wide (excluding cusps), dirty white-tomentose; involuclral bracts narrow-lanceolate, long acuminate with stiff, subulate, divergent, usually purple, cusp; corolla purple. Achenes obovoid, transversely rugose. Flowering VII–VIII; fruiting VIII–IX.

Alpine and subalpine meadows in upper mountain zone.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the Kok-Dzhar Pass. Type in Leningrad.

¹Treatment by O.V. Tscherneva.

²Named after the famous Russian botanist I.F. Schmalhausen.

GENUS 1582. *Saussurea* DC.^{1, 2}

DC. in Ann. Mus. Paris, XVI (1810) 198; Benth. and Hook. f. Gen. pl. II (1876) 471; O. Hoffm. in Pflanzenfam. IV, 5 (1894) 320.—*Heterotrichum* MB. Fl. taur.-cauc. III (1819) 551.—*Bennetia* S.F. Gray. Nat. Arr. Brit. Pl. II (1821) 440.—*Lagurostemon* Cass. Dict. sc. nat. LIII (1828) 466; Wydl. in Linnaea, V, 3 (1830) 425.—*Theodorea* Cass. Dict. sc. nat. LIII (1828) 463.—*Eriostemon* Less. Synops. Compos. (1832) 12.—*Aplotaxis* DC. in Guill. Arch. Bot. II (1833) 330; Ej. Prodr. VI (1837) 538.—*Haplotaxis* Endlich. Gen. pl. (1836–1840) 468; Ldb. Fl. Ross. II, 2 (1845–1846) 672.—*Cyathidium* Lindl. in Royle, III. Bot. Himal. (1839) 251.—*Aucklandia* Falc. in Trans. Linn. Soc. XIX (1842) 23.—*Frolovia* (DC.) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 461.

- 362 Capitula homogamous, with many similar florets, in narrow corymbs, or broad panicles, sometimes solitary. Florets tubular, bisexual, all fertile. Involucre globose, ovoid, campanulate or cylindrical; involucre bracts many-rowed, usually imbricate, appressed or outer bracts divergent or deflected, acute, acuminate, obtuse or subobtuse, often without appendages, less often with membranous colored appendages, sometimes with herbaceous saber-shaped appendages. Receptacle flat or convex, densely or sparsely covered with free scales or less often with yellowish papillae, sometimes connate to apex, glabrous in some species. Corolla pink, purple, or dark violet, less often white, with narrow tube and swollen throat, limb five-fid from middle or below. Anthers with long, acute apical appendages, and two bristles at base, basal appendages ciliate, hairy or with woolly tuft; filaments glabrous, free. Stigmas long, bifid, branches linear, obtuse, dorsally papillate. Achenes glabrous, with truncate apex, sometimes with fimbria (corona) usually smooth, less often spinose along ribs, especially in upper part; slightly compressed at base; cylindrical, or four-angled, straw-colored, brown, with black-purple dots, less often black, often mottled. Pappus one- or two-rowed; outer bristles short, toothed or finely plumose, readily shedding, inner always long-plumose, connate basally into ring, persistent. Perennial or less often biennial herbs. Sometimes semishrubs, short or tall, branched or simple. Leaves alternate, often more or less coriaceous, hard or soft, entire or toothed, crenate-toothed, crenate-lobate, or pinnatifid, glabrous or pubescent (sometimes woolly); often in same species entire, lobed, or pinnatifid. The genus *Saussurea* includes more than 400 species, growing

¹Treatment by S.J. Lipschitz.

²Genus named in honor of Theodore de Saussure (1767–1845), Professor of Mineralogy in Geneva, the famous explorer of the Alps.

in Eurasia and North America. The main centers of species variation are the Himalayas, Tibet, China (about 280 species), Korea and Japan. Within the USSR: Siberia and Far East, Soviet Central Asia.

The unstable nature of the series of characters and the presence of a large number of hybrids and their segregate offspring make it difficult to identify some members of the genus.

Type species: *S. alpina* (L.) DC.

1. Achenes spinose, especially in upper part, forming corona (fimbria) of long, hard, acute teeth at apex. (Subgenus *Stephanodontos* Lipsch.) 1. **S. carduicephala** (Iljin) Iljin
- + Achenes smooth, without spines, not forming corona; if present, of different shape (not of long, hard, acute teeth; however, compare with *S. chondrilloides* Winkl.) 2.
- 363 2. Corymb of numerous capitula enclosed in light-colored scaly bracteal leaves, in two rows. Root collar stuppeous due to fibrous remains of previous year's leaves. (Subgenus *Amphilaena* (Stschegl.) Lipsch.) 2. **S. involucrata** Kar. and Kir. ex Maxim.
- + Whitish scaly bracteal leaves enclosing corymb absent. Root collar not stuppeous 3.
3. Stem simple, with solitary terminal capitulum (less often, when stem branched, capitula several) 4.
- + Capitula aggregated in large or small number in corymbs, glomerules, panicles or racemes 14.
4. Plants pulvinate with short, 1.5–2 cm long stems, bearing small solitary capitula. Basal leaves in rosettes small, pinnate. Pappus-bristles thickened at tip. (Kuldzha Region, outside the USSR)
- 33. **C. pulviniformis** Winkl.
- + Plants of different shape, usually with more or less distinct stem. Capitula larger. Leaves lyrate-pinnatisect or undivided, only sometimes weakly toothed, variable in shape (linear, etc.) 5.
5. Capitula cupuliform, large, (2.5)3–6 cm wide, often drooping. Involucral bracts lanceolate-linear, outer bracts usually decurved. Leaves lyrate, broadly ovate or almost triangular. Florets large, 1.5–3 cm long. Receptacle densely-scaly, scales 8–15 mm long. Achenes usually with border (corona). (Subgenus *Frolovia* (DC.) Lipsch.) 6.
- + Capitula of different shape, smaller, up to 2 cm wide, erect. Involucral bracts appressed, outer bracts usually not decurved. Leaves undivided or weakly toothed. Florets not more than 1.5 cm long. Receptacular scales shorter. Achenes without fimbria (corona) 8.
6. Stem branched. Involucral bracts light green. Florets pink or dark

- red, more than 2 cm long including narrow corolla tube (plants of Soviet Central Asia)..... 7.
- + Stem simple. Involucral bracts dark green. Florets dirty violet, about 1.5 cm long including narrow corolla tube (plants of Siberia and Tarbagatai)..... 3. **S. frolovii** Ldb.
7. Rhizome tuberous. Basal leaves ovate or almost triangular, crenate-lobate. Capitula 2–2.5(3) cm wide. Florets 2.3–2.5 cm long including narrow corolla tube and limb. Achenes mature, lustrous, about 5 mm long excluding fimbria (corona) 5. **S. sulcata** Iljin
- + Rhizome not tuberous. Basal leaves lyrate. Capitula very large, 3–6 cm wide. Florets large, 3–3.2 cm long including narrow corolla tube and limb. Achenes about 7 mm long, with short but distinct fimbria (corona)..... 4. **S. asbukinii** Iljin
- 364 8. Involucral bracts imbricate, unequal; outer bracts ovate or almost triangular 9.
- + Involucral bracts almost equal; outer bracts lanceolate or ovate-lanceolate 13.
9. Leaves tomentose above along veins, bright green (plants of Altai) 35. **S. jadrincevii** Kryl.
- + Leaves not tomentose on upper surface along veins, either entirely tomentose-pubescent, or glabrous (plants of eastern Siberia and Far East) 10.
10. Capitula about 1.5–2 cm wide. Involucral bracts distinctly acuminate, cusps often uncate 36. **S. tomentosa** Kom.
- + Capitula about 1 cm wide. Involucral bracts somewhat obtuse, erect 11.
11. Leaves more or less pubescent beneath (plants of Far East)..... 12.
- + Leaves glabrous beneath, green (plants of East Siberia; Sayans) 39. **S. sajanensis** Gudoschnikov
12. Basal leaves distinctly cordate at base. Pubescence of leaf dense beneath, white-tomentose (plants of Sikhote-Alin) 37. **S. porcellanea** Lipsch.
- + Basal leaves cuneate or roundish at base. Pubescence of leaf not dense beneath, grayish arachnoid-hairy (plants of Sikhote-Alin and Sakhalin) 38. **S. kitamura** Miyabe and Tatewaki
13. Leaves 2–10 mm wide, green, convolute, glabrous or somewhat tomentose. Stem (4)10–30 cm long. Involucre, like stem, usually dark colored..... 11. **S. schanginiana** (Wydł.) Fisch. ex Herd.
- + Leaves 1.5–2 mm wide, grayish-pubescent or white-tomentose above, white-tomentose beneath. Involucral, like stem, light colored or entirely colorless. Prostrate plants, 2–10(12) cm long 12. **S. leucophylla** Schrenk

- 14(3). Capitula about 1.5 cm wide, in racemose or corymbose-paniculate inflorescence. Involucral bracts almost equal 15.
- + Capitula smaller, in corymbs, sometimes if stem branched, individual corymbs clustered in panicles. Involucre imbricate, in several rows of bracts, gradually reduced toward periphery ... 18.
15. Receptacle covered with cartilaginous yellow papillae, sometimes connate almost up to tip 16.
- 365 + Receptacle covered with long, white, linear-subulate, stiff, lustrous scales 17.
16. Stem up to 1 m long, about 1.5–2 cm wide. Capitula in dense, wide, racemose, inflorescence, often half or one-third as long as stem. Involucre densely woolly-tomentose. Veins on lower leaf surface, especially at base, very broad, up to 1–1.5 cm wide, straw-yellow 9. *S. dorogostaiskii* Palibin
- + Stem 15–60 cm long, about 0.5–1 cm wide. Capitula, in less dense and wide racemose inflorescence, usually much shorter than half length of stem, less often solitary. Involucre almost glabrous or weakly pubescent. Veins on lower leaf surface, especially at base, much narrower, up to 5 mm wide 8. *S. baicalensis* (Adams) Robinson
17. Inflorescence racemose, less often capitula solitary. Leaves narrow-lanceolate, 1–1.2(1.5) cm wide, attenuate upward, sparsely toothed (plants of Altai) 10. *S. krylovii* Schisch. and Serg.
- + Inflorescence corymbose-paniculate, capitula less often less numerous, sometimes solitary. Leaves broadly lanceolate, 2.5–7 cm wide, ovate or ovate-oblong, more closely toothed (plants of Soviet Central Asia) 13. *S. sordida* Kar. and Kir.
- 18(14). Receptacle glabrous, i.e., entirely without scales or less often with numerous, sometimes shedding scales 19.
- + Receptacle more or less densely scaly; scales linear-subulate, lustrous, persistent, of variable length in different species 24.
19. Plants rosette type, almost without stem or with strongly reduced stem 20.
- + Plants with distinctly stem, stems more or less tall 21.
20. Leaves hard, orbicular, almost entire, with distinct short cusp. Capitula few, up to 3. Outer involucral bracts strongly attenuate, acuminate. Receptacle entirely glabrous (plants of the Darvaz Range) 105. *S. caprifolia* Iljin and Zapriagaev
- + Leaves herbaceous, soft, broadly lanceolate or ovate, with indistinct cusp, shallow but distinctly crenate-toothed. Capitula usually numerous. Outer involucral bracts weakly attenuate, acuminate. Receptacle glabrous or with few short shedding scales (plants of Pamiro-Alai, Dzhungarian Alatau) 91. *S. kuschakeviczii* Winkl.

21. Involucral bracts blackish or violet; outer bracts equal or almost equal or almost equal to inner, glochidiate with rusty woolly hairs. Leaves fleshy, sparsely toothed or distinctly crenate-toothed. Receptacle entirely glabrous (plants of Uda, Okhotsk, Anadyr, and Kamchatka regions of the *Flora of the USSR* 103. **S. nuda** Ldb.
- + Involucral bracts distinctly unequal, i.e., outer much shorter than inner, not glochidiate; if glochidiate, hairs white and not rusty .. 22.
22. Leaves ovate, 2–2.5 cm wide. Outer involucral bracts almost herbaceous, acuminate, cusp often corniculate. Receptacle with very fine scales (about 1 mm long) (plants of Alai) 92. **S. ovata** Benth.
- + Leaves lanceolate, linear-lanceolate or linear, up to 1.2 cm wide 23.
23. Plants caespitose. Root collar densely covered with hardened remains of previous year's leaves, often fibrous. Stem prostrate or ascending. Leaves lanceolate, toothed, less often pinnatifid. Receptacle variable: glabrous or scaly (plants of Pamir and central Tien Shan) 98. **S. faminziniana** Krassn.
- + Plants not caespitose. Root collar without numerous hardened remains of previous year's leaves. Stem erect. Leaves linear or lanceolate-linear, entire, scarcely convolute. Bracteal leaves one to three, approximate with inflorescence, usually exceeding it. Receptacle glabrous (plants of Chukotka) 104. **S. tschuktschorum** Lipsch.
- 24(18). At least inner (and partly also outer) involucral bracts with apical membranous, usually colored, appendage. (Subgenus *Theodorea* (Cass.) Lipsch.) 25.
- + Involucral bracts without membranous appendage or with narrow, herbaceous, saber-shaped appendage 36.
25. Teeth on leaves and sometimes on outer involucral bracts with cartilaginous cusp. Leaves pinnatifid 26.
- + Teeth on leaves and on involucral bracts without cartilaginous cusp. Leaves in some species sometimes undivided 31.
26. Plants with distinctly winged stem due to decurrent leaves, or stem wingless 27.
- + Plants almost without stem, glaucous, strongly pubescent (plants of Tuva Region) 113. **S. ceterachifolia** Lipsch.
27. Stem wingless. Leaves with narrow, linear or lanceolate lobes. Outer involucral bracts attenuate, herbaceous, often as long as inner or even longer 111. **S. runcinata** DC.
- + Stem strongly or weakly winged. Outer involucral bracts distinctly shorter than inner 28.

28. Leaves pinnati- or bipinnatifid 29.
 + Leaves entire or crenate-toothed, especially in lower part (plants of Zaisan Region) 94. **S. paradoxa** Lipsch.
- 367 29. Capitula up to 1.5 cm wide. Leaves bipinnatifid, i.e., lobes deeply and finely divided in small lobules with numerous, distinct, cartilaginous cusps. Outer involucre bracts in several rows with acute decurved cusp. Outer row of pappus bristles short-plumose (plants of Kazakhstan Altai) 112. **S. laciniata** Ldb.
 + Capitula up to 1 cm wide. Leaves pinnatifid, primary lobes only toothed-crenate, not so deeply and finely divided as in previous species, cartilaginous cusps poorly developed. Outer row of pappus bristles serrate (plants of Trans-Baikal Region) 30.
30. Plants tall, more or less pubescent and scabrous. Stem 20–35(50) cm high, strongly winged in type specimen. Involucre bracts arachnoid-hairy or tomentose, glochidiate 109. **S. alata** DC.
 + Plants shorter, almost glabrous and smooth. Stem 5–10(15) cm high, somewhat winged. Involucre bracts almost glabrous 110. **S. crepidifolia** Turcz.
31. Outer involucre bracts with subulate cusp, sometimes strongly decurved 32.
 + Outer involucre bracts without subulate cusp 33.
32. Capitula smaller (with florets 1.5–2 cm long). Stem prostrate or ascending (erect only in var. *erecta* Winkl.), poorly branched, scabrous due to dense, flexuous, soft acerate hairs, with few or total absence of vegetative branches in axils of lower cauline leaves. Leaves usually deeply pinnatifid. Outer involucre bracts weakly subulately acuminate, not or slightly deflexed (plants of central Tien Shan) 115. **S. prostrata** Winkl.
 + Capitula larger (with florets 2.5–3 cm long). Stem always erect, strongly branched, weakly scabrous, usually with larger number of vegetative branches in axils of lower cauline leaves. Leaves in type specimen undivided or with few teeth, less often pinnatilobate. Outer and middle involucre bracts, at least in four rows, long, acute-subulate, with strongly decurved cusp 114. **S. robusta** Ldb.
33. Lower leaves ovate-oblong or lanceolate-oblong, coarsely crenate or irregularly toothed, less often almost entire. Involucre turbinate 106. **S. amara** (L.) DC.
 + Lower leaves always pinnate. Involucre hemispherical (plants of eastern Siberia and Far East) 34.
34. Plants tall, stems up to 1.5 m tall. Leaves large, individual leaves reaching 25 cm in width, with prominent midrib. Involucre strongly arachnoid-hairy (plants of Sakhalin and lower reaches of Amur) 108. **S. neopulchella** Lipsch.

- 368 + Plants shorter, stems 25–75(100) cm tall. Leaves less wide, with less prominent midrib. Involucre weakly pubescent or glabrous (plants of eastern Siberia and Far East)..... 35.
35. All leaves hard, pinnate, with linear lanceolate-linear or oblong, acuminate, up to 10 pairs of lateral lobes, scabrous above due to spinules and sessile glandular hairs, with short pubescence and numerous sessile glandular hairs beneath (plants of Trans-Baikal and Far East) 107. **S. pulchella** Fisch.
- + Only lower leaves pinnate, middle and upper leaves undivided or toothed, lanceolate or oval; lamina more soft.....
..... 107. **S. pulchella** var. **subintegra** Rgl.
- 36(24). Semishrubs with numerous, strongly and repeatedly branched, virgate, erect, more or less glandular-hairy stems. Leaves less numerous, small (plants of Pamiro-Alai)
..... 100. **S. chondrilloides** Winkl.
- + Perennials, sometimes with woody bases, but then without virgate, erect stems. Leaves usually numerous 37.
37. Involucral bracts coriaceous, straw-yellow, with distinct, brownish, rather wide border along margin. Receptacle with very long scales (up to 2 cm long), scales as long or almost as long as inner involucral bracts 38.
- + Involucral bracts not coriaceous, without distinct, brownish wide border along margin. Receptacle with much shorter scales; scales shorter than inner involucral bracts 39.
38. Leaves bicolorous: green above, snow-white and appressed-tomentose beneath 101. **S. masarica** Lipsky.
- + Leaves concolorous on both sides: green, finely punctate-glandular beneath 102. **S. tadshikorum** Iljin and Gontsch.
39. Small (1.5–6 cm) alpine plants, densely leafy; upper leaves surrounding dense, capitate, almost hemispherical inflorescence of numerous sessile capitula. Bracteal leaves covered with brownish or whitish pubescence. Involucral bracts of almost equal length. (Subgenus *Eriocoryne* Wall. ex DC.) (plants of Soviet Central Asia and Altai) 40.
- + Plants with different combination of characters 41.
40. Leaves tomentose on both sides, grayish in type specimen. Involucral bracts light colored. Pappus brownish-red
..... 7. **S. gnaphalodes** (Royle) Sch. Bip.
- + Leaves velutinous above due to thick tomentum of white hairs, less densely pubescent beneath, sometimes almost glabrous, reddish-violet or green in type specimen. Involucral bracts reddish-violet. Pappus white 6. **S. glacialis** Herd.
41. Roots fibrously branched. Basal appendages of anthers with tuft of long flocculose-woolly hairs 42.

- + Roots not fibrously branched (however, compared with *S. ussuriensis* Maxim. and *S. maximoviczii* Herd.). Basal appendages of anthers weakly or finely hairy, ciliate in some species, flocculose-woolly only in *S. maximoviczii* Herd. 63.
- 42. Involucral bracts with distinct long aristate cusp 43.
 - + Involucral bracts somewhat obtuse or acuminate, in latter case without distinct long aristate cusp 46.
- 43. Cusp of involucral bracts uncate 44.
 - + Cusp of involucral bracts straight 45.
- 44. Stem tall (up to 80 cm high), strong, angular, more or less winged due to decurrent leaves, not woody at base. Inflorescence paniculate, strongly branched, with numerous capitula (plants of Semipalati Region) 14. ***S. rigida*** Ldb.
 - + Stem much shorter (20–40 cm high), cylindrical, not winged, becoming woody at base. Inflorescence weakly branched, with fewer (five to eight) capitula (plants of Dzhungarian Alatau) 15. ***S. ninae*** Iljin
- 45. Corymbs erect. Pointed tips of involucral bracts sometimes fragile. Florets in capitulum (10)12–13. Leaves white- or grayish-tomentose beneath 31. ***S. larionovii*** Winkl.
 - + Corymbs drooping. Pointed tips of involucral bracts not fragile. Florets in capitulum 19–20. Leaves glabrous 32. ***S. alberti*** Rgl. and Winkl.
- 46. Perennials; stem distinctly woody at base 47.
 - + Perennials; stem not woody or weakly woody at base 49.
- 47. Leaves 3–6 mm wide, oblong, crenate-toothed, some almost entire. Capitula one to three (plants of Syr-Darya Karatau) 18. ***S. mikeschini*** Iljin
 - + Leaves 1–2 cm wide. Capitula usually many (plants of Dzhungarian Alatau) 48.
- 48. Leaves distinctly pinnatifid in type specimen. Capitula in lax inflorescence, five to eight. Involucral bracts somewhat acuminate 17. ***S. blanda*** Schrenk
 - + Leaves almost entire to weakly crenate-toothed. Capitula in compact inflorescence, more or less numerous, up to 15. Involucral bracts strongly acuminate 16. ***S. coronata*** Schrenk
- 49. Very tall plants, stem up to 1.5–2 m high, about 1 cm thick in lower part. Inflorescence robust, paniculate. Leaves green beneath 29. ***S. elata*** Ldb.
 - + Plants short, stem up to 1 m high, usually much shorter; stem thinner 50.
- 370 50. Plants forming more or less dense turf. Leaves densely canescent on both sides 51.
 - + Plants not forming dense turf. Leaves white-tomentose beneath or

- less often grayish due to arachnoid hairy-tomentose pubescence, sometimes green on both sides 54.
51. Leaves entire in type specimen 52.
+ Leaves distinctly pinnatifid or crenate-toothed 53.
52. Involucral bracts (especially outer) rather obtuse. Capitula small, narrow-cylindrical, in dense erect corymbs. Leaves linear
..... 22. **S. cana** Ldb.
+ Involucral bracts distinctly acuminate. Capitula large, broad, campanulate, one to three, at stem apex, not forming erect corymbs. Leaves narrow-lanceolate 27. **S. vvedenskyi** Lipsch.
53. Involucral bracts light colored, weakly pubescent. Stem in typical specimen 1.5–4 cm high, in var. *major* Winkl. up to 10–12 cm. Capitula one to three on each stem (plants of Kuldzha District—Sairam, Kokamyr) 26. **S. canescens** Winkl.
+ Involucral bracts dark, densely arachnoid-hairy. Capitula three to five on each stem, number of capitula on entire plant large (plants of central Tien Shan) 25. **S. caespitans** Iljin
54. Leaves concolorous, i.e. green on both sides. Stem somewhat woody at base 55.
+ Leaves green above, white or grayish beneath due to tomentose or arachnoid hairy-tomentose pubescence. Stem not woody at base 56.
55. Leaves in type specimens lanceolate, acuminate, undivided or finely toothed-crenate, weakly scabrous. Capitula smaller and narrower, 5–7 mm wide. Involucre dark colored. Pappus dirty-smoky (plants of western Tien Shan) 19. **S. ispajensis** Iljin
+ Leaves in type specimen ovate, basal and lower cauline leaves obtuse, upper cauline leaves acuminate, usually more deeply toothed-crenate, strongly scabrous. Capitula somewhat larger and wider, 7–10 mm wide. Involucre white. Pappus white (plants of Dzhungarian Alatau (Chulak) and eastern Tien Shan)
..... 28. **S. salemanni** Winkl.
56. Leaves deeply pinnatifid or pinnatilobate, only some undivided 57.
+ All leaves undivided or crenate-toothed 59.
57. Plants up to 60 cm high; stem strongly branched above. Leaves up to 14 cm long and 4 cm wide, pinnatifid into lanceolate or linear, 1.5–4 cm long and 2–5 mm wide lobes. Involucral bracts almost glabrous 24. **S. serratuloides** Turcz.
- 371 + Plants shorter, up to 10–15(25) cm high, with weakly branched stem. Leaves smaller, variously divided; pinnatifid, pinnatilobate, or crenate-toothed with shorter lobes and 1–9 mm long teeth. Involucral bracts pubescent 58.
58. Capitula in somewhat lax corymbs, not erect. Leaves strongly

- unequally divided; pinnatipartite or sinuate-toothed, only some entire (plants of Siberia)..... 23. *S. sumneviczii* Serg.
- + Capitula in compact corymbs, erect. Leaves pinnatifid (plants of Kazakhstan)..... 22. *S. cana* Ldb.
59. Basal and lower cauline leaves narrow, usually 2–8 mm wide (not wider than 1 cm), entire, bright green above and white-tomentose beneath (plants of Siberia) 20. *S. salicifolia* (L.) DC.
- + Basal leaves often withering before flowering; lower cauline leaves wider: 1.5–2(3) cm wide 60.
60. Plants usually with large number of short vegetative shoots in axils of cauline leaves. Stem densely leafy. Leaves strongly scabrous above and along margin, gray-pubescent beneath, sometimes very insignificantly, or white-tomentose. Capitula 5–8 mm wide, in wide corymbose-paniculate inflorescence 61.
- + Plants without short vegetative shoots in axils of cauline leaves, or vegetative shoots scarcely noticeable 62.
61. Leaves more or less gray-pubescent beneath, sometimes very weakly pubescent 30. *S. elegans* Ldb.
- + Leaves distinctly white-tomentose beneath 30. *S. elegans* Ldb. var. *nivea* Lipsch.
62. Capitula small, 5–8 mm wide; involuclral bracts acuminate, without black border. Inflorescence in type specimen depauperate, terminal, usually compact, corymb, not broadly corymbose-paniculate; less often several lateral corymbs besides terminal. Stem sparsely leafy 30. *S. elegans* ssp. *turkestanica* Lipsch.
- + Capitula rather large, 1 cm wide, with obtuse, roundish at apex involuclral bracts, with black border (plants of Tien Shan, Kunges, and outside the USSR) 21. *S. lomatolepis* Lipsch.
- 63(41). Leaves white or gray beneath due to distinct tomentum or arachnoid-hairy pubescence 64.
- + Leaves green or glaucescent beneath, glabrous or sparsely pubescent, sometimes indistinctly arachnoid hairy-pubescent, and then grayish 82.
64. Lower leaves in type specimen deeply cordate or hastate, and wide at base, 65.
- + Lower leaves cuneate and narrow at base 74.
- 372 65. Leaves on both sides, as also stem and involucre white-tomentose or strongly pubescent 66.
- + Leaves green above, white-tomentose beneath. Stem glabrous or weakly pubescent 67.
66. All plants snow-white due to dense tomentose pubescence. Capitula ovoid, larger; involucre up to 12 mm long; involuclral bracts densely white-tomentose, short spinescent. Florets pink (plants of Far East) 40. *S. sovietica* Kom.

- + Plants more weakly pubescent, leaves arachnoid hairy-woolly above and not tomentose, weakly crenate-sharp toothed. Capitula smaller; involucre 7–8 mm long; involucre bracts not densely white-tomentose, with long, usually strongly squarrose, cusps. Florets violet (plants of eastern Sayans)..... 41. **S. squarrosa** Turcz.
67. Upper cauline leaves approximate with inflorescence. Leaves strongly crenate-sharp toothed. Stem often flattened, thick. Involucre bracts with strongly squarrose cusp in type specimen (plants of eastern Sayans)..... 42. **S. pseudosquarrosa** M. Pop. and Lipsch.
- + Upper cauline leaves not approximate with inflorescence. Stem never flattened. Involucre bracts without squarrose cusp, if cusp present, then straight..... 68.
68. Stem very tall (up to 1 m or higher). Lower cauline leaves long-petiolate, rather large and wide, up to 16 cm long excluding petiole and up to 10 cm wide. Petiole of middle and lower cauline leaves often winged. Inflorescence-robust panicle. Peduncles brownish due to dense glandular hairs. Florets pink (plants of Far East—Birobidzhan) 49. **S. splendida** Kom.
- + Stem less tall. Lower leaves medium. Petioles wingless. Inflorescence less robust. Peduncles gray arachnoid-hairy pubescent, not glandular hairy..... 69.
69. Lower leaves ovate, oblong-ovate or oblong-lanceolate (2.5 to 8 cm wide), deeply cordate at base in type specimen..... 70.
- + Lower leaves narrower, 1–2 cm wide, not deeply cordate at base 71.
70. Stem 10–20(15) cm high, ascending. Inflorescence usually compact, with small number of capitula (plants of the Carpathians)..... 44. **S. discolor** (Willd.) DC.
- + Stem 25–80 cm high, erect from base. Inflorescence usually lax, with larger number of capitula (plants distributed from Ural to Mongolia)..... 43. **S. controversa** DC.
71. Leaves deeply toothed 72.
- + Leaves scarcely toothed, gradually acuminate. Involucre bracts obtuse or somewhat obtuse (plants of Yakutia and Ayan District) 73.
72. Leaves lanceolate-linear or oblong-lanceolate, abruptly long acuminate. Capitula on long peduncles, somewhat remote. Involucre bracts acuminate (plants of Irkutsk Region)..... 47. **S. lenensis** M. Pop. ex Lipsch.
- + Leaves ovate or ovate-oblong, long acuminate, somewhat hastate or roundish-obtuse at base. Capitula in compact inflorescence, less often solitary. Involucre bracts obtuse or somewhat obtuse (plants of Ural) 48. **S. uralensis** Lipsch.

73. Plants 10–15(20) cm high. Capitula usually solitary, sometimes two or three on short peduncles in compact corymbs (plants of Ayan District) 46. *S. ajanensis* (Rgl.) Lipsch.
- + Plants taller, stem 25–40 cm high. Capitula two to five, in corymbs; usually stem more or less strongly branched in upper part, and then, besides terminal corymb, lateral capitula present at different heights on long floriferous branches (plants of Yakutia) 45. *S. hypargyrea* Lipsch. and Vved.
- 74(64). Involucral bracts narrowed from broader base to distinct, usually incurved cusp or small, herbaceous, also incurved, appendage 75.
- + Involucral bracts without incurved cusp or appendage 77.
75. Stem wingless. Capitula larger and wider, 1–1.4 cm long and 1 cm wide. Involucral bracts usually dark-colored, with long cusp, rarely recurved 76.
- + Stem more or less winged. Capitula 8 mm long and about 7 mm wide. Involucral bracts light-colored with small, herbaceous, usually violet, recurved appendage (plants of Trans-Baikal, Yakutia and Far East) 62. *S. duvia* Freyn.
76. Stem up to 15 cm high. Lower leaves 1.2–1.5 cm wide. Cusps of involucral bracts less developed, straight. Pappus slightly exerted from involucre (plants of Sikhote-Alin) 79. *S. soczavae* Lipsch.
- + Stem more than 15 cm high. Lower leaves up to 5–6 cm wide. Cusps of involucral bracts long, usually recurved. Pappus strongly exerted from involucre (plants of Kamchatka and Commander islands) 80. *S. pseudo-tilesii* Lipsch.
77. Stem tall, usually more than 35 cm high 78.
- + Stem short or medium, usually less than 35 cm high 79.
78. Outer involucral bracts usually turning black; entire involucre (especially inner bracts) in type specimen velutinous-woolly. Leaves hard, white-tomentose beneath, somewhat convolute. Florets pink 59. *S. amurensis* Turcz.
- 374 + Outer involucral bracts usually not turning black; entire involucre in type specimen pubescent but not velutinous-woolly. Leaves softer, gray- or grayish-arachnoid hairy-tomentose beneath, not convolute. Florets deep red (always ?) 85. *S. stubendorffii* Herd.
79. Stem densely leafy up to inflorescence. Outermost involucral bracts lanceolate, as long as or somewhat shorter than inner 80.
- + Stem sparsely leafy up to inflorescence. Outer most involucral bracts distinctly shorter than inner, often hardening later, somewhat acuminate or somewhat obtuse. Capitula mostly on long peduncles,

- usually in somewhat lax terminal corymb (plants of eastern Siberia) 83. *S. sukaczewii* Lipsch.
80. Plants almost stem-less or with 1–10 cm long, less often up to 15 cm stem. Upper leaves lanceolate or lanceolate-linear. Basal leaves usually not withering before flowering and often reaching up to inflorescence or exceeding 81.
- + Plants with 15–30 cm long stem. Stem leafy up to top. All leaves oblong-ovate or elliptical, with frequent sharp teeth. Basal leaves usually withering before flowering (plants of Altai and Saur) 74. *S. foliosa* Ldb. var. *altaica* Turcz.
81. Capitula in dense capitate corymbs, often subtended by one to three upper cauline leaves, either longer or as long as capitulum. Outer involucre bracts shorter than inner. Receptacular bristles up to 6 mm long. Florets 1–1.4 cm long (plants of the Siberian Arctic) 78. *S. tilesii* Ldb.
- + Capitula in dense, but not capitate corymbs, not subtended by upper cauline leaves. Outer involucre bracts almost as long as innermost or slightly shorter; all involucre bracts often dark-colored (red-violet). Receptacular bristles 2–3 mm long. Florets about 8 mm long (plants of Altai and Sayans) 75. *S. pricei* Simpson
- 82(63) Leaves distinctly punctate-glandular beneath, glandular hairs not lustrous. Outer involucre bracts as long as or almost as long as inner. All involucre bracts narrowed from wider base to long subulate cusp 83.
- + Leaves not distinctly punctate-glandular beneath, if glandular hairs present, then scattered, lustrous. Involucre imbricate, consisting of several rows of unequal bracts: outer short, inner longer. Involucre bracts without appendage or with narrow saber-shaped appendage 84.
83. Alpine plants, small, often almost stemless, stem 2–8 cm high. Leaves thicker, hard, oblong-lanceolate, 0.5–1 cm wide, shallow crenate-toothed 76. *S. congesta* Turcz.
- 375 + Plants of valleys, larger; stem 10–20 cm high. Leaves thin, ovate or ovate-triangular, 2–5.5 cm wide, deeply crenate-toothed with sharper teeth (plants of the Vitim Plateau) 77. *S. poljakovii* Glehn
84. Involucre bracts with saber-shaped, straight or decurved appendage 85.
- + Involucre bracts without saber-shaped appendage, obtuse or acuminate 92.
85. Leaves entire or toothed 86.
- + Leaves deeply pinnatisect or pinnatilobate 90.
86. Middle cauline leaves decurrent on stem, as a result, stem more or less winged 87.

- + Stem wingless 89.
87. Capitula in compact terminal corymbs, 5–7 mm wide. Stem narrow-winged 88.
- + Capitula in racemose panicle or lax equally long corymb, 10–14 mm wide. Stem with broader toothed or entire wing. Saber-shaped apical appendages of outer and middle involucre bracts dark red, more or less recurved (plants of Trans-Baikal Region and Far East) 63. *S. umbrosa* Kom.
88. Leaves aeruginous, oblong, glabrous, usually glossy on both sides, entire or weakly toothed; basal leaves narrower (about 2 cm wide), petiolate. Saber-shaped apical appendages of involucre bracts always distinctly developed, long (plants of eastern Siberia) 57. *S. acuminata* Turcz.
- + Leaves green, oblong-lanceolate, or ovate-oblong, glabrous above, sparsely arachnoid hairy-pubescent beneath, distinctly toothed-crenate, teeth acute; basal leaves 3–4.5 cm wide, with triangular-hastate (sometimes almost cordate) base, narrowed into petiole. Saber-shaped apical appendages of involucre bracts sometimes poorly developed and short (plants of Sakhalin) 58. *S. sachalinensis* F. Schm.
89. Capitula together with florets about 2 cm long and up to 1 cm wide, usually numerous (up to 15), less often only three, clustered at stem apex. Involucre bracts glabrous, dark-colored in type specimen, with thin recurved apical appendage, less often without, but then apices recurved and appressed. Leaves thick, hard, oblong-ovate 51. *S. recurvata* (Maxim.) Lipsch.
- + Capitula one to three, less often more. Involucre bracts (especially outer) velutinous-woolly, less often subglabrous, with thin, up to 1–1.25 cm long recurved apical appendage. Leaves thin, ovate-triangular or almost triangular 65. *S. subtriangulata* Kom.
- 376 90. Primary lobes of leaves usually more than 10 pairs, narrow, long, large toothed. Upper cauline leaves oblong, cristate-pinnate. Involucre bracts with herbaceous, cristate-toothed, erect or recurved appendage 34. *S. odontolepis* Sch. Bip.
- + Primary lobes of leaves less than 10 pairs, wide. Lower leaves pinnatifid, upper cauline leaves oval or lanceolate. Involucre bracts with undivided appendages. Capitula at least 1.2–1.5 cm long 91.
91. Peduncles slender, somewhat drooping. Leaves thin, oval-oblong, with wide, acute lobes. Involucre bracts puberulent or weakly arachnoid-hairy, green, with saber-shaped, 5–8 mm long, recurved or straight appendages 66. *S. sinuata* Kom.

- + Peduncles thick, short, straight. Leaves ovate-oblong, cuspidate, deeply pinnatisect. Involucral bracts glabrous, usually dark-colored, with or without recurved appendages, but then tip of involucral bracts recurved 51. *S. recurvata* (Maxim.) Lipsch.
- 92(84) Involucre glabrous; outer bracts like true floral bracts herbaceous, green; subsequent bracts green, ovate at base, attenuate-long acuminate; inner bracts oblong or lanceolate, red in upper part, long acuminate, exerted from outer bracts. Leaves fleshy, glabrous, quite variable in shape, size and especially in serration. Capitula two to seven on each stem, solitary or less often three, sessile, at apices of stem and lateral branches, protruding from axils of upper leaves (plants of Kara-Archa area in central Tien Shan) 99. *S. karaartscha* Saposhn.
- + Involucre glabrous or pubescent; outer involucral bracts not like true bracts. Plants with different characters 93.
- 93. All or at least lower cauline leaves pinnatisect or pinnatilobate 94.
- + All leaves undivided or toothed 103.
- 94. Plants of saline lands, slightly bitter to taste. Leaves fleshy 95.
- + Plants not from saline lands but other habitats. Leaves not fleshy 99.
- 95. Stem prostrate or ascending, caespitose. Leaves narrow (2–5 mm wide) pinnatifid, with few or more triangular or linear lateral lobes, sometimes leaves almost undivided. Capitula usually drooping, sometimes in secund inflorescence (plants of Pamir and Tien Shan) 98. *S. faminziniana* Krassn.
- + Stem straight and not prostrate or ascending, usually solitary. Capitula erect and not drooping 96.
- 96. All leaves deeply pinnatisect, usually bipinnatisect, then secondary lobes linear 96. *S. turgaiensis* B. Fedtsch.
- 377 + Leaves not bipinnatisect 97.
- 97. Basal leaves lyrate-pinnatisect, with large, almost sagittate, and crenate-large toothed terminal lobe; middle and upper cauline leaves almost undivided or toothed-lobed. Capitula small. Inflorescence branched in type specimen. Involucral bracts pale. Outer pappus bristles not persistent 98.
- + Basal and cauline leaves crenate to toothed-lobed. Capitula at fruiting 1.6–2 cm long and 1–1.2 cm wide, in dense corymbs at stem apex. Inflorescence unbranched or weakly branched. Involucral bracts deeply colored (red-violet). Outer pappus bristles persistent. Leaves and peduncles strongly scabrous (plants of Tien Shan, outside the USSR) 97. *S. kaschgarica* Rupr.
- 98. Stem 15–50 cm high. Leaves decurrent, as a result stem sometimes

- winged. Capitula numerous, lax paniculate, of many corymbs. Achenes without border (corona)..... 93. **S. salsa** (Pall.) Spreng.
- + Stem 4–10(15) cm long. Entire plant usually more glaucous. Leaves not decurrent on stem. Capitula terminal on main stem and branches, in dense, often globose corymbs of 4–10 capitula. Achenes with narrow border (corona) 95. **S. dehurica** Adams
99. Capitula at least 1.2–1.5 cm long..... 100.
- + Capitula not more than 1 cm long 101.
100. Peduncles thick, short. Leaves ovate-oblong, cuspidate, deeply pinnatisect. Involucral bracts glabrous, usually dark, not recurved 50. **S. elongata** DC. var. **polyodiifolia** DC.
- + Involucral bracts recurved 51. **S. recurvata** (Maxim.) Lipsch.
101. Basal leaves usually large and wide, lyrate-pinnatisect, with prominent terminal lobe, generally appressed to stem; lobes lanceolate or oblong-lanceolate, cuspidate, weakly cuneate-decurrent at transition to petiole. Involucral bracts ciliate or weakly tomentose along margin. Basal appendages of anthers comose.....
- 53. **S. maximoviczii** Herd.
- + Basal leaves oblong or ovate, cordate or hastate at base, without prominent terminal (upper) lobe; lateral lobes broadly oblong, terminating in wide somewhat obtuse teeth. Involucral bracts arachnoid-hairy. Basal appendages of anthers ciliate 102.
102. Leaves glabrous beneath, weakly scabrous or smooth.....
- 52. **S. ussuriensis** Maxim. var. **incisa** Maxim.
- 378 + Leaves arachnoid hairy-pubescent beneath, harder, strongly scabrous
- 52. **S. ussuriensis** Maxim. var. **firmifolia** Lipsch.
- 103(93) Capitula cupuliform, peduncles up to 2 cm long and 1 cm wide, 3–15, at stem apices (plants of Far East).....
- 64. **S. grandifolia** Maxim.
- + Capitula smaller, narrowly or broadly cylindrical, infundibuliform or campanulate 104.
104. Leaves with frequent and sharp teeth, green on both sides, glabrous beneath or sparsely covered with short, somewhat stiff hairs; middle cauline leaves broadly ovate, ovate or elliptical..... 105.
- + Leaves grayish beneath due to arachnoid-hairy pubescence, sometimes green and glabrous (but then different in shape than reported above); middle cauline leaves lanceolate, ovate-lanceolate, triangular or triangular-ovate, hastate, undivided or weakly, sometimes strongly, toothed..... 106.
105. Leaves strongly decurrent, as a result stem distinctly winged. Involucre often glossy; involucral bracts almost glabrous in type specimen, weakly pubescent only along margin and apex; outer bracts ovate, shortest. Large, 40–120 cm high forest plants.....
- 73. **S. latifolia** Ldb.

- + Leaves weakly decurrent on stem. Involucre not glossy; involucre bracts usually pubescent; outermost bracts lanceolate, longer than subsequent ovate bracts; inner bracts densely covered with long, somewhat stiff, appressed hairs. Short, 15–35 cm high, alpine and subalpine plants 74. *S. foliosa* Ldb. var. *glabrata* Kryl.
106. Middle leaves decurrent, as a result stem winged in type specimen; wings unequal in width 107.
- + Middle leaves not decurrent or very weakly decurrent, as a result stem wingless in type specimen 114.
107. Stem in upper part and subtending leaves, when present, glandular-hairy. Inflorescence of numerous capitula. Capitula up to 1 cm wide (plants of Sakhalin) 54. *S. nupuripoensis* Miyabe and Miyake
- + Glandular pubescence absent. Inflorescence usually comprising numerous capitula. Capitula 5–6 mm wide 108.
108. Leaves hard, 3.5–8 cm wide, strongly attenuate. Involucre bracts green, in type specimen, only sometimes pigmented at apex. Pappus weakly exerted from capitulum 109.
- + Leaves fleshy, 1.5–3.5 cm wide, somewhat attenuate-acuminate. Involucre bracts usually dark-colored, less often green. Pappus distinctly exerted from capitulum 110.
109. Stem 50–100 cm long. Leaves glaucous or somewhat glaucescent beneath, glabrous, strongly toothed, distinctly cuneate at base, narrowed into rather long winged-petiole (plants of eastern Trans-Baikal Region and continental part of Far East) 71. *S. neoserrata* Nakai
- 379 + Stem 150–200 cm long. Leaves grayish-pubescent beneath, somewhat toothed, with roundish base, narrowed in short winged-petiole (plants of southern Kuril Islands) 72. *S. fauriei* Franch.
110. Involucre bracts glabrous, sometimes weakly pubescent only along margin 111.
- + Involucre bracts pubescent 112.
111. Leaves and stem green. Stem narrow-winged in type specimen. Leaves small toothed, not convolute (plants distributed from Ural to Trans-Baikal Region) 69. *S. parviflora* (Poir.) DC.
- + Leaves and stem dark colored, purple. Stem very weakly winged in type specimen. Leaves almost entire, somewhat convolute (plants of Trans-Baikal Region) 69. *S. parviflora* subsp. *purpurata* (Fisch. ex Herd.) Lipsch.
112. Leaves more or less pubescent beneath, with glossy, more numerous or less numerous glandular hairs. Stem narrow winged, sometimes wingless 113.

- + Leaves entire, glabrous, glaucescent beneath, eglandular. Stem broad-winged. Involucral bracts somewhat obtuse, velutinous or arachnoid-hairy dorsally (plants of the Carpathians) 70. *S. porcii* Degen
113. Stem weakly leafy. Leaves sparse, up to 1, less often 1.5 cm wide. Involucral bracts, especially outer, acute, pubescent, with narrow violet border 61. *S. shiretokoensis* Sugawara
- + Stem strongly leafy. Leaves usually densely arranged, up to 2 cm wide. Involucral bracts strongly arachnoid hairy-pubescent, glochidiate, without narrow violet border 60. *S. duiensis* Fr. Schm.
- 114(106) Stem and leaves purple. Stem very weakly winged or wingless. Leaves almost entire, weakly convolute
... 69. *S. parviflora* subsp. *purpurata* (Fisch. ex Herd.) Lipsch.
- + Stem and leaves green 115.
115. Lower leaves long-petiolate, wide, triangular, ovate-triangular or hastate, large toothed, cordate, emarginate or distinctly cuneate at base 116.
- + Leaves of other shape, often, but not always, lanceolate, narrow; not cordate nor distinctly cuneate at base 121.
116. Lower leaves ovate or ovate-triangular. Upper cauline leaves approximate with and usually exceeding inflorescence 117.
- + Lower leaves cuneate. Upper cauline leaves not approximate with and not exceeding inflorescence 119.
117. Stem in upper part, cauline and subtending leaves beneath, as well as petiole flocculose-arachnoid hairy-woolly (plants of Kuril Islands) 55. *S. kurilensis* Tatevaki
- 380 + Stem, cauline and bracteal leaves beneath, as well as petiole not arachnoid hairy-woolly pubescent 118.
118. Leaves thin. Inflorescence of numerous capitula. Capitula narrow (about 5–6 mm wide). Stem pubescent in uppermost part with stiff, not glandular hairs (plants of Kamchatka, Kuril Islands, and Sakhalin) 56. *S. riederi* Herd.
- + Leaves thick. Inflorescence of less numerous capitula. Capitula more than 1 cm wide. Stem sometimes weakly winged due to decurrent leaves in uppermost part, and bracteal leaves, especially along margin, glandular-hairy (plants of Sakhalin)
..... 54. *S. nupuripoensis* Miyabe and Miyake
119. Leaves, even uppermost cauline, oval or broadly lanceolate, toothed. Involucre arachnoid hairy-pubescent
..... 52. *S. ussuriensis* var. *genuina* Maxim.
- + Upper leaves linear-lanceolate, narrow, entire. Involucre glabrous or subglabrous 120.

120. Involucre broader and shorter, of three or four rows. Inflorescence comprising fewer (4–15) capitula in type specimen, compact.....
..... 67. **S. triangulata** Trautv. and Mey.
- + Involucre narrow and oblong, of five to seven rows. Inflorescence lax, long paniculate, usually comprising numerous narrow capitula; floriferous branches in type specimen bent.....
..... 68. **S. manshurica** Kom.
121. Outer involucre bracts wide, ovate, ovate-lanceolate or oblong-ovate, somewhat obtuse; inner bracts strongly pilose. Leaves arachnoid hairy-pubescent, grayish beneath, less often glabrous..
..... 122.
- + Outer involucre bracts less numerous, narrow, long acuminate, almost as long as subsequent bracts; inner bracts glabrous or subglabrous, white-villous only at tip. Leaves entirely glabrous on lower surface; lower cauline leaves lanceolate or ovate-lanceolate, irregularly toothed, teeth sharp (plants of Kamchatka).....
..... 81. **S. oxyodonta** Hult.
122. Capitula numerous, large and wide, (1)1.5–2 cm wide; central capitulum of corymb usually larger than laterals.....
..... 90. **S. pseudoangustifolia** Lipsch.
- + Capitula numerous in type specimen, narrower; central capitulum of corymb not larger than laterals..... 123.
123. Leaves (especially along margin), as well as partly stem (in upper part) glandular due to many-celled glandular hairs. Involucre of two or three rows (plants of Chukotka)..... 89. **S. viscida** Hult.
- + Leaves as well as stem not glandular. If glandular, then glands sessile, lustrous. Involucre of three to five rows..... 124.
- 381 124. Plants woody..... 125.
- + Plants herbaceous..... 126.
125. Caudices absent. Leaves linear, narrow, 2–6 mm wide, entire, usually convolute, glabrous on both sides or sparsely flocculose beneath. Receptacular bristles up to 5–6 mm long (plants of the islands of the Bering Strait).....
..... 88. **S. angustifolia** (Willd.) DC.
- + Caudices numerous, densely covered with hardened remains of previous year's leaves. Leaves broad (1.5–2 cm wide); lower leaves oblong, ovate or ovate-oblong, arachnoid hairy-pubescent on both sides (densely beneath). Receptacular bristles shorter, up to 2–3 mm long (plants of Tadzhikistan-Zeravshan River Basin).....
..... 87. **S. saxosa** Lipsch.
126. Capitula in terminal, more or less compact corymbs, at apices of stem and branches; peduncles usually not exceeding capitula.....
..... 127.

- + Capitula in paniculate inflorescence; peduncles usually exceeding capitula 128.
- 127. Stem 4–20(25) cm long. Leaves with scarcely noticeable arachnoid-hairy pubescence on upper surface, finely grayish arachnoid-hairy beneath, and like peduncles sparsely covered with sessile, lustrous glandular hairs. Outer involucre bracts narrow, oblong-ovate (plants of Chui Steppe in Altai and Tuva [Autonomous] Republic) 86. **S. ambigua** Kryl. ex Serg.
- + Stem 25–70 cm long. Leaves glabrous, green above, more or less grayish pubescent beneath or glabrous. Peduncles and leaves without or with isolated scattered glandular hairs. Outer involucre bracts wide, ovate 82. **S. alpina** (L.) DC.
- 128. Leaves usually glabrous beneath or very sparsely tomentose; lower leaves narrow-lanceolate in type specimen, 1–2 cm wide, less often wider; cauline leaves usually more than 10, not decurrent on stem. Floriferous branches forming paniculate inflorescence, less numerous; inflorescence of fewer, (3)10–15(25), capitula. Florets lilac, with strong blue tinge (plants of Estonia and the northwestern European Part of the USSR) 84. **S. esthonica** Baer ex Rupr.
- + Leaves usually gray- or grayish arachnoid hairy-tomentose beneath; lower leaves broadly lanceolate in type specimen, 2–3.5(4) cm wide; cauline leaves usually less than 10, usually weakly decurrent on stem. Floriferous branches forming paniculate inflorescence, numerous; inflorescence of larger number of capitula (10)15–25(40). Florets deep red (plants of Siberia, predominantly eastern) 85. **S. stubendorffii** Herd.

382 *Subgenus* 1. **Stephanodontos** Lipsch. in Tr. Mosk. Obshch. Ispr. Prir 3 (1960) 178.—Achenes spinulose with corona of long, stiff, sharp teeth. Pappus white, double; outer bristles less numerous, distinctly unequal, up to 10 mm long, persistent; inner bristles numerous, almost equal, about 15 mm long, plumose, connate at base into a ring.

1. **S. carducephala** (Iljin) Iljin in Lipsch. in Tr. Mosk. Obshch. Ispr. Prir. 3 (1960) 178.—*Jurinea carducephala* Iljin in Izv. Tadzh. Bazy Akad. Nauk SSSR, Botanika, I, 1 (1933) 64.

Perennial. Caespitose; caudices covered with remains of hardened bases of previous year's leaves. Stem (5)10–12 cm high, straight, simple, like leaves covered with short, scattered hairs, sparsely leafy. Leaves usually at stem base, entire to more or less crenate-toothed or almost pinnatifid, green above, grayish-floccose beneath with prominent midrib and less distinct lateral veins; basal leaves numerous, reaching capitulum or shorter, elliptical, elliptical-lanceolate, oblong-spatulate or lanceolate,

gradually attenuate into petiole, sheathed, 4–10 cm long with petiole and 1.5–2 cm wide, petiole (1.5)2–4 cm long; cauline leaves numerous, linear or lanceolate, 2–5 cm long and 1–5 mm wide. Capitula solitary, large, about 2–2.5 cm long and about 2.5–3 cm wide. Involucre arachnoid hairy-pubescent, glabrescent, light colored or anthocyanin-colored; involucre bracts numerous, many-rowed, linear, aristate, slightly recurved when dry; outer bracts almost as long as inner. Receptacle densely covered with linear-subulate, short, about 2–3 mm long scales; florets pink, about 2 cm long, narrow part of tube about 7 mm long, broadened part together with lobes of limb about 1.2 cm long, both with occasional lustrous glandular hairs; appendages of anthers divided, setaceous, 3–4 mm long. Achenes oblong, about 6 mm long, dark brown, ribbed, spinulose along ribs, especially in upper part, forming corona; corona of long, almost equal, stiff, sharp teeth; pappus snow-white, two-rowed; outer bristles less numerous, distinctly unequal, 3–10 mm long, finely plumose-scabrous, persistent; inner bristles numerous, almost equal, about 15 mm long, plumose, connate at base into shedding ring. Flowering VII–VIII.

Stony slopes, clefts in rocks, screes.—*Soviet Central Asia*: Pamiro-Alai (mountainous Badakhshan). Endemic. Described from Roshan. Type in Leningrad.

Note. Differs from all other *Saussurea* species found in the USSR by the spinulose achenes and a corona of long, stiff, acute teeth. With respect to these characters, it approaches the Indian species *S. ceratocarpa* Decne. It is an intermediate species connecting the genera *Saussurea* and *Jurinea*.

- 383 *Subgenus 2. Amphilaena* (Stschegl.) Lipsch. in Tr. Mosk. Obsch. Isp. Prir. 3 (1960) 182; Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 369.—Sect. *Amphilaena* Stschegl. in Bull. Soc. Nat. Mosc. XXI, 3 (1848) 244.—Sect. *Eriocoryne* (gen. *Aplotaxidis*) Wall. ex DC. Prodr. VI (1837) 541 p. p.—Sect. *Bracteatae* Clarke Comp. Ind. (1876) 220.—Sect. *Obvallatae* Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 489.—Bracteal leaves wide, colored, crowded below corymb of clustered capitula, and enclosing them. In several species found outside the USSR, included in this subgenus, the capitula are solitary or few, with swollen peduncles. Receptacle sparsely covered with short scales. Pappus biseriate, outer bristles few, small, finely plumose-scabrous, inner bristles long-plumose.

2. *S. involucrata* Kar. and Kir. ex Maxim. in Bull. Acad. Sc. Pétersb. XXVII (1881) 489 in textu; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 439.—*S. involucrata* (Kar. and Kir.) B. Fedtsch. in Perech. Rast. Turk. IV (1911) 235.—*Aplotaxis involucrata*

Kar. and Kir. in Bull. Soc. Nat. Mosc. XV, 2 (1842) 389.—*Haplotaxis involuocrata* (Kar. and Kir.) Ldb. Fl. Ross. II, 2 (1845-1846) 673.—*S. karelini* Stschegl. in Bull. Soc. Nat. Mosc. XXI, 3 (1848) 244.—*S. lioui* Ling Yong in Contr. Inst. Bot. Nat. Acad. Peiping, III, 4 (1935) 149, tab. XXIX; Lipschitz, op. cit. (1954) 440.—*Amphilaena involuocrata* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 439.—**!c.**: Iubilaeum semiseculare doctoris . . . G. Fischer de Waldheim . . . Mosquae (1847) tab. 2.

Perennial. Root collar stuppeous from fibrous remains of previous year's leaves. Stem (10)13–25(35) cm high and 2–3 cm thick, fistular, densely leafy and, hence, often not visible, succulent, glabrous. Basal and cauline leaves coriaceous, oblong, or oblong-ovate, up to 14 cm long and up to 2.5 cm wide, sessile, semiamplexicaul, narrowed toward base, obtuse or subacute, with distinct, straw-colored midrib broadened in lower part of leaf, smooth on both sides or somewhat scabrous due to more or less numerous, scattered, lustrous glandular hairs, strongly and finely serrate-toothed, teeth numerous, small, terminating in cartilaginous cusp, with dense, capitate glandular hairs between teeth. Bracteal leaves 13–17, tow-rowed, light (creamy) scaly, with many veins, like cauline leaves in shape but usually wider, up to orbicular, 5.5–7 cm wide, with frequent sharp teeth, two times as long as and completely enclosing inflorescence. Capitula sessile, 10–20, in compact terminal globule enclosed in bracteal leaves. Involucre three or four-rowed, bracts lanceolate, acute, with blackish border or entirely black, with stiff hairs, especially at apex, sometimes glochidiate, as a result pubescence of
384 bracts often indistinct. Receptacle sparsely covered with short scales; florets dirty violet, about 1.4 cm long; narrow part of tube about 0.6 cm long, broad part of tube with about 0.8 cm long lobes of limb, filaments papillate; appendage of anthers ciliate. Pappus double, outer bristles less numerous, finely plumose-scabrous, fragile, about 5 mm long, inner bristles long-plumose, about 1–1.2 cm long; achenes dark brown, glabrous, ribbed. Flowering VII–VIII.

Stony screes and deposits in alpine zone.—*Soviet Central Asia*: Tien Shan, Dzhungaria-Tarbagatai; *Eastern Siberia*: Angara-Sayans (Tanu-Ola). *General distribution*: Dzhungaria-Kashgaria (Tien Shan). Described from the alpine zone of the Dzhungarian Alatau. Type in Leningrad; isotype in Moscow.

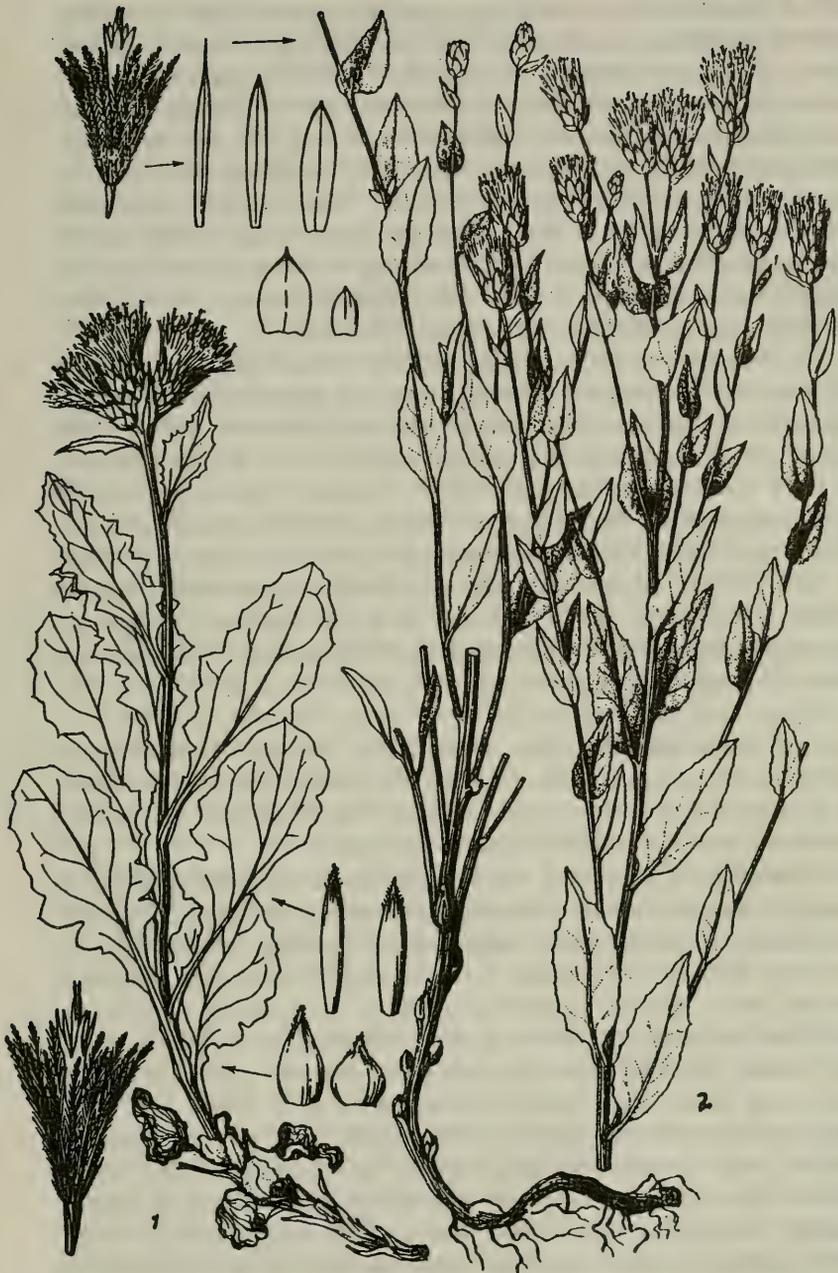
Note. This species is close to the related Himalayan species *S. obvallata* Edg. According to Karelin and Kirilov, the entire plant, especially the capitula, emits a strong odor causing vomiting.

The biological role of the bracteal leaves is not fully understood. Apparently, they protect the inflorescence from sharp temperature fluctuations and play the role of floral flags attracting pollinator insects.

Subgenus 3. Frolovia (DC.) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 370.—Genus *Frolovia* (DC.) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 461.—Sect. *Frolovia* generis *Aplotaxidis* DC. Prodr. VI (1837) 538.—Sect. *Frolovia* generis *Haplotaxidis* in Endlich. Gen. pl. (1836–1840) 468 and in Ldb. Fl. Ross. II, 2 (1845–1846) 672.—Sect. *Frolovia* (DC.) Kitam. generis *Saussureae* in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 141.—Stem fistular, tall one-headed, less often, when branched, capitula two to five. Basal leaves large, lyrate or crenate-lobed in type specimen. Capitula cupuliform, large, 3–5(6) cm wide, often drooping, on long peduncles. Involucral bracts lanceolate-linear; outer bracts more or less decurved. Florets up to 3 cm long. Receptacle densely covered with 0.8–1.5 cm long scales. Pappus one-rowed. Achenes large, usually with corona.

3. *S. frolovii* Ldb. Ic. pl. Fl. Ross. IV (1833) 16; Ldb. Fl. alt. IV (1833) 15; Kryl. Fl. Alt. III, 711; Kryl. Fl. Zap. Sib. XI, 2928.—*Aplotaxis frolovii* DC. Prodr. VI (1837) 538.—*Haplotaxis frolovii* Ldb. Fl. Ross. II, 2 (1845–1846) 672.—*Cnicus altaicus* Steph. ex DC. Prodr. VI (1837) 538 (nom. nud.).—*Frolovia lyrata* Ldb. op. cit. (1833) 17 and DC. Prodr. VI (1837) 598 (pro syn. nom. nud.).—*Frolovia ledebouriana* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 461.—Ic.: Ldb. Ic. pl. Fl. Ross. IV (1833) tab. 352.

386 Perennial. Rhizome thick; stems solitary, less often two or few, straight, 25–100 cm high and up to 1 cm wide, fistular, finely sulcate, arachnoid hairy-pubescent, in upper part, mainly below capitulum, tomentose, sometimes glabrous, usually simple, one-headed, occasionally with one branch and then two-headed, sparsely leafy or leafless. Leaves lyrate-pinnatisect, with larger triangular or ovate-triangular, acuminate (less often somewhat obtuse), almost sagittate, unevenly crenate-toothed or almost entire terminal lobe, lateral lobes gradually reduced toward base, usually runcinate; all leaves green above, with distinct midrib, petiolate, sparsely covered with short stiff hairs, grayish arachnoid hairy-woolly beneath, almost tomentose; basal leaves 4–11, long-petiolate, (10)15–50 cm long with petiole and 5–20 cm wide; cauline leaves absent or few (two or three), smaller, short-petiolate; uppermost leaf reduced, oblong-lanceolate or almost linear, entire or weakly toothed. Capitula solitary terminal, occasionally two, 3–4 cm wide, drooping. Involucre of numerous bracts; bracts lanceolate-linear, long acuminate, blackish-green on outside, pale yellow on inner side, covered with hairs and short bristles often along margin and apex, usually subglabrous; inner bracts divergent, connivent after fruiting; outer bracts decurved. Receptacle densely covered with linear, about 1 cm long, straw-yellow, lustrous scales; florets dirty reddish-violet, about 1.5 cm long, narrow



part of tube about 0.7 cm long, broad part with lobes of limb (excluding anthers) 0.6 cm long; anthers blackish-violet, basal appendages of anthers linear, pubescent. Pappus one-rowed, its bristles somewhat stiff, yellowish, long-plumose, about 1.1 cm long; achenes oblong-obovoid, mature achenes dark brown, ribbed, 6–8 mm long and 2–3 mm wide, with corona of obtuse, somewhat thick teeth. Flowering VII–VIII.

Alpine and subalpine meadows, tundra, forest meadows, coniferous forests, including larch forests.—*Soviet Central Asia*: Dzhungaria-Tarbagatai; *Western Siberia*: Irtysh (eastern part), Altai; *Eastern Siberia*: Angara-Sayans (western Sayans, Tuva Region). *General distribution*: Mongolia. Described from Altai. Type in Leningrad.

Note. According to the original diagnosis of Ledebour, in *S. frolovii* the pappus is 2-seriate and its outer bristles are deciduous; I found only a one-rowed pappus in the entire material at my disposal. This species, as also the three species close to it, namely, the two species described by M.M. Iljin from Soviet Central Asia.—*S. sulcata* Iljin and *S. asbukinii* Iljin—and the third described from Taiwan—*S. formosana* Hayata (*Jc. Pl. Formos.* VIII (1919) 69; Kitam. in *Mem. Coll. Sc. Kyoto Univ.* ser. B, XIII (1937) 142, tab. XIX, fig. 2 = *Frolovia formosana* (Hayata) Lipsch. comb. nova)—given a more detailed understanding of composite genera, can be separated with complete justification under the separate genus *Frolovia* (DC.) Lipsch.

- 387 4. *S. asbukinii* Iljin in Bot. Zhurn. SSSR, XXVII, 6 (1942) 144.—*S. frolovii* var. *procera* Herd. in O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 235.—*Frolovia asbukinii* (Iljin) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 462.

Perennial. Rhizome thick, woody, many-headed, covered with brown, more or less split remains of basal leaves; stem up to 70 cm high, with well-developed whitish pith, strongly sulcate, arachnoid hairy-pubescent, especially densely in upper part, branched slightly above base, branches simple, long, upward spreading, leafless, terminating in solitary capitulum. Leaves with petiole up to 30 cm long, up to 10 cm wide, light green, glabrous above, grayish green beneath due to arachnoid hairy more or less dense coating, lyrate, petiole up to 15 cm long, with broad midrib and weak lateral veins beneath; basal leaves numerous, half as long as stem, with large, obtuse or orbicular, terminal lobe, middle lobes oblong-oval, lower and lateral lobes similar in shape, smallest and remote; lateral lobes almost entire with occasional teeth; lower cauline leaves like basal but somewhat smaller; middle leaves on shorter petioles; upper leaves remote, small, lanceolate or linear, entire. Capitula cupuliform, 5–6 cm wide. Involucre imbricate, 5–6 cm wide and 3–4 cm long at fruiting, strongly arachnoid hairy-pubescent; involucre bracts stiff, green on outer side, lanceolate-linear, long

acuminate, cusp somewhat stiff, with one more or less distinct, weakly carinate vein; outermost bracts smaller, about 1–1.2 cm long and 1 mm wide, recurved; middle bracts about 2 cm long and 2 mm wide, erect, with only slightly divergent cusp; inner bracts straw-yellow, glossy, about 2.5–3 cm long and 2–3 cm wide, with purple, ciliate, straight apex; cilia distinct in majority of outer and middle involucrial bracts. Receptacle densely covered with narrow-linear, snow-white, about 1.5 cm long scales almost half as long as inner bracts; florets pink, numerous, about 3–3.2 cm long (including narrow part of tube and anther); narrow part of tube white, about 1.6 cm long, broad part about 0.7 cm long, lobes of limb about 0.5–0.6 cm long; appendages of anthers strongly divided, pubescent. Pappus snow-white, one-rowed, 2–2.25 cm long, its bristles somewhat unequal, long-plumose; achenes oblong-obovoid, compressed, about 7 mm long and 3 mm wide, glabrous, punctate (with blackish-brown outline) with prominent veins, and short corona above. Flowering IV–V.

On rocks and in debris.—*Soviet Central Asia*: Tien Shan (Mogoltau, Kuramin Range). Endemic. Described from Soviet Central Asia (Okur-Tau, Tadzhikistan). Type in Leningrad.

388 *Economic Importance.* These plants contain an alkaloid, which has not been studied in detail; the local people consider it poisonous.

Note. This species, closest to *S. sulcata* Iljin, has been described from only one specimen. It differs from the latter by the absence of tuberous rhizome, lyrate leaves, somewhat larger capitula, and, particularly, by achenes with a distinct corona (fringe). The material at my disposal was extremely inadequate for a conclusive decision about the independent status of the two species. It is quite possible that at a later stage *S. asbukini* Iljin will be combined with *S. sulcata* Iljin into a single species; in that case, according to priority, it should be named *S. sulcata* Iljin.

5. *S. sulcata* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III, 26 (1922) 101.—*Frolovia sulcata* (Iljin) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 462.

Perennial. Rhizome tuberous; collar covered with remains of previous year's leaves. Stem tall, 40–60 cm high, deeply sulcate, furcate (occasionally simple and then one-headed) in upper part, weakly arachnoid-hairy, almost leafless, only with isolated small leaves at base of branching. Leaves green; basal leaves numerous, ovate-triangular, 10–20 cm long, less often up to 25 cm including petiole. Petioles 5–8 cm long, less often longer; lamina with irregular wide lobes or weakly incised, in some specimens more deeply pinnatifid (var. *pinnatifida* Lipsch.), with prominent veins beneath, and midrib merging with petiole;

lamina sometimes slightly oblique at base, more or less arachnoid-hairy on both sides, predominantly so beneath; cauline leaves reduced, only at point of branching of stem, sessile, entire. Capitula solitary (two to five in specimen), terminal on floriferous branches (10–20 cm long), large, 2–2.5(3) cm wide and up to 3–3.5 cm long including florets. Involucre imbricate, bracts light green, stiff, with indistinctly carinate vein, arachnoid-hairy, ciliate, all bracts distinctly acuminate; outer bracts smaller, 0.5–1 cm long and 2 mm wide, recurved; middle and inner bracts oblong, middle about 1.5–2 cm, inner 2–2.5 cm long. Receptacle densely covered with narrow, snow-white, about 1 cm long scales almost half as long as inner involucral bracts; florets pink, 2–2.5 cm long including narrow part of tube and limb; basal appendages of anthers strongly divided, pubescent. Pappus snow-white, one-rowed, pappus bristles somewhat unequal, about 2 cm long, long-plumose; achenes about 5 mm long, roundish at apex, without corona, glabrous, glossy, olive-green, with blackish-brown pattern. Flowering V.

389 Varicolored outcrops (red clays, conglomerates).—*Soviet Central Asia*: Pamiro-Alai (Margelan District), Tien Shan (former Karavan District of the Kirgizian SSR). Endemic. Described from the Margelan Region, vicinity of the village of Kul. Type in Leningrad.

Note. In the original description, M.M. Iljin did not compare this species with any other. Genetically and morphologically, *S. sulcata* Iljin is close to *S. frolovii* Ldb., but differs by having a tuberous rhizome, branched stem, ovate-triangular, usually not very deeply divided leaves (in *S. frolovii* they are lyrate-pinnatifid), light-colored involucral bracts, of which the outer are weakly twisted (in *S. frolovii* they are blackish-green, the outer ones strongly twisted), pink, longer (2–2.5 cm long) florets (in *S. frolovii* they are dirty reddish-violet, about 1.5 cm long), smaller achene with roundish apex without corona (achenes are larger in *S. frolovii* with a distinct corona of obtuse, somewhat thick teeth). Concerning the relationship between *S. sulcata* and *S. asbukinii* Iljin, see the note to the latter.

Subgenus 4. Eriocoryne Wall. ex DC. Prodr. VI (1837) 541, p. p.; Ldb. Fl. Ross. II, 2, 673 p. p., pro sectione generis *Haplotaxidis*; Hook. f. Fl. Brit. India, III (1881) 373.—Sect. *Congestae* Clarke Comp. Ind. (1876) 221 p. max. p.—Small, densely woolly-pubescent alpine plants. Stem usually short, simple, clavate, with densely arranged leaves. Capitula rather numerous, sessile, in compact capitate inflorescence on fistular stem broadened at apex, surrounded by woolly bracteal leaves (woolly cover brownish or white). Achenes terminating with stiff corona and style base. Pappus brown or white, one- or two-rowed and then its outer bristles small.

6. *S. glacialis* Herder in Bull. Soc. Nat. Mosc. XL, 3 (1867) 144; Kryl. Fl. Zap. Sib. XI, 2928; Lipschitz in Bot. Mat. Gerb. Inst. Akad. Nauk SSSR, XVI, 443.—*S. pamirica* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1889) 171.—*S. sorocephala* auct.: Kryl. Fl. Alt. III (1904) 710 non Schrenk.—*S. (Aplotaxis) approximata* Schischk. and Serg. in Sistemat. Zam. Gerb. Tomsk Univ. 1 (1944) 2.—? *S. chthonocephala* Bornm. in Fedde, Repert. Beih. CVIII, 1 (1938) 59.

Perennial. Rhizome long, branched, usually many-headed, spreading between stones and debris, densely covered with brown remains of previous year's leaves; caudices issuing short, 1.5–6 cm long, solitary, erect, flattened, densely leafy floriferous shoots; some caudices terminating in rosettes of leaves. Leaves oblong or lobate, but 1.5–4 cm long and 0.4–1 cm wide, somewhat obtuse, entire or, especially in upper part, erose-toothed (teeth somewhat obtuse), variable in color, green, or grayish-green due to pubescence, often reddish-violet; basal and lower cauline leaves somewhat narrowed toward base in short petiole; middle leaves like basal; upper leaves approximate, reduced, subtending capitate inflorescence; all leaves, especially those surrounding inflorescence, woolly-villous above due to thick pubescence of long white hairs; lower surface less hairy (predominantly in the Soviet Central Asian specimens) or even subglabrous (in the Altai specimens). Capitula 0.7–1 cm wide, 10–20 or more, aggregated at stem apex in almost capitate inflorescence, subtended by upper bracteal leaves. Involucral bracts equal, membranous; outer bracts oblong-ovate or oblong, subacute, colored (reddish-violet) throughout, especially strongly in upper half, villous due to dense, white, long, entangled hairs; inner bracts lanceolate, reddish-violet, lustrous, acuminate, often toothed in upper half along margin and at apex, appressed-pubescent (hairs white). Receptacle covered with short scales or almost glabrous, florets pink, purple when dry, about 1–1.2 cm long; narrow part of tube about 0.6 cm long, broad part 0.6 cm long including lobes of limb; anthers whitish, with linear hairy at apex basal appendages. Outer pappus bristles isolated, serrate, shedding, about 2 mm long, inner bristles long-plumose, slightly hard at base, connate into ring; white, only in lower part sometimes brownish-violet, about 1–1.1 cm long. Achenes oblong-cylindrical, about 0.5 cm long, glabrous, smooth. Flowering VII–VIII.

Stony scree, gravelly slopes, pebbles and sands in river beds in alpine zone.—*Western Siberia*: Altai; *Soviet Central Asia*: Pamiro-Alai, Tien Shan, Dzhungaria-Tarbagatai (Saur, Mustau Range). *General distribution*: Indo-Himalayas (?), Dzhungaria-Kashgaria. *S. glacialis* was described from the Saryjas Glacier in Tien Shan, and *S. pamirica* from Pamir. Type in Leningrad.

Note. *S. chthonocephala* Bornm., described by Bornmüller from northwestern India (Chitral), as is evident from the diagnosis and diagram,

should be included among the synonyms of *S. glacialis*; I did not see Bornmüller's type specimen of this species.

7. ***S. gnaphalodes*** (Royle) Sch. Bip. ex Klatt in Nova Acta Acad. Leopold.-Carol. Nat. Curios. XLI, pars II, 6 (1880) 406; O. and B. Fedtsch. Perech. Rast. Turk. IV, 236; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 442.—*S. gnaphalodes* (Royle) Ostenfeld in Hedin Southern Tibet, VI, 3 (1922) 33.—*Aplotaxis gnaphalodes* Royle, Ill. Bot. Himal. II (1839) 251 and DC. Prodr. VI (1837) 542.—*Aplotaxis sorocephala* Schrenk, Enum. pl. nov. I (1841) 43.—*Saussurea sorocephala* Schrenk, Enum. pl. nov. II (1842) 38.—*Haplotaxis sorocephala* Schrenk in Ldb. Fl. Ross. II, 2 (1845–1846) 673.—*Saussurea sorocephala* Hook. f. and Thoms. in Clarke, Comp. Ind. (1876) 226; Hook. f. Fl. Brit. India, III, 377.—**lc.**: Royle, Ill. Bot. Himal. II (1839) t. 59, f. 1; Blatter, Beautiful Flowers of Kashmir, I (1927) t. 33; Pampanini, R. La. Fl. del Caracorum in Spedizione Ital. de Filippi nell Himalaia, Caracorum etc. (1913), ser. II, v. X (1930), tab. VII, fig. 2 (nigra).

391 Perennial. Rhizome brown, spreading among stones, many-headed, caudices densely covered with brownish remains of old leaves; some caudices terminating in leaf rosettes, most producing single, floriferous, erect, miniature (1.5–6 cm long), very densely leafy stem terminating in capitate inflorescence of numerous sessile capitula, enclosed by densely brownish-woolly bracteal leaves. Leaves white-tomentose on both sides, oblong or lobate, 2–4 cm long and 0.3–1 cm wide, obtuse or subobtuse, toothed (mainly in upper part of leaf; teeth roundish) or entire; basal leaves short-petiolate; middle cauline leaves like basal; bracteal leaves approximate, sessile, not narrowed at base, enclosing capitate inflorescence. Involucre 0.7–1 cm wide; bracts equal in length, outer oblong or oblong-ovate, subacute throughout, more strongly in upper part, densely villous with reddish-brown or white hairs; inner bracts lanceolate, membranous, lustrous, acuminate, often weakly toothed, reddish brown-woolly; receptacle covered with short, linear-subulate, lustrous scales; florets pink, about 0.9–1 cm long, narrow part of tube about 0.4 cm long, broad part including limb about 0.5 cm long; anthers whitish, basal appendages of anthers densely ciliate. Pappus colored (brownish-red), outer pappus-bristles less numerous or solitary, scarcely noticeable, shedding, about 3 mm long, inner ones 12–14, long-plumose, about 1 cm long, almost as long as corolla; achenes oblong-cylindrical, about 0.5 cm long, smooth. Flowering VII–VIII.

Stony screens, gravelly slopes, pebbles, moraines, shale rock in alpine zone.—*Soviet Central Asia*: Pamiro-Alai (Alai Range, Pamir, Shugnan, including Trans-Ili Alatau), Tien Shan, Dzhungaria-Tarbagatai (Dzhungaria-Alatau). *General distribution*: Indo-Himalayas, Dzhungaria-

Kashgaria, Tibet, China (Szechuan). *S. sorocephala* Schrenk was described from the Dzhungarian Alatau; type specimen in Leningrad; *S. gnaphalodes* (Royle) Sch. Bip. was described from the Himalayas; type in Kew; isotypes in Leningrad and Geneva.

Note. This plant was first described by Schrenk as *Aplotaxis*, and later he included it in the genus *Saussurea*. This combination (*S. sorocephala* Schrenk) remained unknown to English authors (Hooker, Thomson, Clarke), and therefore, they wrongly and illegitimately proposed the combination *S. sorocephala* Hook. f. and Thoms. *S. sorocephala* Schrenk is identical with the earlier described *Aplotaxis gnaphalodes* and, therefore, should be called *Saussurea gnaphalodes* (Royle) Sch. Bip. Ostenfeld did not know of the existence of this combination, which was left out of "*Index Kewensis*"; therefore, he proposed the same name (*S. gnaphalodes* (Royle) Ostenfeld) again.

392 *Subgenus 5. Saussurea*—Subgenus *Eusaussurea* Hook. f. Fl. Brit. India, III (1881) 365.—Glabrous or pubescent, sometimes villous or woolly herbs. Stems solitary or several, usually distinctly developed, simple or branched, less often almost completely reduced, and then plants without stem. Leaves rather variable in shape and size of lamina and its base (entire, crenate-toothed, pinnatifid or pinnatifid, etc.), decurrent on stem forming wing or nondecurrent; basal leaves often withering by the time of blooming. Capitula sessile or pedunculate, solitary, less numerous or numerous; in latter case, capitula arranged in compact or lax corymbs, in turn often forming paniculate inflorescence. Involucre cylindrical, ovoid, globose, hemispherical, etc.; bracts obtuse or acute, with straight or recurved cusp, many-rowed, unequal and then imbricate, less often equal or almost equal; in some groups of species, outer bracts herbaceous, in others with apical, colored appendages; appendages herbaceous, saber-shaped, straight or recurved. Receptacle of various types: 1) scaly with unequal; 2) papillate; or 3) glabrous, without scales. Achenes truncate or with short corona, bearing outer pappus bristles, if present. Pappus one or two-rowed, outer bristles, if present, serrate or finely plumose, stiffer and shorter, usually fragile, inner bristles long-plumose, with thickened bases connate into entirely shedding ring.

Section 1. Pycnocephala Lipsch. in Bot. Mat. Gerb. Inst. Akad. Nauk SSSR, XVI (1954) 447; Ej. op. cit. XXI (1961) 370.—*Lagurostemon* Cass. Dict. sc. nat. LIII (1828) 466 p. p.; Wydl. in Linnaea, V, 425; DC. Prodr. VI, 532 p.p. saltem §* excl. *S. taraxacifolia*; Less. Synops. Compos. (1832) 11.—Sect. *Strictae* Clarke, Comp. Ind. (1876) 222 p. p. saltem §b.—Sect. *Caulescentes* Hook. f. Fl. Brit. India, III (1881) 371, saltem §*** p. min. p.—Rhizome and root not divided in fibers along their length. Capitula large 1.5–2.5(3) cm wide, in racemes

or corymbose-paniculate inflorescence, sometimes solitary. Involucral bracts wide, almost equal. Receptacle covered with cartilaginous yellow papillae, often connate almost up to apex, or covered with somewhat long, linear-subulate, white, lustrous scales. Basal appendages of anthers woolly. Pappus two-rowed.

Series 1. Baicalenses Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 370.—Stem fistular. Inflorescence racemose, less often capitula solitary. Leaves lanceolate, oblong or oblong-ovate. Receptacle covered with cartilaginous yellow papillae, sometimes connate almost up to apex.

393 Besides *S. baicalensis* (Adams) Robinson, which is found in the USSR, this series includes two more species: *S. dorogostaiskii* Palibin (Mongolia) and *S. calobotrys* Diels (China).

8. *S. baicalensis* (Adams) Robinson in Proc. Amer. Acad. XLVII (1911) 216; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 446; Popov, Fl. Sr. Sib. II, 764.—*Liatris baicalensis* Adams in Mém. Soc. Nat. Mosc. V (1811) 115.—*Saussurea pycnocephala* Ldb. Ic. pl. Fl. Ross. I (1829) 15; Ej. Fl. alt. IV, 14 p. max. p.; Ej. Fl. Ross. II, 2, 661 p. max. p.; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 7, saltem *α. genuina* Herd.; Kryl. Fl. Zap. Sib. XI, 2907.—*Saussurea pycnocephala α. papillosa* Kryl. Fl. Alt. III (1904) 702.—*Saussurea liatroides* Fisch. in DC. Prodr. VI (1837) 532; Turcz. Fl. baic.-dahur. II, 1, 104.—*Lagrostemon liatroides* Fisch. ex Wydl. in Linnaea, V, 3 (1830) 427.—*Serratula liatroides* Adams ex Wydl. op. cit. (1830) 427; DC. op. cit. (1837) 532.—*Carphephorus baicalensis* DC. op. cit. (1836) 132.—*lc.*: Ldb. op. cit. (1829) tab. 59; Popov, op. cit. Plate 89, Fig. 2.

Perennial. Root collar densely covered with brownish, often fibrously split remains of old petioles. Stem fistular, straight, solitary, less often few, 15–60 cm long and 0.5–1 cm wide, ribbed, often flattened and colored, usually glabrous below, pubescent in middle and especially upper part with glandular as well as simple, long, white hairs. Leaves lanceolate, oblong or oblong-ovate, long acuminate, serrate-toothed, teeth cartilaginous at apex; all leaves covered, especially above and along margin, with fine, somewhat stiff, glandular hairs besides sparse white tomentum, more strongly tomentose along margin and on upper leaves; lower leaves numerous, 6–25 cm long and 1–3 cm wide, short-petiolate, strongly broadened at base and enclosing stem; veins on lower surface reaching 5 mm in width and extended in petiole; middle and upper cauline leaves sessile, not decurrent or weakly decurrent over stem, reduced and narrower. Capitula 1.5–3 cm wide, less often solitary, often numerous (4–15), on short peduncles, exerted from axils of small upper leaves, forming racemose inflorescence at stem apex; less often capitula

aggregated at apex in dense, almost corymbose inflorescence; peduncles and bracts, often subtending lower capitula, densely covered with somewhat thick glandular hairs. Involucre white-woolly or almost glabrous; all involucre bracts almost equal, outer resembling bracteal leaves, ovate-lanceolate or lanceolate, long acuminate, dark colored (blackish-violet), with less numerous glandular hairs; inner bracts narrower, glabrous in lower half, usually with numerous, short glandular hairs in upper half, often with simple long hairs at apex. Receptacle covered with short, yellowish, cartilaginous papillae, often connate almost up to apex; florets dirty violet, about 1.5 cm long; narrow part of tube about 0.8 cm long; broad part about 0.7 cm long including lobes of limbs; basal appendages of anthers flocculose-woolly. Pappus double, outer bristles serrate, small, 0.1–0.2 cm long, usually persistent, inner ones long-plumose, about 1–1.2 cm long; achenes glabrous, weakly glossy, ribbed; mature achenes black or olive-green, with poorly developed corona at apex. Flowering VII–VIII.

Moss-lichen covered tundras, gravelly and stony slopes in alpine belt, open larch forests near the forest limit, less often subalpine meadows.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayans; Dauria (southwestern). *General distribution*: Mongolia. Described from the Baikal Region (*Liatris baicalensis*) and Altai (*S. pycnocephala*); types in Leningrad.

Note. Ledebour (*Fl. Ross.* II, 661) and a series of later authors wrongly reported *S. baicalensis* for Soviet Central Asia. Specimens from Soviet Central Asia distributed as this species belong to *S. sordida* Kar. and Kir. It hybridizes with *S. schanginiana* (Wydł.) Fisch. The hybrids were described as var. *heteromorpha* (Turcz.) Lipsch. of the latter species (see note to *S. schanginiana*). On the other hand, it undoubtedly is very close to *S. krylovii*. Thus, some specimens (Baikal—Berguzin, Shtubendorf; Altai—Elo, Bunge; Altai—upper reaches of Yustyd, Vereshchagin) are completely the same as *S. baicalensis*, in habit, leaf shape, and inflorescence, but their receptacle is similar to that of *S. krylovii*, i.e., distinctly scaly.

9. *S. dorogostaiskii* Palibin in Zhurn. Russk. Bot. Obshch. XIII, 1–2 (1928) 109; Lipschitz in Bot. Mat. Gerb. Bot. Inst. XVI, 448.—*lc.*: Palibin op. cit. (1928) 110.

Perennial. Plants up to 1 m high; root collar densely covered with fibrous remains of previous year's leaves. Stem fistular, robust in type specimen, about 1.5–2 cm wide in middle and below, ribbed, more or less densely pubescent with long white hairs; subsequently often almost turning bare, usually densely leafy. Leaves oblong-ovate, hard, frequently

[sic]; recte *pycnocephala*—Sci. Ed.

and more or less deeply crenate-toothed, teeth cartilaginous, lamina scabrous on both sides, especially along margin, due to more or less numerous spinules; basal and lowermost cauline leaves large, obtusely acuminate, decurrent in broad-winged petiole; midrib straw-yellow beneath, usually very broad, up to 1–1.5 cm wide, merging into petiole; upper cauline leaves sessile, not decurrent or somewhat decurrent, somewhat amplexicaul. Capitula numerous, large, on thick pubescent peduncles, in dense racemose inflorescence, reaching 5–8 cm in width. Involucre densely white-lanate, up to 3.5 cm wide, bracts almost equal, outer ovate-lanceolate or lanceolate, dark-colored, long acuminate, glandular-hairy, spinose along margin, inner narrower. Receptacle covered with short, cartilaginous, yellowish papillae, often connate almost up to apex; florets dirty-brown, about 1.5–1.6 cm long; narrow part of tube about 0.8–0.9 cm long, broad part including lobes of limbs about 0.6–0.7 cm long; basal appendages of anthers woolly. Pappus double, outer pappus bristles serrate-scabrous, unequal, up to 3 mm long, persistent, inner ones long-plumose, about 1–1.1 cm long; achenes glabrous, ribbed, somewhat curved, blackish-brown, with poorly developed corona at apex. Flowering VII–VIII.

Gravelly and stony slopes, screes, alpine meadows. Not yet found in the USSR; however, it may be found in future as it grows in the bordering areas of Mongolia. *General distribution*: Mongolia. Endemic. Described from Mongolia; type in Leningrad.

Note. In the original diagnosis and description of the species in Russian, I.V. Palibin made several mistakes: 1) the pappus in *S. dorogostaiskii* Palibin is not one-rowed, but two-rowed; 2) the achenes are blackish when mature, not differing from *S. baicalensis*; and 3) the receptacle is not glabrous but covered with cartilaginous papillae. In a number of specimens, the characteristic features: 1) plant height; 2) width and density of racemose inflorescence; 3) width of vein in the petiole; 4) diameter of stem; 5) woolly-tomentose pubescence of involucre; and 6) blunt taper of leaf apex—are transitional to *S. baicalensis*. Possibly, these are hybrids between the two species; additional observations in nature are needed.

Series 2. Interpositae Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 370.—Capitula (two) three or four, densely arranged at stem apex, or more (5–11), in racemose, inflorescence, less often solitary. Leaves narrow-lanceolate, with distinct remote teeth. Receptacle covered with scales.

Type of series: *S. krylovii* Schischk. and Serg.

This series connects the series *Baicalenesis* with *Pygmaeae* (see below). The only species of this series (*S. krylovii*) and the forms close to it are undoubtedly of hybrid origin. In my view, the characters of *S.*

krylovii are quite persistent and stable in typical specimens, and, therefore, it should be considered as a separate species. It is quite probable that it is a result of ancient hybridization between *S. baicalensis* and *S. schanginiana*, subsequently fixed for selection. In that case, *S. krylovii* inherited the multiple capitula, a tendency for forming racemes, and the leaf shape and dentation from *S. baicalensis*, and the scaly receptacle from *S. schanginiana*. In the "spectrum of segregation" *S. krylovii*, like any population of hybrid origin, produces forms closer to one of the parents, i.e., closer to *S. schanginiana* (see below, especially var. *heteromorpha* (Turcz.) Lipsch.), or *S. baicalensis*.

- 396 10. *S. krylovii* Schischk. and Serg. in Sistemat. Zam. Gerb. Tomsk. Univ. 1 (1944) 1; Kryl. Fl. Zap. Sib. XI, 2908.—*S. pycnocephala* Ldb. β . *paleata* Kryl. Fl. Alt. III (1904) 702.—*S. pycnocephala* Ldb. Fl. alt. IV (1833) 14 ex min. p.; Ej. Fl. Ross. II, 2, 661 ex min. p.—*S. pygmaea* Spr. γ . *heteromorpha* quoad pl. Song. a cl. Kar. leg.; sched. in herb. Inst. Bot. Acad. Sc. URSS.

Perennial. Root collar densely covered with brown, somewhat fibrous remains of petioles. Stems (10)15–50 cm high, straight, green or red, ribbed, thinly covered with long white hairs together with somewhat thick glandular hairs, often glabrescent. Leaves narrow-lanceolate to lanceolate-linear, long acuminate, distinctly serrate-toothed, teeth remote, straight or weakly falcate; basal and lower cauline leaves narrow and long, petiole, thickened at base, 10–20 cm long with petiole and (0.6)1–1.2(1.5) cm wide; middle and upper cauline leaves equal in width, sessile, not decurrent or weakly decurrent; all leaves scabrous on both sides, as well as along margin due to small cilia. Capitula (two) three or four, densely arranged at stem apex, or more (5–11) in racemose inflorescence, and then lower capitula remote on 1–4 cm long peduncles, less often solitary. Involucre 1–2 cm wide; outer bracts shorter than middle and inner in type specimen, less often almost as long, oblong-ovate or ovate-lanceolate, dark colored (blackish-violet), sparsely pubescent with long white hairs and scattered glandular hairs; inner bracts lanceolate, long acuminate, straw-yellow in lower part, lustrous, dark colored above and similar to outer bracts. Florets dirty violet, about 1.3–1.4 cm long; narrow part of tube about 0.7–0.8 cm long, its broad part including lobes of limb about 0.5–0.6 cm long; basal appendages of anthers woolly-barbate. Receptacle densely covered with linear-subulate, white, lustrous, about 0.5 cm long scales; pappus double, outer pappus-bristles serrate-scabrous, about 0.1–0.2 cm long, persistent, inner ones long-plumose, about 1–1.1 cm long. Achenes 0.5–0.7 cm long, reddish-brown or dark brown. Flowering VII–VIII.

Gravelly slopes, mountain plateaus, forest edges, meadows in lower part of the alpine belt and upper forest zone.—*Western Siberia*: Altai;

Soviet Central Asia: Dzhungaria-Tarbagatai. Described from Altai ("between the valley of the Kalgutta River and the pass to Ak-kol River"). Type in Tomsk; isotype in Leningrad.

Note. This species is close to *S. baicalensis* (Adams) Robinson, from which it can be distinguished immediately by the presence of linear-subulate receptacular scales. Ideas on the origin of *S. krylovii* are discussed in the note to the description of series *Interpositae*. It differs from *S. sordida* Kar. and Kir. by having racemose inflorescences, narrower, apically attenuated, lanceolate or linear-lanceolate leaves, and more remotely toothed leaf margins. The specimens of Karelin and Kirilov, which are cited in the literature under the name *S. pygmaea* γ . *heteromorpha* (Herd. in *Bull. Soc. Nat. Mosc.*, XLI, 3 (1868) 5 p. p. saltem quoad pl. Kar. and Kir.) also belong to *S. krylovii* Schischk. and Serg. Unquestionably the latter specimens approach *S. krylovii*, whereas the Sayan and Baikal specimens approach *S. schanginiana* (cf. note to *S. schanginiana*).

Series 3. Pygmaeae Lipsch. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XXI (1961) 370.—Stem one-headed. Leaves narrow-linear, entire, less often with isolated teeth along margin. Receptacle with shorter scales (sometimes absent, for example, in *S. leucophylla* Schrenk). Plants forming small turf.

Note. Besides the indigenous species *S. schanginiana* (Wyd.) Fisch. and *S. leucophylla* Schrenk, this series also includes species found outside the Soviet Union: *S. pygmaea* Spr. (Alps of Western Europe), *S. graminifolia* Wall. (Himalayas), *S. brunneopilosa* Hand.-Mazz. (China, Kansu), *S. eopygmaea* Hand.-Mazz. (Tibet). Apparently, the following species known to me only from their descriptions should also be included under this series: *S. graminea* Dunn. (= *S. poophylla* Diels, according to Handel-Mazzeti) (Tibet), *S. lanicaulis* Hand.-Mazz. (Szechuan, Yunnan) and others.

11. *S. schanginiana* (Wyd.) Fisch. ex Herd. in *Bull. Soc. Nat. Mosc.* XLI, 3 (1868) 5; Kryl. *Fl. Zap. Sib.* XI, 2906.—*Lagurostemon pygmaeum* β^* . *schanginianum* Wyd. in *Linnaea*, V (1830) 427.—*Heterotrichum schanginii* MB. ex DC. *Prodr.* VI (1837) 532; Herd. op. cit. (1868) 5.—*Saussurea pygmaea* β . *schanginii* DC. *Prodr.* VI (1837) 532.—*S. pygmaea* auct.: Ldb. *Ic. pl. Fl. Ross.* I (1829) 15; Ej. *Fl. alt.* IV, 14; Ej. *Fl. Ross.* II, 2, 660 excl. β . *leptophylla*, non Spr.—*S. pygmaea* α . *communis* Turcz. *Fl. baic.-dahur.* II, 1 (1856) 105.—*S. pygmaea* α . *typica* Kryl. *Fl. Alt.* III (1904) 701.—*S. pygmaea* β . *sibirica* Herd. op. cit. (1868) 5.

Perennial. Stem 4–30 cm high, solitary or few, forming small turf with rosettes of basal leaves; stem usually dark-colored (violet or brown),

more or less villous or pubescent, less often subglabrous, leafy, sometimes quite densely (var. *polyphylla* (Schrenk) Lipsch.), basally covered with shining brownish sheaths of basal leaves of previous year. Leaves linear, 4–20 cm long and 1.5–5(10) cm wide; lower leaves somewhat broader in middle, entire, less often with occasional, scarcely noticeable, scattered teeth along margin (f. *dentifolia* Lipsch.), flat or convolute, subglabrous or slightly villous; cauline leaves scarcely broadened at base, weakly amplexicaul. Capitula solitary, occasionally two to five, terminal, up to 3 cm long with florets and (1.5)2–3 cm wide; upper cauline leaves subtending capitulum usually shorter than capitulum. Involucre more or less pubescent or villous, less often subglabrous, bracts almost equal, dark colored (brownish-black), acuminate; outer bracts wider, ovate or lanceolate; inner bracts narrower, linear-lanceolate or almost linear, straw-yellow in lower part (covered with outer involucre bracts), glossy. Receptacle covered with linear-subulate, lustrous, about 0.3–0.5 cm long scales; florets violet-lilac, about 1.4–1.5 cm long, narrow part of corolla tube about 0.7–0.8 cm long, broad part about 0.6–0.7 cm long including lobes of limb; anthers about 0.6 cm long; basal appendages of anthers woolly. Pappus smoky, double, outer pappus-bristles serrate, unequal, up to 2–4 mm long, inner ones plumose, about 1 cm long; achenes glabrous, about 0.6 cm long, with short corona at apex. Flowering VII–VIII.

Moss-lichen covered and gravelly tundras, scree and rocks, less often alpine meadows in the alpine zone, also near the upper limit of cedar and larch forests.—*Soviet Central Asia*: Tien Shan, Dzhungaria-Tarbagatai; *Western Siberia*: Irtysh (eastern high-mountain part), Altai; *Eastern Siberia*: Angara-Sayans (Sayans, Tuva [Autonomous] Republic, southern part of Irkutsk), Yenisei, Dauria (eastern), Lena-Kolyma, Anadyr. *General distribution*: Mongolia. Described from Altai (“on shales in the Kumid Mountains,” Shagin). Type in Leningrad.

Note. The authentic sheet has three labels: the first, written in the hand of F.B. Fischer with the label “Schanginiana m”, the second, in Russian, “in Kumid bald peaks on shales,” and the third, in Latin, “in alpinus, praesertim corgonensibus,” and, in a different hand-writing below, “D. Schagin.” The third label corresponds to the citation of the location reported by Wydler (*Linnaea*, V, 1830, 427). This species varies in stem length, nature of leafiness, form, and width of leaves, and number of capitula. These are more clearly demarcated variations.

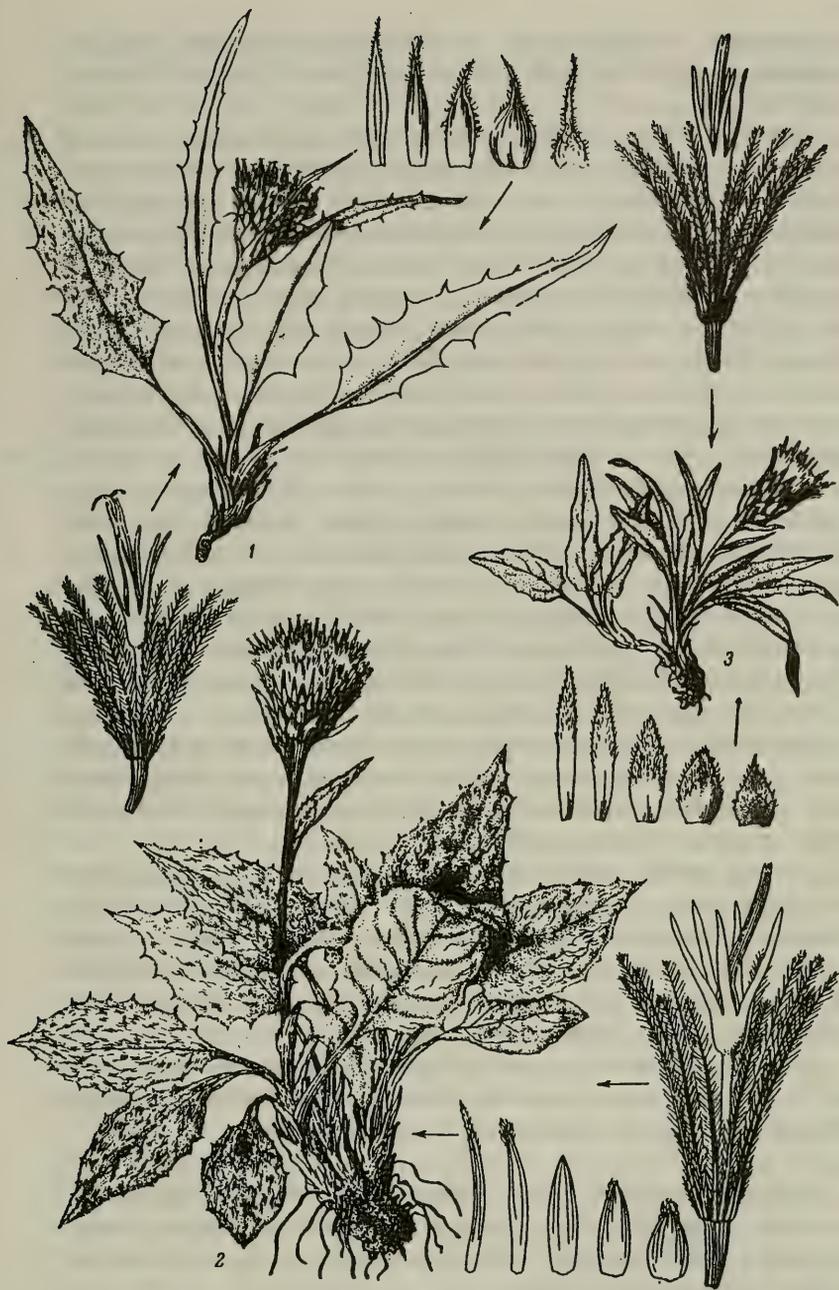
1. *Saussurea schanginiana* var. *polyphylla* (Schrenk) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 371.—*S. pygmaea* β . *polyphylla* Schrenk Enum. pl. nov. II (1842) 35.—*S. polyphylla* Schrenk ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 5.—*S. pygmaea* γ . *polyphylla* Turcz. seu Turczaninowiana Herd. op. cit. (1868) 5.—The type specimen originated from the Chocondo Alps. The plant has a

simple, short (5–10 cm long), densely leafy, villous, unicapitulate stem, linear-filiform, narrow, sparsely villous convolute leaves, upper leaves more or less enclosing capitulum (shorter than capitulum), and villous involucre bracts. This variety is found together with typical *S. schanginiana* sporadically in the Tuva Republic, on the Vitim Plateau, Chocondo bald peaks, Gargan Pass of the Turkin Region and in some other places.

Some specimens deviate from typical *S. schanginiana* (Wydł.) Fisch. and are undoubtedly the result of hybridization with *S. baicalensis* (Adams) Robinson. These specimens were described as var. *heteromorpha* by N.S. Turczaninow.

2. *S. schanginiana* var. *heteromorpha* (Turcz.) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 371.—*S. pygmaea* γ.
 399 *heteromorpha* Turcz. Fl. baic.-dahur. II, 1 (1865) 105.—*S. schanginiana* (Wydł.) Fisch. var. *heteromorpha* Turcz. in Popov. Fl. Sr. Sib. II (1959) 764.—Stem 20–30 cm high, usually more or less branched, sparsely villous, one to five-headed; capitula in somewhat compact paniculate inflorescence. Basal leaves linear or linear-lanceolate, usually with rather broad midrib beneath, continued in broad petiole, weakly convolute, entire or somewhat toothed, teeth often with cartilaginous cusp; cauline leaves less numerous, usually linear, entire; uppermost leaves not enclosing capitulum. Involucre bracts dark-colored, villous. This variety was described from the Oka River (in eastern Sayans). To it besides the type, belong specimens from the vicinity of the Arashan Health Resort (Tulkin Region, Buryat Republic), the village of Goloustnyi on the shores of Baikal, the Munku-Arдыk Alps, the Minusinsk Region (Saksar and Byshtakh Mountains), and Yakutia. Var. *heteromorpha* is also quite close to *S. krylovii* Schischk. and Serg. (Cf. the description and note of the latter), a species undoubtedly of hybrid origin, but differing from typical *S. krylovii* by having narrower, weakly crenate-toothed or entire leaves and a more compact inflorescence of fewer capitula. It differs from typical *S. schanginiana* by more robust growth, usually wider, often slightly crenate-toothed leaves, and a mostly branched stem and few capitula, often in a compact terminal inflorescence. In its multi-headedness, var. *heteromorpha* resembles somewhat *S. baicalensis*; however, the latter clearly differs by the presence on the receptacle of cartilaginous yellow papillae and by wider leaves. As in all hybrid forms, many of these characters are quite unstable in var. *heteromorpha* and strongly lean to one or the other parent.

12. *S. leucophylla* Schrenk in Bull. sc. Acad. Sc. Pétersb. X, 23 (1842) 354; Enum. pl. nov. II (1842) 35; Kryl. Fl. Zap. Sib. XI, 2907.—



S. pygmaea β. *leucophylla* Ldb. Fl. Ross. II, 2 (1845–1846) 660.—*S. pygmaea* var. *juldusica* Winkl. in O. and B. Fedtsch. Consp. Fl. Turkest. IV (1911) 228.

Perennial. Plants caespitose; root brownish, many-headed, producing more or less numerous stems and rosettes of basal leaves. Stem prostrate or often upright, simple (not at all branched), 2.5–12 cm long, one-headed, densely white-woolly, covered at base with brown, oblong-lanceolate, decorative yellow scales—remains of dead leaves. Leaves of vegetative branches oblong, usually exceeding stem, (4)6–14 cm long and 1–2(4) mm wide, linear, entire, obtuse, convolute, somewhat attenuate basally into scaly, brownish, glabrous, persistent sheath; cauline leaves four to seven, remote, like basal, but shorter, wider at base, somewhat decurrent, densely white-tomentose up to base on both sides; uppermost leaves crowded below capitulum, as long as or slightly exceeding capitulum. Capitula solitary, up to 2.5 cm long including florets and up to 3 cm wide, densely villous. Involucre, like stem, somewhat or not at all colored; outer involucral bracts herbaceous, remote, sometimes squarrose, with broadly ovate-triangular base; inner bracts narrower, lanceolate or linear, straw-yellow in lower part. Receptacle with white, linear-subulate, lustrous, about 3–5 mm long bristles; florets reddish-lilac, about 1.4–1.5 cm long, narrow part of tube 0.7–0.8 cm long, wider, including lobes of limb about 0.7 cm long; basal appendages of anthers woolly. Pappus double, outer pappus bristles serrate, less numerous, unequal, about 3 mm long, inner ones plumose, about 1.2 cm long; achenes about 0.5 cm long, glabrous, with narrow margin at apex. Flowering VII–VIII.

Gravelly tundra, screes, rocks, clayey deposits, alpine meadows in the alpine zone.—*Soviet Central Asia*: Pamiro-Alai, Tien Shan, Dzhungaria-Tarbagatai; *Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayans (Tuva Republic). *General distribution*: Dzhungaria-Kashgaria, Mongolia (western). Described from the Dzhabyk Range in the Dzhungarian Alatau. Type in Leningrad.

Note. By growth habit it can be divided in two forms: almost stemless (f. *subacaulis* Lipsch.) and with distinct stem (f. *caulescens* Lipsch.), with a whole range of intermediate forms between them.

Series 4. Sordidae Lipsch.—Inflorescence corymbose-paniculate, sometimes capitula solitary. Leaves broadly lanceolate or ovate-lanceolate, 2.5–7 cm wide, with approximate teeth along margin. Receptacle covered with scales.

13. *S. sordida* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 389; Ldb. Fl. Ross. II, 2, 661; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 448.—*S. pycnocephala* Ldb. β. *sordida* (Kar.

and Kir.) Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 7.—*S. pycnocephala* auct. fl. turk. non Ldb.—*S. russowii* Winkl. in Catal. sem. Horti Bot. Petropol. (1883) 41; Ej. in Acta Horti Petropol. IX, 2 (1886) 423.—*S. sordida* var. *russowii* (Winkl.) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 449.—*S. serawschanica* B. Fedtsch. in Consp. Fl. Turkest. IV (1911) 229.

402 Perennial. Root collar covered over a larger part with fibrously split remains of previous year's leaves. Stem 20–100 cm high, erect, simple or branched, weakly or strongly hard-fibrous and then rough, usually villous in upper and lower parts, sometimes almost glabrous, with sparse, long, white hairs. Leaves 2–7 cm wide, broadly lanceolate, ovate or oblong-ovate, acuminate, sparsely pubescent above, scabrous due to spinules, hispid beneath, especially along veins and margin, less often almost glabrous; all leaves with prominent midrib, serrate-toothed, teeth approximate, cartilaginous at apex; basal and lowermost cauline leaves reaching 20–35 cm in length, petiolate, petioles winged, hispid in large specimens, sheathing at base; midrib somewhat broadened and attenuate into petiole; middle cauline leaves sessile, decurrent; upper leaves reduced. Capitula up to 2–2.5 cm wide, usually numerous, more or less long-pedunculate in corymbose-paniculate inflorescence, less often solitary or few (three), almost sessile (var. *oligocephala* Winkl. ex Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 371). Involucre subglabrous or more or less pubescent with white stiff hairs; bracts appressed, lanceolate or ovate-lanceolate, acuminate, often spinulose along margin, usually blackish-brown, less often green; outer bracts almost as long as inner or shorter. Florets many, dirty pink-violet, about 1.4–1.5 cm long; narrow part of tube about 0.8 cm long, broad part including lobes of limb about 0.6 cm long; basal appendages of anthers woolly; receptacle densely covered with linear-subulate, lustrous, about 0.5–0.7 cm long scales almost half as long as inner bracts. Pappus double, outer bristles fragile, toothed-scabrous, unequal, about 1–4 mm long, inner ones long-plumose, about 1–1.1 cm long; achenes glabrous, mature achenes about 0.6 cm long, dark brown, with narrow corona at apex. Flowering VII–VIII.

Subalpine and alpine meadows, meadow-covered glades in forests, rocks and screes.—*Soviet Central Asia*: Pamiro-Alai, Tien Shan, Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria? (mountainous part). Described from Dzhungarian Alatau; *S. russowii* Winkl.—From the Borborogussun River (Xinjiang, toward east of Sayram-Nor); *S. serawschanica* B. Fedtsch.—From the Zeravshan River; type specimens of all these "species" in Leningrad.

Note. An apparently polymorphic species, variable in the following characters: 1) stem height; 2) shape and width of leaves; 3) degree and nature of pubescence; 4) roughness of stem surface; 5) number of capitula

in the inflorescence; 6) presence or absence of peduncles; 7) nature of pubescence of involucre (almost glabrous or densely pubescent); 8) length of receptacular scales and their ratio to the length of inner involucral bracts; and 9) ratio of the length of outer and inner involucral bracts. Consequently, some extreme forms of *S. sordida* have been incorrectly described as separate species. These include *S. russowii* Winkl. and *S. serawschanica* B. Fedtsch. K.U. Winkler tried to distinguish *S. russowii* Winkl. from the species of Karelin and Kirilov by the following characters: 1) greater height (up to 1 m) and larger size of all plant organs; 2) unequal involucral bracts, i.e., outer bracts considerably shorter than inner ones (for *S. sordida* Winkler indicated that they are almost equal); 3) receptacular scales one-third as long as the inner involucral bracts (according to Winkler, in *S. sordida* they are half as long as the inner bracts); and 4) densely hispid stem and petioles. All these characters are unstable and result in the full range of transitions to *S. sordida*; these characters are also not constant in the type material of *S. russowii*. Accordingly, I cannot accept the independent status of *S. russowii* Winkl. and include it under the robust forms of *S. sordida* (*S. sordida* Kar. and Kir. var. *russowii* (Winkl.) Lipsch. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XVI (1954) 449). *S. serawschanica* B. Fedtsch., described from Zeravshan by B.A. Fedtschenko, compares not with *S. sordida* but only with *S. russowii*. The specimens from Zeravshan, at first glance, appear to have thinner, wider, ovate leaves in comparison with the type specimens of *S. sordida*, and are characterized by lesser pubescence on the stem. However, after a careful comparison of them with large collections of *S. sordida* the above-mentioned characters do not appear to hold up absolutely and do not permit us to recognize *S. serawschanica* B. Fedtsch. separately. The report of Ledebour (*Fl. Ross.* II, 661) on the presence of *S. baicalensis* in Soviet Central Asia, which was based on the herbarium specimens of Schrenk from the Dzhungarian Alatau, is incorrect. The specimens of Schrenk, distributed as *S. baicalensis*, have a distinctly developed receptacle with scales, corymbose-paniculate (and not racemose) inflorescence and broad leaves (2–7 cm wide) and should be referred to the species *S. sordida*. Thus, true *S. baicalensis* is not found in Soviet Central Asia. All reports of authors, who following Ledebour, have confirmed the discovery of *S. baicalensis* in Soviet Central Asia, should be referred to *S. sordida*.

Section 2. Laguranthera (C.A.M.) Lipsch. in *Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR*, XV (1959) 17.—Subsect. *Laguranthera* C.A.M. ex Endlich. *Gen. pl.* (1836–1840) 468.—Sect. *Lagurostemon* (Cass.) DC. *Prodr.* VI (1837) 532 p. p. (excl. §*); *Kitam.* in *Mem. Coll. Sc. Kyoto Univ.* ser. B, XIII, 150 and 151 p. p.—Rhizomes and roots fibrously split along length. Capitula narrow campanulate or cylindrical,

small or up to 1 cm wide, usually numerous, in corymbose or paniculate inflorescence. Involucral bracts undivided, without appendages, distinctly imbricate, appressed, ovate, subobtusate or acute, in some species cusp recurved. Receptacle covered with scales; basal appendages of anthers fascicular-woolly. Pappus double. Basal leaves mostly withering before flowering. Perennials or semishrubs.

Series 5. Rigidae Lipsch.—Sect. *Lagrostemon*, saltem §** in DC. Prodr. VI (1837) 532.—Stem not woody at base, tall, winged due to decurrent leaves. Basal leaves withering before flowering. Cusps of involucral bracts curved.

404 14. *S. rigida* Ldb. Ic. pl. Fl. Ross. I (1829) 19; Ej. Fl. alt. IV, 32; DC. Prodr. VI, 532; Ldb. Fl. Ross. II, 2, 671; Kryl. Fl. Zap. Sib. XI, 2927.—*Ic.*: Ldb. op. cit. (1829), tab. 79.—*Exs.*: Kar. and Kir. (1841) No. 1625.

— Perennial. Root thick, bearing stems up to 80 cm tall and up to 1 cm wide. Stem not woody at base, strong, straight, angular-sulcate, rough, with scattered glandular hairs, winged, branched. Basal leaves oblong, pinnatifid, withering before flowering; lower and middle cauline leaves undivided, narrow-oblong, decurrent over stem or (according to *Fl. Zap. Sib.* [Flora of Western Siberia]) crenate-lobate, sometimes toothed, with lanceolate-linear acute lobes, 10–14 cm long and 0.5–1 cm wide; upper cauline leaves and leaves on branches broadly or narrow-linear, somewhat broadened at base, more or less amplexicaul or slightly decurrent; all leaves arcuate, scabrous above due to numerous spinules, glandular-hairy beneath, veins and margin hairy, convolute. Capitula 1.2–1.4 cm long and 0.4–0.7 cm wide, numerous, in dense approximate corymbs at apices of main stem and branches, aggregated in broadly corymbose-paniculate inflorescence. Involucre cylindrical, imbricate, many-rowed; outer involucral bracts ovate, narrowed in subulate, decurved cusp; inner bracts oblong, colored at apex and with short cusp; all bracts usually with prominent midrib, more or less arachnoid hairy-pubescent. Florets pink-lilac, about 1–1.1 cm long, narrow part of tube about 0.5 cm long, broad part with lobes of limb about 0.5–0.6 cm long; appendages of anthers with dense tuft of woolly hairs. Receptacle covered with dense membranous linear-subulate, lustrous, about 0.8 cm long scales. Achenes 0.5–0.6 cm long, brownish, finely ribbed; pappus snow-white, double; outer pappus bristles serrate-scabrous, fragile, 2–3 cm long, inner ones long-plumose, about 1 cm long. Flowering VII–VIII.

Shrub and meadow steppe.—*Western Siberia*: Irtysh. Endemic. Described “from meadows of the Dzhungarian-Kirgizian desert” (Semipalatka Region). Type in Leningrad.

Note. This species differs from the closely related species *S. elata* Ldb. and *S. elegans* Ldb. by having involucre bracts with subulate, decurved tips and decurrent leaves, because of which the stem appears winged.

Series 6. Suffruticosae Lipsch.—Stems woody at base, wingless, 20–45 cm high. Involucre bracts obtuse or acute; in latter case cusps not decurved, except in *S. ninae* Iljin.

15. *S. ninae* Iljin in Bot. Zhurn. SSSR, XXVII, 6 (1942) 145.—*S. dshungarica* Iljin in Bot. Zhurn. SSSR, XXVII, 6 (1942) 145 p. p. (f. *canescens* Iljin).

Perennial. Root thick, woody, fibrously branched, many-headed, with more or less numerous, woody, long caudices. Stems up to 10, 15–35 cm high, brownish at base, woody, covered with remains of old petioles
405 of basal leaves, somewhat ascending, obtusely ribbed, weakly floccose and arachnoid hairy-pubescent with scattered, sessile, lustrous glandular hairs, simple or branched in upper half as well as in inflorescence. Leaves green, weakly arachnoid-hairy (particularly beneath), and with lustrous glandular hairs; lower and middle cauline leaves oblong or lanceolate, attenuate toward base and relatively short-petiolate, with distinct midrib, acute, cuspidate with short, straight or weakly bent spinulose cusp, crenate-toothed, teeth usually not very frequent, acuminate-aristate; upper cauline leaves usually reduced, narrowed toward base, sessile, lanceolate or oblong, sometimes almost entire, with spinescent cusp. Capitula pedunculate with filiform or lanceolate-linear bracteal leaves, in corymbose inflorescence; sometimes with branching of stem, additional peduncles originating from axils of upper leaves, terminating in one or two capitula. Involucre cylindrical, 1–1.2 cm long and 0.6–0.8 cm wide, flocculose-arachnoid hairy, especially at apices; involucre bracts green or violet, imbricate, all terminating in long, usually decurved, subulate cusp; innermost bracts with shorter and usually nondecurved cusp; outer bracts ovate or lanceolate, inner oblong-linear. Receptacle densely covered with linear-subulate, lustrous, unequal scales, longest up to 0.8 cm long; florets purple, about 1.4–1.5 cm long, narrow part of tube about 6–7 mm long, broad part (covered with lustrous glandular hairs) with lobes of limb almost as long as narrow part; anthers about 0.6–0.7 cm long, basal appendages of anthers woolly. Pappus double, snow-white, outer pappus bristles unequal, serrate-scabrous, short (up to 0.5 cm long), fragile, inner ones long-plumose, about 1–1.1 cm long. Flowering VII.

Crevices in rocks.—*Central Asia*: Dzhungaria-Tarbagatai (Dzhungarian Alatau). Endemic (?). Described from the Koksus River Basin. Type in Leningrad.

Note. In the original description of *S. ninae* M.M. Iljin compared it with *S. dshungarica*, also from the nearby localities in the Dzhungarian Alatau and described immediately following *S. ninae* in the same publication. An examination of the material used by M.M. Iljin for describing *S. dshungarica* showed its heterogeneity, which was also clear to the author himself, who distinguished two forms—*viridis* Iljin and *canescens* Iljin—in the Herbarium. I do not recognize the separate status of *S. dshungarica* but distribute the specimens of this species between *S. ninae* Iljin and *S. coronata* Schrenk. Details of the relationship between *S. dshungarica* and *S. coronata* Schrenk are discussed in the note to the latter species.

L.E. Rodin's specimens from Altyn-Emelskii Pass, like the collections of E.P. Matveeva from the same sites (the latter were annotated by M.M. Iljin as *S. dshungarica* f. *canescens* Iljin) differ from typical *S. ninae* Iljin by the absence of a long, subulate, usually decurved cusp of the involucre bracts, more dense leafy cover on the stem, more deeply crenate-toothed leaves, a more strongly pubescent lower surface of the leaf and the capitula more compactly clustered in corymbs at tips of stems. Evidently, this is a unique race (*S. rodinii* Lipsch.), which requires further study in nature. In having of a decurved, subulate cusp on the involucre bracts, *S. ninae* Iljin is closer to the series *Rigidae*, but in the woody stem base, habit and shape of the capitula and leaves, the texture of the latter, and other characters, it is undoubtedly closer to the series *Suffruticosae*, thus connecting both the series.

16. ***S. coronata*** Schrenk in Bull. Acad. Sc. Pétersb. III, 7 (1845) 107; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 443.—*S. coronata* var. *colorata* Herd. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 141, No. 583.—*S. dshungarica* Iljin in Bot. Zhurn. SSSR, XXVII, 6 (1942) 145 p. p., f. *viridis* Iljin in herb.

Perennial. Roots thick, woody, fibrously branched, many-headed, with more or less numerous, woody, long caudices. Stem up to 40 cm high, dark brown above, woody, glossy, covered with hard remains of basal leaves, sulcate, simple or branched in upper part, glabrous. Leaves coriaceous, green on both sides or more or less grayish-pubescent beneath, sometimes almost glabrous, oblong or lanceolate-oblong, acuminate, petiolate, with less prominent midrib beneath, slightly broadened and merging into petiole; lower and middle cauline leaves more or less deeply crenate-toothed, teeth unequal, callous-spinescent; upper leaves lanceolate, reduced, sometimes almost entire; bracteal leaves on peduncles of capitula rather numerous, small or larger, acuminate or subobtusate; all leaves with numerous, sessile, glossy glandular hairs. Capitula 3–10, ovoid, in a relatively dense corymb, sometimes peduncles

long, and then corymbose inflorescence more spreading. Involucre about 1.5 cm long and up to 1 cm wide, many-rowed; bracts hard, appressed, almost glabrous or arachnoid-hairy, glandular-hairy, green; inner bracts usually violet, acuminate, with straight, not recurved cusp. Florets purple (?), narrow and broad parts of tube and lobes of limb glandular-hairy; appendages of anthers with tuft of woolly hairs at base. Receptacle covered with linear-subulate, lustrous, up to 0.8 cm long, scales. Pappus double, outer bristles serrate-scabrous, unequal up to 0.5 cm long, inner ones long-plumose, about 1–1.1 cm long; achenes with narrow corona at apex. Flowering VII–VIII.

Rocks.—*Soviet Central Asia*: Dzhungaria-Tarbagatai (Dzhungarian Alatau). Endemic. Described from the Dzhungarian Alatau, from the mountains facing the Kizylgach River, north of Kopal. Type in Leningrad.

Note. In the original description of *S. coronata* Schrenk, the author was silent about the affinity of this species and did not compare it with 407 *S. blanda* Schrenk described from the Dzhungarian Alatau, which, in my opinion, is closely related. The material of *S. coronata* is very limited, and the species is represented by collections of Schrenk as well as some later collectors (Lipsky, Voroshilov). *S. coronata*, by comparison with *S. blanda*, has less divided and stiffer, more weakly scabrous leaves, capitula typically more compactly arranged and more numerous involucre bracts with a distinct cusp, and plants more strongly woody at base. Concerning the relationship between these two species, additional collections and observations in nature are needed.

M.M. Iljin described *S. ninae* Iljin and *S. dshungarica* Iljin from the Dzhungarian Alatau. Both are close to *S. coronata* Schrenk, which had escaped Iljin's notice, as he did not compare either of his own species with the latter, and only considered differences between them. *S. coronata* differs from *S. ninae* by a more strongly reduced stem, more coriaceous leaves, reduced peduncles of the capitula, and a less distinct cusp of the involucre bracts, which are not recurved. As regards *S. dshungarica*, a study led me to the conclusion that it was described a second time and must be included among the synonyms of *S. coronata*. According to M.M. Iljin, the characteristic features of *S. dshungarica* are: 1) strong lignification of the lower part of the stem (which was also observed in *S. coronata*); 2) the length of the receptacular scales reaches only up to half or one-third the length of the involucre bracts (this character is not stable, showing variations, and the receptacular scales are similar in length to those in *S. coronata*); and 3) involucre bracts with cusps (the latter are present in both *S. dshungarica* and *S. coronata*, and are not recurved).

17. *S. blanda* Schrenk in Bull. Acad. Sc. Pétersb. X, 23 (1842) 354; Ej. in Enum. pl. nov., II (1842) 37; Ldb. Fl. Ross. II, 671; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 443.—*S. konuroba* Saposhn. in Not. system. Herb. Horti. Bot. USSR, VI, 2 (1926) 32; Lipschitz. op. cit. 443.

Perennial. Root woody, fibrously branched along length, many-headed, with more or less numerous caudices, densely covered with dark brown bases of old leaves. Stems 10–30(35) cm high, usually numerous, woody at base, somewhat ascending or upright (less often weakly flexuous in shady forms), sulcate, glabrous, simple or branched in inflorescence, sometimes strongly branched from middle in shady forms (f. *umbrosa* Iljin), with spreading branches. Leaves hard (thinner and softer in shady forms), pinnatifid or pinnatisect, oblong, sometimes divided almost to midrib, sometimes weakly crenate; lateral lobes ovate to triangular or lanceolate, acute with spinescent cusp or roundish-obtuse; midrib usually very prominent beneath, especially in lower part of leaves, merging into petiole; leaves green on both sides, somewhat lighter beneath; strongly scabrous above and margin in type specimen due to numerous, stiff, setose hairs and sessile lustrous glandular hairs, subglabrous beneath or almost glabrous and with numerous lustrous glandular hairs; uppermost leaves reduced, pinnatifid or entire, with spinescent cusp. Capitula on long peduncles, solitary or two or three at stem and branch apices forming broadly corymbose or corymbose-paniculate inflorescence. Involucre imbricate, many-rowed, about 1.3–1.5 cm long and 0.8–1 cm wide; involucre bracts appressed, green or violet, lustrous, almost glabrous or weakly arachnoid-hairy especially at apex and along margin, besides with less numerous glandular hairs; outer bracts ovate, inner lanceolate or oblong-linear, somewhat acute but without recurved cusp. Florets purple, with scattered, lustrous, sessile glandular hairs, especially distinct on corolla-tube, about 1.3–1.4 cm long; narrow part of tube about 0.6 cm long, broad part including lobes of limb about 0.7–0.8 cm long; anthers about 0.6 cm long, basal appendages white woolly comose. Receptacle covered with linear-subulate, lustrous, about 0.5–0.6 cm long scales; pappus double, outer pappus bristles serrate-scabrous, fragile, unequal, about 3–5 mm long, inner ones long-plumose, about 1–1.2 cm long; achenes mottled-violet, with small corona. Flowering VII–VIII.

Rocks, cliffs, granite screes.—*Soviet Central Asia*: Dzhungaria-Tarbagatai (Dzhungarian Alatau), Tien Shan (Trans-Ili Alatau, western Talgar). Endemic. Described from the Dzhungarian Alatau (Dzhamantyk and Dzhabyk). Type in Leningrad.

Note. The specimens from the rocks of Sarkansk Ravine in the Dzhungarian Alatau (P.P. Polyakov and L.A. Kupriyanova) differ sharply

from the typical *S. blanda* by having leaves tomentose beneath, strongly tomentose involucrel bracts terminating in a short black cusp and capitula up to 2 cm long and 1 cm wide. Apparently, this is a new species—*S. pseudoblанда* Lipsch. It can also be concluded that these specimens are of hybrid origin (*S. blanda* × *S. ninae* or *S. blanda* × *S. coronata*). This question can be resolved only by further observations in nature. *S. konuroba* Saposhn. was not compared with any species in the original description. A study of the authentic specimen (Dzhungarian Alatau, Konuroba River—V. Sapozhnikov and Tripolitova) revealed its complete identity with *S. blanda* Schrenk.

18. *S. mikeschirii* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, II (1937) 248.—**lc.**: Iljin, Ibid (1937) 249.

Semishrubs; roots woody, fibrously branched along length, many-headed, producing many caudices, with stems or sometimes only rosettes of leaves. Stems 15–30 cm long; numerous, woody at base and densely covered with brownish, weakly lustrous remains of bases of previous year's basal leaves, angular-sulcate, weakly pubescent, sparsely branched (branches less numerous) or less often simple. Leaves somewhat hard, 409 arachnoid-hairy on both sides and with more or less numerous sessile glandular hairs, oblong-lanceolate or lanceolate, 3–7 cm long and 0.3–0.6 cm wide, acuminate, with light colored midrib beneath, gradually narrowed below, and again broadened at base in short sheath, crenate-toothed, teeth remote, terminating in short corniculate cusp, less often almost undivided, weakly convolute, reduced toward stem apex; uppermost leaves small, lanceolate-linear or linear, entire, acuminate, often subtending involucre. Capitula one to three, terminal on stem and lateral, usually short, branches. Involucre almost ovoid, about 1.2 cm long and 0.7–0.8 cm wide, imbricate, five-rowed, weakly arachnoid-hairy and with sparse lustrous glandular hairs; involucrel bracts appressed, with somewhat prominent midrib, dark-colored in upper part, subacute; outer bracts ovate, middle oblong-ovate, inner lanceolate. Florets pink-purple, about 1.3–1.4 cm long, narrow part of tube about 0.6–0.7 cm long, broad part including lobes of limb sparsely covered with lustrous glandular hairs, about 0.7 cm long; basal appendages of anthers woolly. Receptacle densely covered with linear-subulate, lustrous scales, largest scale about 5–6 mm long. Pappus white, double, outer bristles serrate-scabrous, unequal, readily shedding, up to 4 mm long, inner ones long-plumose, equal, about 1.1 cm long; immature achenes glabrous. Flowering VII–VIII.

Gravelly slopes.—*Soviet Central Asia*: Tien Shan (Karatau Range). Endemic. Described from the Syr-Darya Karatau. Type in Leningrad.

Note. In the original description, the plant was wrongly included

under the *S. alpina* complex. *S. mikeschinii* is undoubtedly a semishrub and belongs to the series *Suffruticosae* Lipsch.

19. *S. ispajensis* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 11 (1937) 250.—**lc.**: Iljin, *Ibid*, 251.

Perennial. Root woody, fibrously branched along length, developing more or less numerous caudices, densely covered with hardened remains of old leaves; some caudices producing rosettes of leaves. Stems 15–30 cm long, erect, angular-sulcate, glabrous or subglabrous, simple, sparsely leafy. Leaves green on both sides, more or less scabrous due to short scattered spines, with more prominent midrib and lateral arcuate veins beneath; basal and lowermost cauline leaves oval or oblong, crenate-toothed, especially in lower half of lamina, or almost entire, slightly cuneate at base and narrowed in long narrow petioles; cauline leaves oblong, acuminate, narrowed toward base, sessile, weakly decurrent over stem, slightly convolute; uppermost leaves reduced, lanceolate or linear, entire, often with rolled margin. Capitula 3–10(12), sessile, in terminal compact corymbs. Involucre 1–1.4 cm long and 0.6–0.7 cm wide, 410 imbricate, four- or five-rowed, weakly arachnoid hairy-pubescent; bracts appressed, subacute, purple-violet in upper part, outer ovate or oblong-ovate, inner lanceolate. Receptacle covered with linear-subulate, lustrous, unequal, up to 0.7 cm long scales; florets purple, about 1.2–1.3 cm long, narrow part of tube about 0.5–0.6 cm long, broad part including lobes of limb about 0.6 cm long; basal appendages of anthers comose-woolly. Pappus dirty-smoky, double, outer pappus bristles serrate-scabrous, unequal, fragile, up to 3 mm long, inner ones long-plumose, about 1–1.2 cm long; achenes oblong, almost tetraquetrous, about 5 mm long and 2 mm wide, glabrous, smooth, straw-yellow, with purple striations, and apical corona. Flowering VIII.

Soviet Central Asia: Tien Shan (west, Talass Alatau Range). Endemic. Described from Ispai in western Tien Shan. Type in Leningrad.

Note. M.M. Iljin wrongly compared this species with *S. mikeschinii* whereas it is much closer to *S. larionovii* Winkl., from which it differs by lacking aristate cusps on the involucre bracts and having a simple stem, weak sinuate leaves, smoky-dirty colored pappus, etc. By comparison with other members of series *Suffruticosae* Lipsch. the stems of this species are weakly lignified at the base; however, phylogenetically this species undoubtedly should be included here. Maybe it has been confused with *S. blanda* Schrenk, from which it differs by more weakly sinuate, less scabrous leaves, capitula densely arranged in a corymb, and a smoky colored pappus.

Series 7. Salicifoliae Lipsch. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XV (1959) 17.—Stems not woody at base, wingless or

weakly winged. More or less numerous, short, vegetative branches axillary (sometimes almost entirely absent). Leaves undivided, crenate-toothed and pinnatifid, white-tomentose or green beneath; involucre bracts obtuse or acute, but in latter case cusp straight, not recurved.

20. *S. salicifolia* (L.) DC. in Ann. Mus. Paris, XVI (1810) 200; Ldb. Fl. alt. IV, 29, excl. γ . *incisa* Ldb.; DC. Prodr. VI, 553 p. p.; Ldb. Fl. Ross. II, 2, 670 p. p. excl. β . *ramosissima* Ldb. and ϵ . *incisa* Ldb.; Turcz. Fl. baic.-dahur. II, 1, 106 p. p.; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 8 p. p.; Kryl. Fl. Zap. Sib. XI, 2923; Popov, Fl. Sr. Sib. II, 764.—*Saussurea multiflora* DC. in Ann. Mus. Paris, XVI (1810) 199.—*Serratula salicifolia* L. Sp. pl. ed. I (1753) 817.—*Heterotrichum leptophyllum* MB. ex DC. Prodr. VI (1837) 533 nomen.

Perennial. Root thick, with fibrously branched bark. Stems numerous, up to 40(60) cm long, simple or sometimes branched from base, sulcate, arachnoid-hairy or tomentose. Leaves linear, lanceolate-linear or oblong, 411 2–10 cm long (less often longer) and 2–10(15) mm wide, entire, rarely with occasional teeth, convolute, less often flat, green, glabrous or weakly pubescent above, white-tomentose beneath; basal and lower cauline leaves short-petiolate, upper sessile. Capitula more or less numerous, 0.4–0.7 cm wide or larger, up to 1 cm wide (var. *macrocephala* Turcz.), terminal on stem and branches in dense or slightly lax corymbs. Involucre imbricate, arachnoid hairy-pubescent; bracts pigmented at apex; outer bracts ovate, subobtuse, inner oblong, obtuse. Receptacle densely covered with up to 0.8 cm long scales; florets violet pink, (13)14–23(28) in each capitulum, narrow part of tube about 0.6–0.7 cm, broad part about 0.6 cm long including lobes of limb; appendages of anthers woolly. Pappus white, double, outer pappus bristles persistent, serrate, unequal, up to 4.5 mm long, inner ones plumose, about 1–1.1 cm long; achenes brownish or olive colored, usually mottled, compressed, with indistinct corona, mature achenes 4–4.5 mm long. Flowering VII–VIII.

Cryophilous steppes, steppe meadows, stony-gravelly slopes, rocks.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayans, Dahuria, Lena-Kolyma (vicinity of Olekminsk). *General distribution*: Mongolia, ?China. Described from Siberia. Type in Leningrad.

Note. This specimen, preserved in the herbarium of the Botanical Institute, Academy of Sciences of the USSR, has two labels: the one written in the hand of academician I.P. Borodin, "*S. salicifolia* DC. γ . *major* Ledeb. Gmelin," and the other, written on an old piece of paper, "*Cirsium inerme* erectum, foliis ex lineari lanceolatis infra candidis," is very close to Gmelin's illustration (*Fl. Sibirica*, II, tab. 27), which is cited by De Candolle (l.c.) and, apparently, can be considered the type or isotype of *Saussurea salicifolia* DC. In the work mentioned, De Candolle gives Siberia as the habitat: "Hab. in Sibiriae apricis (v.s.)."

The species is variable in the shape and width of the leaves, size of the capitula and the number of florets. The infraspecific division of *S. salicifolia* was first proposed by Ledebour in *Icones plantarum* (1829), and subsequently in *Flora Altaica* (1833), later by De Candolle in the *Prodromus* (1837) and by Turczanin in *Flora baicalensi-dahurica* (1856). Some varieties described by these authors under different names are identical and do not have separate ranges, while others deserve to be segregated as separate species. Among the latter is var. *incisa* Ldb. (*l.c. pl. Fl. Ross.* 1 (1829) 19, tab. 76; *Ej. Fl. Alt.* IV (1833) 30), with more or less deeply pinnately cut leaves, which was subsequently split off by L.P. Sergievskaja as a separate species, *Saussurea sumneviczii* Serg.

The list of synonyms of the varieties of *S. salicifolia* is given below.

1. var. *macrocephala* Turcz. in DC. Prodr. VI (1837) 533; Turcz. Fl. baic.-dahur. II, 1 (1856) 106.—*S. salicifolia* “e regione transbaicalensi” Ldb. Fl. alt. IV (1833) 30.—*S. salicifolia* var. 412 *transbaicalensis* Ldb. ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 8.—*S. salicifolia brevifolia* Turcz. in DC. Prodr. VI (1837) 533.—*Saussurea multiflora* DC. in Ann. Mus. Paris. XVI (1810) 199.—*Heterotrichum leptophyllum* MB. ex DC. Prodr. VI (1837) 533 nomen.—Differs by having larger, often solitary, capitula at the apex of long peduncles, larger number of florets, and oblong-linear leaves. It is found scattered in the Trans-Baikal Region, mixed with the type form.

2. var. *major* Ldb. pl. Fl. Ross. I (1829) 19; *Ej. Fl. alt.* IV, 29; *Ej. Fl. Ross.* II, 2, 670.—*S. salicifolia* var. *angustifolia* DC. Prodr. VI (1837) 533; Turcz. Fl. baic.-dahur. II, 1 (1856) 107.—Characterized by entire linear leaves, smaller capitula in numerous corymbs, and taller stems.

3. var. *intermedia* Ldb. *l.c. pl. Fl. Ross.* I (1829) 19; *Ej. Fl. alt.* IV (1833) 30; *Ej. Fl. Ross.* II, 2, 670.—Differs by having oblong-lanceolate leaves, and shorter stems (10–15 cm high). A variety transitional to *S. sumneviczii* Serg.

The specimens from Soviet Central Asia identified by many authors as *S. salicifolia* mostly belong to *S. elegans* Ldb. var. *nivea* Lipsch., *S. cana* Ldb., and other species.

The inclusion of *S. salicifolia* (L.) DC. in the section *Lagurostemon* Cass. by M.G. Popov (*Fl. Sr. Sib.* II (1959) 764) is undoubtedly wrong.

21. ***S. lomatolepis*** Lipsch. in Byull. Mosc. Obshch. Isp. Prir. Otd. Biol. LIX, 6 (1954) 80.—*S. salicifolia* var. *macrocephala* Winkl. in sched. Herb. Inst. Bot. Acad. Sc. USSR (non Turcz.)

Perennial. Root woody, thick, fibrously branched along length, producing numerous stems. Stems woody at base and covered with

hardened remains of old leaves, 15–35 cm high, erect, sulcate-angular, simple or less often branched right from base, arachnoid hairy-pubescent, glabrescent. Leaves broadly lanceolate or oblong, up to 8–10 cm long and 1.5–2 cm wide, toothed-crenate, almost glabrous, scabrous above, grayish arachnoid hairy-pubescent beneath with distinct midrib; basal and lower cauline leaves short-petiolate, upper reduced, narrower, sessile; vegetative shoots arising from axils of some leaves. Capitula 1.5–2 cm long (at fruiting) and about 0.8–1 cm wide, in groups of two to five in dense corymbs at stem and branch apices. Involucre imbricate, four- or five-rowed, pubescent; outer bracts ovate, inner oblong, all bracts subobtusate, with distinct, narrow, dark border along margin. Receptacle densely covered with linear-subulate, lustrous, up to 6 mm long scales; florets dark pink, about 1.2 cm long, narrow part of tube about 0.6 cm
 413 long, broad part including lobes of limbs covered with lustrous glandular hairs, about 0.6 cm long; appendages of anthers flocculose-woolly. Pappus double, outer bristles serrate, about 2 mm long, shedding, inner ones about 1–1.1 cm long, long-plumose; achenes cylindrical, mottled, glabrous, about 0.6 cm long. Flowering VII–VIII.

Described from China from the Kunges River in the Kuldzha Region. Type in Leningrad. Probably it occurs in the USSR. It is closest to *S. salicifolia* var. *macrocephala* Turcz., from which it differs by broader, distinctly toothed-crenate leaves that are gray-tomentose beneath, obtuse, narrowly dark-bordered involucre bracts and larger capitula.

22. *S. cana* Ldb. Ic. pl. Fl. Ross. I (1829) 18; Ej. Fl. alt. IV, 28; DC. Prodr. VI, 533; Ldb. Fl. Ross. II, 2, 670; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 444.—*Saussurea microphylla* C.A.M. (nomen) in Ldb. et al. Reise, II (1830) 413 and herb.—*Saussurea fruticulosa* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV, 3 (1841) 448.—*S. cana* β. *angustifolia* Ldb. Fl. Ross. II, 2 (1845–1846) 670.—Ic.: Ldb. op. cit. (1829) tab. 75.

Perennial. Root woody, brown, with fibrously branched bark, many-headed at apex; caudices sometimes covered with loose turf and bearing floriferous shoots or terminating in rosettes of leaves. Stems 10–15(25) cm high, erect, weakly ascending, simple, with somewhat numerous, erect floriferous branches only above, slightly sulcate-angular, gray-pubescent. Leaves grayish tomentose on both sides; basal leaves usually withering before flowering; leaves of sterile rosettes oblong, more or less deeply pinnatipartite or almost entire, acuminate, weakly convolute, gradually attenuate toward base, short-petiolate, sheathing; cauline leaves linear, entire, narrow (var. *angustifolia* Ldb.) or more or less pinnatipartite in type form; all leaves gradually reduced toward stem apex, usually sessile, somewhat semiamplexicaul; upper leaves small, entire. Capitula cylindrical, 4–20, erect, short-pedunculate, in simple or usually compound

terminal corymb. Involucre imbricate, five-rowed, grayish arachnoid-hairy, 1–1.3 cm long, bracts appressed, red-colored, usually entirely or at apex and along margin, with one distinct vein, sometimes covered by pubescence; outer bracts ovate, roundish at apex, with indistinct short teeth; inner bracts oblong, subacute. Receptacle densely covered by linear-subulate, white, lustrous, narrow, up to 0.8 cm long scales; florets pink, about 1.2–1.3 cm long; narrow part of tube about 0.6 cm long, broad part with occasional lustrous glandular hairs, with lobes of limb about 0.6–0.7 cm long; basal appendages of anthers flocculose-woolly. Pappus double, white, outer pappus bristles serrate, fragile, about 2–3 mm long, inner ones long-plumose, about 1–1.1 cm long; achenes narrow cylindrical, mature achenes up to 0.7 cm long, glabrous. Flowering VII–IX.

White clays, marl, limestones, shales, rock outcrops, stony steppes.—*Western Siberia*: Upper Tobol (southern part), Irtysh, Altai; *Eastern Siberia*: Angara-Sayan (?); *Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region, Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria (Kunges River Valley in Xinjinang), Japan, China (Shangshi and Kangsu provinces). *S. cana* Ldb. is described from Kazakhstan (vicinity of Karakalinsk). Type in Leningrad; *S. fruticulosa* Kar. and Kir. was described from Uzbekistan (Tarbagatai). Type in Leningrad.

Note. Keller's specimens from the Kaldzhir Valley (Aine-Bulak, 1908) differ by having (up to 0.6 cm wide) lanceolate or oblong-linear leaves and deserve to be segregated as a separate variety (var. *latifolia* Lipsch.). Strangely, *S. cana* Ldb. was omitted from the *Flora of Western Siberia*. Typical specimens of *S. cana* are characterized by narrowly cylindrical capitula, gracefully erect, broadly ovate-roundish, obtuse involucrel bracts terminating in a short barely noticeable cusp (submucronulate), and leaves that are grayish-tomentose on both sides (in *S. salicifolia*, with which this species is often confused, they are green and scabrous above, and white-tomentose beneath), usually oblong-linear or oblong, entire, and more or less convolute (leaves slightly pinnately incised, dentate). *S. cana* is phylogenetically very close to *S. sumneviczii* Serg., from which it differs by having leaves that are entire or slightly divided and grayish-tomentose on both sides (in *S. sumneviczii* Serg., they are green and scabrous above, and white-tomentose beneath, deeply pinnately cut), and capitula that are erect and usually densely arranged. For the relationship between *S. cana* and *S. caespitans* Iljin, cf. the note to the latter.

23. *S. sumneviczii* Serg. in *Sistemat. Zam. Gerb. Tomsk. Univ.* 1–2 (73–74) (1949) 12; *Kryl. Fl. Zap. Sib.* XI, 2924:—*S. salicifolia* γ. *incisa* Ldb. *Ic. pl. Fl. Ross.* 1 (1829) 19; *Ej. Fl. alt.* IV, 30; *DC. Prodr.*

VI, 533; Ldb. Fl. Ross. II, 2, 671; Kryl. Fl. Alt. III, 709.—*S. squarrosa* Fisch. (non Turcz.) ined. ex Ldb. Fl. Ross. II, 2 (1845–1846) 671.—*Saussurea salicifolia* var. *squarrosa* Bge. ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 9 nomen.—**lc.**: Ldb. op. cit. (1829) tab. 76.

Perennial. Root many-headed, fibrously branched, usually producing many stems; root collar covered with hardened remains of basal leaves. Stems numerous, less often solitary, 1.5–10 (up to 45) cm high, simple or branched in inflorescence, grayish or white-tomentose. Leaves variable in shape and degree of incision, in typical form (1)2–5 cm or longer, 6–14 cm, oblong, glaucous-green, weakly stellate-hairy, and with arachnoid hairy-floccose, lustrous glandular hairs, or almost glabrous and green above, white-tomentose beneath; all leaves in type form more or less deeply pinnatilobate or crenate-dentate, 0.1–1 cm wide in undivided part; some of them sometimes undivided or weakly toothed; lower cauline leaves short-petiolate, base of petiole of basal leaves slightly sheathing; upper leaves sessile, not decurrent. Capitula two to nine, compactly arranged at stem and branch apices, less often sparse. Involucre imbricate, 3–5(7) mm wide; bracts reddish or violet, weakly arachnoid hairy-pubescent, especially along margin and apex, often slightly glandular dorsally; outer bracts smaller, ovate, often with prominent midrib, subobtusate or short-acuminate, inner bracts oblong, subobtusate. Florets violet-pink, about 1.2–1.3 cm long; narrow part 0.5 cm long, broad part sometimes with lustrous glandular hairs, about 0.7 cm long including lobes of limbs; appendages of anthers comose-lanate. Receptacle densely covered with linear-subulate, lustrous, up to 0.7 cm long scales; pappus snow-white, outer pappus bristles serrate-scabrous, fragile, about 3 mm long, inner bristles long-plumose, about 1 cm long; achenes 3–4 mm long, mottled, mature achenes dark violet. Flowering VII–VIII.

Stony and gravelly slopes and plains, rocks, clayey outcrops.—*Western Siberia*: Altai; *Eastern Siberia*: Angara Sayans (southern part of Tuva Republic). *General distribution*: Mongolia. Described from Altai. Type in Tomsk; isotype in Leningrad. *S. salicifolia* γ . *incisa* Ldb. was described from Chuya steppes. Type in Leningrad.

Note. This is a polymorphic species with transitions to *S. serratuloides* Turcz. and *S. salicifolia* (L.) DC. L.P. Sergievskaja recognized several varieties: var. *communis* Serg.: “. . . Stem 10–20 cm long; all leaves deeply pinnately incised over a larger part up to half, white-tomentose beneath, 6–10 cm long, in undivided part 2–4 mm broad; lobes or their teeth 1–9 mm long and 1–3 mm wide remote”; var. *mutabilis* Serg.: “. . . Stem 13–45 cm long; leaves grayish to grayish-white beneath, pinnatilobate or crenate-toothed; upper leaves often entire, lobes 2.5–4 mm long and 4–7 mm wide”; this variant is a transition to *S. serratuloides* Turcz. To the varieties proposed by L.P. Sergievskaja in *S. sumnevicii* must be added one more new variety, var. *sergievskajae*

Lipsch.: stem up to 25 cm long; basal leaves up to 14 cm long, cauline leaves 5–7 cm long, up to 1 cm wide, with numerous remote small teeth along margin, some leaves almost entire; veins, especially in basal leaves, prominent beneath; vegetative shoots arising from axils of cauline leaves (Chuya steppe). *S. sumneviczii* is closest to *S. serratuloides* Turcz., but the leaves of the latter species are pinnately cut almost up to the middle into linear or lanceolate lobes, 1.5–4 cm long and 2–5 mm wide; stem strongly branched above; involucre bracts almost glabrous. On the other hand, *S. sumneviczii* is very similar to *S. cana* Ldb., but the latter is characterized by leaves grayish-tomentose on both sides, which 416 in the type form are entire and narrower. Moreover according to Ledebour (*Fl. alt.* IV, 30), the florets of *S. cana* Ldb. are larger, and the involucre bracts grayish-tomentose, not villous. Sergievskaja did not compare her species with *S. cana* Ldb.; apparently, it was unknown to her.

24. *S. serratuloides* Turcz. in Bull. Soc. Nat. Mosc. XX, 2 (1847) 35.—*S. geblariana* C.A.M. in Mém. Acad. Pétersb. sér. VI, VII (1855) 6; Kryl. Fl. Zap. Sib. XI, 2925.

Perennial. Roots fibrously and transversely branched, producing few stems; root collar covered with dark brown, weakly glossy sheaths of basal leaves. Stems more or less flexuous, in type form straight, 20–60 cm long, angular-ribbed, glabrous or grayish-tomentose, branched, branches more or less bent. Leaves numerous, up to 13 cm long and up to 4 cm wide; basal leaves petiolate, upper sessile, adnate with stem by narrow base, but not decurrent; all leaves green, glabrous, weakly scabrous above due to spinules, white-tomentose beneath, oblong, with prominent midrib, deeply pinnatipartite; middle undivided part 0.2–0.4 cm wide, somewhat toothed between lobes, lobes incurved, almost linear or lanceolate, 0.2–0.5 cm wide, acute, convolute; lateral lobes longer, almost entire or more or less pinnatilobate; lower and upper lobes one-third to half as long as middle, entire or toothed; uppermost and branch leaves smaller, toothed or pinnatipartite in middle. Capitula cylindrical, 5–10, on short peduncles terminal on stem and branches, in almost corymbose inflorescence; corymbs, in turn, forming compound, almost paniculate inflorescence in several specimens. Involucre imbricate, 1–1.4 cm long and 0.4–0.5 cm wide; bracts unequal, green or violet, almost glabrous or less often very weakly pubescent, with weakly noticeable veins; outer bracts small, ovate, with small cusp, middle oblong, longer, subobtusate or subacute; inner bracts almost linear, obtuse. Receptacle covered with linear-subulate up to 0.8 cm long, white, lustrous scales; florets pink, about 1.3 cm long, narrow part of tube 0.5–0.6 cm long, broad part about 0.7 cm long including lobes of limb; appendages of anthers comose-woolly. Pappus snow-white, double, outer pappus-bristles serrate-scabrous, fragile, unequal, about 4–5 mm long, inner ones long-

plumose, about 1–1.1 cm long; achenes about 0.4 cm long, mottled, ribbed, with a crown. Flowering VII–VIII.

Western Siberia: Altai. Endemic. Described from western Altai, from Topolovka. Type in Leningrad.

Note. This species is closest to *S. sumneviczii* Serg., from which it differs by larger leaves which are deeply divided into lanceolate or linear lobes and taller, strongly branched stem.

417 During a study of *S. sumneviczii* Serg. it was found that some specimens from Altai (Oirotiya, Chuya River Valley) should be referred to *S. serratuloides*; others are intermediate between these species.

25. ***S. caespitans*** Iljin in Bot. Mat. Gerb. Bot. Sada, III, 26 (1922) 102; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 445.

Perennial. Caespitose; roots long, strongly fibrously branched, many-headed. Stems numerous, reduced, slender, angular-ribbed, arachnoid, usually densely leafy, covered at base with numerous, brown, hard remains of previous year's leaves. Leaves 2.5–3.5 cm long, 0.5–0.8 cm wide, lanceolate, pinnatifid, teeth remote, with short callose cusp, leaves gradually narrowed toward base in flattened petiole, white-tomentose beneath, grayish-green above, more or less pubescent; uppermost leaves reduced, entire. Capitula cupuliform, 1.5–2 cm long and 0.8–1 cm wide, numerous, pedunculate on stem apices forming (two)three to five-headed, weakly spreading corymbs. Involucre strongly arachnoid-hairy, glabrescent at places, imbricate, five-rowed; bracts dark-colored, subacute, with distinct midrib, usually covered by pubescence; outer and middle bracts ovate or ovate-oblong, innermost linear, narrower. Receptacle covered with linear-subulate, white, lustrous, unequal scales, longest about 5 mm long; florets 1.4–1.5 cm long, narrow part of tube about 0.6–0.7 cm, broad part 0.7–0.8 cm long including lobes of limb; appendages of anthers comose-woolly. Pappus double, outer pappus-bristles serrate, less numerous, unequal, up to 3 mm long, fragile, inner ones plumose, 1–1.1 cm long; achenes 0.5–0.6 cm long, narrow, glabrous, smooth. Flowering VII–VIII.

Outcrops of red clays, stony and gravelly slopes.—*Soviet Central Asia:* Tien Shan (region of Sarydzhas in Tekesa Valley). Endemic. Described from Sarydzhas. Type in Leningrad.

Note. M.M. Iljin did not compare *S. caespitans* with any species of the *S. salcifolia* group in which it was included. The following features are characteristic for *C. caespitans*: formation of dense tufts, pinnatifid leaves, usually pubescent on both sides (more strongly beneath); cupuliform, rather large capitula; dark-colored, strongly arachnoid-hairy, somewhat acuminate involucre bracts.

From *S. cana* Ldb., especially the forms with incised leaves, *S. caespitans* differs by broader, more deeply incised, lanceolate (not apically roundish), dark-colored, strongly pubescent leaves, the pubescence often covering the prominent midrib; capitula larger, 418 somewhat scattered, cup-shaped (in *S. cana* they are narrowly cylindrical, gracefully erect); involucre bracts (even the outermost), somewhat acuminate. From *S. sumneviczii* Serg. it differs by the leaves that are strongly pubescent on both sides in typical specimens (in *S. sumneviczii*, they are usually green, almost glabrous above), larger cupuliform capitula, strongly pubescent involucre bracts with a distinct cusp, and also by forming dense tufts. After the description of *S. caespitans* M.M. Iljin cites specimens: "Semireche Province, Dzsharkent district, Sary-Dzhas, 27.VI.1910, No. 1650, A.I. Michaelson"; this is the type of the species. The second ones cited by Iljin, "Tarbagatai, Chingiz Mountains, 10.VIII.1909, No. 1094, R. Yu. Rozhevits," in my opinion, do not belong to *S. caespitans*, but are *S. cana* Ldb. (their leaves are undivided, linear-oblong; the capitula smaller, gracefully erect; the involucre bracts roundish at the apex, subobtus).

26. *S. canescens* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1889) 168.

Perennial. Roots woody, fibrously branched along length, with more or less numerous caudices, covered with remains of previous year's leaves and producing solitary floriferous shoots; entire plant grayish. Stems ascending 1.5–4 cm long (about 10–12 cm high in var. *major* Winkl. (op. cit. 168)), canescent, sometimes glabrescent, simple, one-headed or three-headed when stem weakly branched above, leafy. Leaves coriaceous, about 1.5–3 cm long (3–7 cm long in var. *major* Winkl.), pinnatifid or crenate-lobate, lobes subacute, with callose spine at apex (under lens); basal and lower cauline leaves petiolate; upper leaves reduced, narrowed below, almost sessile, scarcely amplexicaul, not decurrent, all leaves canescent on both sides. Capitula one to three on each stem, in latter case corymbs compact since capitula short-pedunculate and weakly drooping, 1.5 cm long and 0.7–1 cm wide. Involucre imbricate, five-rowed, grayish arachnoid hairy-pubescent, glabrescent; bracts light colored or dark in upper part, distinctly acuminate, especially inner (cusp often with tuft); outer bracts ovate, inner oblong or oblong-lanceolate; receptacle covered with scales. Florets pink, about 1.2 cm long; narrow part of tube about 0.5 cm long, broad part with lobes of limb about 0.7 cm long; appendages of anthers comose-woolly; pappus double, white, outer pappus bristles serrate, fragile, about 3 mm long, inner ones long-plumose, about 1.1 cm long; achenes (immature) about 0.3 cm long, with an indistinct corona. Flowering VII–VIII.

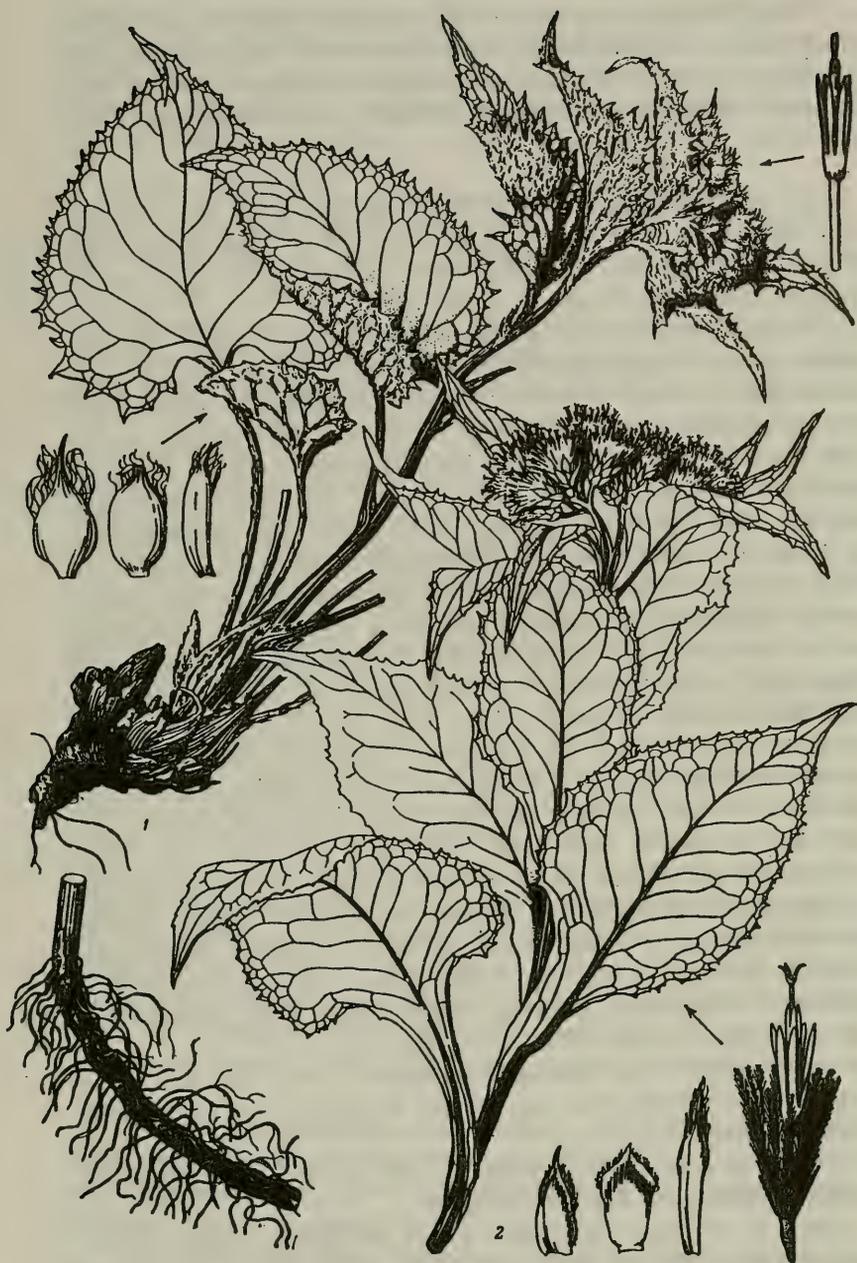
420 So far not found in the USSR. Described from Kuldzha Region (from the alpine zone of Kokkamyr and Lake Sayram-Nor). Type in Leningrad. Its occurrence in the border areas of the USSR is quite probable.

Note. K. Winkler groundlessly compared *S. canescens* with *S. salicifolia*, with which it has no connection. Nevertheless, in the same publication, Winkler described another new species *S. salemannii* Winkl. also from the Kuldzha Region, to which he should have compared his *S. canescens*, especially its var. *major* Winkl. These two species (*S. canescens* and *S. salemannii*) are geographically and phylogenetically extremely close. Until more material is available for these species, they can be distinguished as separate species by the following characters: *S. canescens* is a shorter, grayish-pubescent plant, one- to three-headed, the capitula being 0.7–1 cm wide (in *S. salemannii* they usually are wider); the leaves are grayish-pubescent on both sides and barely scabrous (whereas the leaves of *S. salemannii* are not grayish-pubescent and are quite strongly scabrous on both sides). For the relationship between *S. canescens* and *S. vvedenskyi*, cf. the note to the latter species.

27. *S. vvedenskyi* Lipsch. in Bot. Mat. Gerb. Inst. Bot. Akad. Nauk UzbSSR, XV (1959) 16.

Semishrub. Roots woody, fibrously branched, many-headed, bearing numerous stems and rosettes of leaves, forming turf. Stems 7–11 cm high, 1–1.5 mm wide, angular, upright or slightly arcuate, pubescent, strongly leafy, terminating in solitary or less often two capitula; old leaves remain at base for long along with imbricate remains of previous year's leaf sheaths. Leaves narrow-lanceolate or linear-lanceolate, entire or indistinctly toothed, canescent on both sides, with prominent midrib; basal leaves 4–5.5 cm long and 0.5–0.7 cm wide, middle cauline and upper leaves reduced, sessile, capitula campanulate, one, less often two or three at stem apex, about 1.5–1.7 cm long and 1–1.1 cm wide. Involucre imbricate; bracts three- or four-rowed, almost carinate, more or less pubescent; outer and middle bracts ovate, inner oblong; all bracts violet, with short cusp, sometimes weakly recurved; réceptacle covered with linear-subulate scales. Florets pink, about 1.5 cm long; corolla tube about 0.8 cm long, campanulate, limb five-fid, about 0.7 cm long, with sessile, scattered, lustrous glandular hairs; appendages of anthers comose-woolly. Achenes cylindrical, with short corona at apex, glabrous, about 5 mm long, with four whitish ribs; pappus double, outer pappus bristles about 2 mm long, fragile, scabrous, inner ones about 1.1 cm long, soft, silky, plumose. Flowering VII–VIII.

Stony and gravelly slopes.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from Akbashtau Mountain. Type in Tashkent.



421 *Note.* This species is close to *S. canescens* Winkl. but differs by the distinctly semishrub habit, form of the leaves which are narrowly lanceolate or linear-lanceolate, and entire or indistinctly toothed (and not crenate-lobate or almost pinnatifid), taller, more strongly leafy stem, and so on.

28. *S. salemannii* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1889) 166; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI, 371.—*S. salicifolia* var. *viridifolia* Winkl. in sched. and ex O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 230.

Perennial. Entire plant strongly scabrous; roots woody, fibrously branched along length, many-headed. Stems 13–25 cm long, covered with hardened remains of leaves at base, scabrous due to scattered soft bristles, sometimes almost glabrous, sulcate, usually branched. Leaves green on both sides, in type form strongly scabrous due to numerous bristles all over leaf, especially along margin; basal and lower cauline leaves petiolate, up to 7–8 cm long and 1.5–2 cm wide; lamina obovate or broadly lanceolate, more or less crenate-lobate, lobes roundish or subacute, or less often sinuate-pinnatifid; cauline leaves like basal sessile, weakly amplexicaul, not decurrent on stem or short-petiolate; uppermost cauline leaves reduced, toothed or entire. Capitula about 2 cm long and 1 cm wide, compactly borne on short peduncles, forming corymbs, sometimes solitary on lateral, rather long, curved floriferous shoot. Involucre imbricate, four- or five-rowed, appressed, pubescent; outer bracts ovate, inner oblong or oblong-lanceolate; all bracts with more or less distinct midrib, attenuate into short cusp; receptacle covered with stiff scales, as long as inner bracts. Florets pale pink, about 1.4–1.5 cm long; narrow part of tube almost as long as broad part including lobes of limb; lower appendages of anthers comose-lanate. Pappus double, outer bristles fragile, almost as long as achene, scabrous, inner white, about 1.3 cm long, plumose, two or more times as long as outer bristles; achenes 0.4–0.5 cm long, glabrous, mottled, finely ribbed, smooth along ribs. Flowering VII–VIII. (Plate XXX, Fig. 1.)

Soviet Central Asia: Dzhungaria-Tarbagatai (found only once in the Chulak area). Probably this species also occurs in other parts of the USSR adjoining China.

Described from China (vicinity of Lake Sayram, Talki River and Talkibash Mountain). Type in Leningrad.

Note. K. Winkler, absolutely without justification, compares this species with *S. elegans* Ldb., with which, in my opinion, it has no connection, except for scabrous leaves, either in the habit of the plant, size of the capitula, or form of the leaves. I also include under *S.*
422 *salemannii* Winkl. the specimens of Regel from Upper Borotal (1878),

identified by Winkler as *S. salicifolia* var. *viridifolia* Winkl. The specimens from the Dzhungarian Alatau (Chulak area, S. Lipschitz) differ slightly from the type specimen by having thinner and weakly scabrous (almost smooth) leaves. In all other respects, they are identical with the type of *S. salemannii* Winkl., to which I refer them.

29. *S. elata* Ldb. Ic. pl. Fl. Ross. I (1829) 20; Ej. Fl. alt. IV, 33; DC. Prodr. VI, 532; Ldb. Fl. Ross. II, 2, 672; Kryl. Fl. Alt. III, 709; Kryl. Fl. Zap. Sib. XI, 2925.—Ic.: Ldb. op. cit. (1829) tab. 80.—Exs.: Kar. and Kir. (1840) No. 835.

Perennial. Stem fistular, erect, tall, 1–2 m high and 1 cm thick, ribbed-angular, ribs often reddish, especially in upper part, stem weakly pubescent and covered with sessile lustrous glandular hairs, glabrescent, simple below, branched from middle or above, branches upward spreading. Basal leaves usually withering before blooming, oblong-elliptical, acuminate, narrowed into petiole, almost entire or unequally large-toothed; middle cauline leaves hard, lanceolate, acute, entire, narrowed toward base, sessile or almost sessile, not decurrent on stem, 6–15 cm long and 1–4 cm wide, on both sides covered with short, stiff, cilia, besides with lustrous glandular hairs beneath; upper cauline leaves reduced, linear lanceolate. Capitula numerous in dense corymbs at stem and branch apices, forming long and spreading corymbose-paniculate inflorescence. Involucre imbricate, 1–1.2(1.5) cm long and 0.5–0.7 cm wide, mouldy pubescent, with or without sessile glandular hairs; outer involucre bracts ovate or oblong-ovate, subobtusate; inner bracts oblong, obtuse; all bracts greenish or pigmented in upper half as well as along margin, with more or less distinct midrib, covered with pubescence over larger part of inner bracts; receptacle densely covered with linear-subulate, small, about 3 mm long scales. Florets violet-lilac, about 1.4 cm long; narrow part of tube about 0.7 cm long; broad part with lobes of limb about 0.7 cm long; appendages of anthers comose-woolly. Pappus double, outer pappus-bristles serrate-scabrous, fragile, about 3 mm long, inner ones long-plumose, about 0.8–1 cm long; achenes smooth, compressed, about 0.7–0.8 cm long, almost equaling pappus. Flowering VII–VIII.

Thickets of steppe shrubs, steppe meadow, sands, steppes with *Stipa lessingiana*.—*Western Siberia*: Irtysh from foothills of the Altai from the Bukhtarma River (between Ust-Kamenogorsk and Bukhtarminsk). Endemic. Type in Leningrad.

Note. Albino specimens (f. *albiflora* Lipsch.) are found, for example, in the former Zaisan district.

423 30. *S. elegans* Ldb. Ic. pl. Fl. Ross. I (1829) 19; Ej. Fl. alt. IV, 31; DC. Prodr. VI, 533; Ldb. Fl. Ross. II, 2, 671; Kryl. Fl. Zap. Sib. XI,

2926.—*S. elegans* var. *latifolia* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV, 2 (1842) 388.—*S. salicifolia* var. *elegans* Trautv. Ibid, XXXIX, 2 (1866) 370.—*S. tenuis* Ldb. Ic. pl. Fl. Ross. I (1829) 19; Ej. Fl. alt. IV, 31; DC. Prodr. VI, 533; Ldb. Fl. Ross. II, 2, 671.—*S. elegans* var. *tenuis* (Ldb.) Serg. in Kryl. Fl. Zap. Sib. XI (1949) 2927.—*S. amoena* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV, 3 (1841) 447.—*S. elegans* var. *amoena* (Kar. and Kir). Serg. op. cit. (1949) 2927.—*S. salicifolia* var. *ramosissima* Ldb. Fl. Ross. II, 2 (1845–1846) 670.—*S. salicifolia* var. *stenocephala* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 369 p. p. excl. syn.—*S. salicifolia* var. *scabra* Rgl. and Schmalh. in Tr. Peterb. Bot. Sada, VI, 2 (1880) 313.—*S. salicifolia* auct. fl. Turkest. p. max. p.; O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 230 p. p., non DC.—Ic.: Ldb. Ic. pl. Fl. Ross. I, tab. 77 and 78.—Exs.: Kar. and Kir. (1840) No. 834; Ej. (1841) No. 1629.

Perennial. Roots fibrously branched along length. Stems several, 30–60(80) cm high, erect, angular-ribbed, often glabrous below, lustrous, usually slightly arachnoid-hairy with scattered lustrous glandular hairs, densely leafy (in ssp. *turkestanica* Lipsch. weakly leafy); more or less numerous short shoots in leaf axils (ssp. *turkestanica* Lipsch. without vegetative shoots in leaf axils). Leaves scabrous above and along margin due to short spiny bristles, grayish arachnoid hairy-floccose beneath, sometimes distinctly white-tomentose (var. *nivea* Lipsch. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XXI (1961) 371) or almost glabrous, green, usually covered with sessile lustrous glandular hairs; basal leaves oblong or oblong-ovate, pinnatilobate or almost lyrate-pinnatipartite, up to 15 cm long, 1.5 to 3(4) cm wide in middle, petiolate, petioles two-fifths to half as long as lamina; usually plants withering before flowering; cauline leaves numerous (in ssp. *turkestanica* Lipsch. less numerous and sparse), ovate or broadly lanceolate, sessile, entire, often some, usually in lower half of lamina, crenate-lobate or toothed, all leaves acuminate, narrowed toward base, sometimes weakly decurrent (in ssp. *turkestanica* Lipsch.), 3–10 cm long, 0.5–2.5(3) cm wide; uppermost leaves reduced, narrower, linear-lanceolate, 0.3–0.8 cm wide. Capitula cylindrical, 1.5–2 cm long and 0.5–0.8 cm wide, usually numerous, in broad corymbose-paniculate inflorescence (in ssp. *turkestanica* Lipsch. inflorescence poorly developed, usually terminal compact corymb; less often, besides terminal many lateral corymbs also present). Involucre imbricate; bracts somewhat arachnoid hairy-pubescent, with scattered lustrous glandular hairs, green, sometimes entirely or partially dark-colored; bracts of two or three outer rows ovate, subobtusate or cuspidate (in ssp. *turkestanica* Lipsch., outer as well as inner bracts more acuminate, often with a short blackened cusp); receptacle covered with linear-subulate, lustrous, up to 0.7 cm long scales. Florets purple-pink, about 1.3–1.4 cm long, narrow part of

tube about 0.8 cm long, broad part with lobes of limb covered with glandular hairs, about 0.6 cm long; anthers exerted, about 0.5–0.6 cm long; their appendages comose-woolly. Pappus white, double, outer pappus-bristles serrate, fragile, about 3–4 mm long, inner ones plumose, about 1 cm long; achenes about 0.5 cm long, cylindrical, mottled due to longitudinal violet stripes, glabrous. Flowering VII–VIII.

Meadow, shrub and sheep fescue steppes, stony slopes.—*Soviet Central Asia*: Aralo-Caspian Region, Syr-Darya, Balkhash Region, Tien Shan (predominantly ssp. *turkestanica* Lipsch.), Dzhungaria-Tarbagatai, Pamiro-Alai (predominantly ssp. *turkestanica* Lipsch.); *Western Siberia*: Irtysh (eastern part).

S. elegans Ldb. is described from the Chingistau Mountain. Type in Leningrad. *S. tenuis* Ldb. is described from the Arkat Mountains. Type in Leningrad. *S. amoena* Kar. and Kir. is described from Chorga Creek, draining into Lake Nor-Zaisan. Type in Leningrad; isotype in Moscow.

Note. A quite polymorphic species with extremely unstable characters. The original diagnosis of the species by Ledebour says: "Folia supra scabra subtus tomento arachnoideo incana." Specimens with snow-white tomentum on the lower surface of the leaves (this is var. *nivea* Lipsch.) are found throughout the range of this species. Apparently, this type of pubescence, running the gamut of transitions to green, almost glabrous or grayish lower leaf surface due to arachnoid-floccose pubescence, is a consequence of ancient hybridization between *S. elegans* and other species (*S. salicifolia*, *S. cana*) with a white-tomentose lower leaf surface. I do not see a basis for segregating *S. amoena* Kar. and Kir. as a separate species. The distinctive features of this species are not constant. These are: 1) stems branched from base to top (that is explained by the fact that the specimens used by Karelin and Kirilov to describe their species were cattle-grazed and then grew again with profuse branching); 2) broadly lanceolate leaves, 2.5–5.5 cm long and 0.8–1 cm wide (they are also characteristic for several forms of *S. elegans*); and 3) presence of more or less numerous vegetative shoots in the leaf axils (which is also observed in typical *S. elegans*).

Typical *S. tenuis* Ldb. is distinguished by greater leafiness and more numerous vegetative shoots in the leaf axils, leaves that are glabrous on the lower surface and are usually narrower, with slightly involute margins, and more strongly crenate-lobate (their lobes sometimes elongate, acute), and by compact corymbs of smaller capitula. None of these characters is constant, since in *S. elegans* specimens also are found that are characterized by a more or less strongly leafy stem, numerous, short, vegetative shoots in the leaf axils, pubescence lacking on the lower leaf surface (contrasting with the distinct snow-white tomentum here in var.

nivea Lipsch.), variable cutting and size of the leaves, compact and
 425 poorly developed corymbs, as well as by the size of the capitula. For
 this reason, I am combining *S. tenuis* Ldb. with *S. elegans* Ldb. Albino
 specimens of *S. elegans* f. *albiflora* Lipsch. occur.

31. *S. larionovii* Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1891)
 376.—*S. takhtadjanii* Lipsch. in Byull. Mosk. Obshch. Isp. Prir., Otd.
 Biol. LIX, 6 (1954) 83.

Perennial. Root woody, fibrously branched. Stems solitary or few,
 (10)15–25(30) cm long, upright or slightly ascending, angular-sulcate,
 canescent, sometimes almost glabrous, simple or branched, usually
 weakly winged. Leaves quite variable in shape and width, lanceolate,
 oblong-lanceolate, linear-lanceolate, in type form distinctly crenate-
 toothed or pinnatifid, often entire, strongly scabrous above and along
 margin due to numerous spiny bristles, more or less grayish beneath
 due to arachnoid-hairy pubescence or white-tomentose (var. *nivea*
Lipsch.), less often almost glabrous with distinct midrib, merging in a
 weakly winged petiole in basal leaves; basal leaves sometimes early
 withering; lower cauline leaves 5–10 (less often more) cm long including
 petiole, (0.5)1–1.5 cm wide, petiole (1)2–3(5) cm long; middle and upper
 cauline leaves reduced, sessile, semiamplexicaul and more or less
 decurrent, as a result stems sometimes somewhat winged. Capitula 1.2–
 1.4(1.6) cm long, (0.3)0.5(0.7) cm wide, narrow cylindrical, in compact,
 erect corymbs; sometimes, when stem branched, few lateral corymbs
 besides central corymb borne in corymbose-paniculate inflorescence.
 Involucre withered, four- or five-rowed, reddish, sometimes green,
 arachnoid-hairy, glabrescent; outer bracts ovate, inner oblong-lanceolate;
 all bracts, especially inner acuminate, with distinct midrib, attenuate in
 aristate straight or weakly curved cusp, sometimes dark-colored, readily
 breaking, with hyaline hairs along margin and apex on outer as well as
 inner sides. Receptacle covered with long scales, scales subulate, three-
 fourths as long as inner involucral bracts; lustrous; florets pink, up to
 1.4 cm long, narrow part of tube about 0.7 cm long, as long as broad
 part of tube including lobes of limb, limb with sessile, lustrous glandular
 hairs; appendages of anthers floccose-lanate. Pappus double, outer pappus
 bristles short, up to 2–2.5 mm long, fragile, scabrous-serrate, inner bristles
 plumose, about 1.1–1.2 cm long; achenes glabrous, with short corona.
 Flowering VII–VIII.

Stony slopes, outcrops of red clays and shales, shore gravels, saline
 meadows, *Lasiagrostis* complex.—*Soviet Central Asia*: Tien Shan (valleys
 of Kegen, Sarydzhas, Tekes, and other rivers). *General distribution*:
 Dzhungaria-Kashgaria. Endemic. Described from China, from the Great
 Yulduz Range and from the Kharsal River. Type in Leningrad.

426 *Note.* The plant was described by K. Winkler from specimens without fully developed capitula. The main character given by Winkler as distinguishing this species from other “narrow-leaf forms of *S. salicifolia*” is the presence of distinct appendages on the involucre bracts. Winkler wrote: “All *Saussurea* with involucre bracts having apical appendages are distinguished by more or less roundish, and not linear-lanceolate, appendages.” In this *Saussurea* by “appendage” Winkler meant a sinuate or straight cusp, which is the continuation of the midrib of the involucre bract. This cusp is aristate, usually without pigmentation, with hyaline cilia along the margin and at the apex; it breaks off easily. Without any hesitation, I include under *S. larionovii* the *Saussurea* specimens from the central Tien Shan (Sarydzhas and Kegen River valleys). These specimens differ somewhat from the authentic specimens of *S. larionovii* originating from the Kharsal River in the region of the Great Yulduz, where they were collected by Larionov. Our specimens differ from the authentic ones by a longer stem, distinctly dentate-crenate or pinnatifid leaves (this tendency is also readily observed in the type specimens), a wider and distinct branching of the stem and, consequently, the formation of paniculate inflorescence in some specimens. However, according to my broad interpretation of the species, they undoubtedly should be referred to *S. larionovii*, given the presence of the aristate cusp on the involucre bracts, the more or less winged stems, and the shape of capitula. In 1954, I described *S. takhtadjanii*, from material collected outside the USSR (the former Chinese Turkestan—Muzart, Maral Bashi; type in Leningrad). I pointed out that this species is closest to *S. larionovii* Winkl., but differs from the latter by having a wingless, strongly branched stem with numerous, erect corymbs of capitula, and broader leaves, crowded at the base of the stem, where they form rosette-like structures. The revision showed that *S. takhtadjanii* should be relegated to synonymy under *S. larionovii*. *S. larionovii* apparently is closest to *S. alberti* Rgl. and Winkl. It differs from the latter by leaves that are grayish-tomentose beneath, erect corymbs of capitula, number of florets in a capitulum (12–13, and not 19–20), and more acute involucre bracts.

32. *S. alberti* Rgl. and Winkl. in Tr. Peterb. Bot. Sada, VI, 2 (1880) 298.

Perennial. Stem sulcate, weakly winged. Basal leaves petiolate, elliptical-lanceolate or oblong-lanceolate, acute, crenate-dentate, weakly cuneate toward base, glabrous on both sides, scabrous along margin due to small bristles that are visible under a lens, up to 7 cm long, excluding petiole, and 2–2.75 cm wide; cauline leaves narrower, usually entire, glabrous, decurrent on stem as wing. Capitula with 19–20-florets,

numerous, pedunculate in corymbs at the apices of bent floriferous branches. Involucre almost cylindrical; bracts imbricate, appressed, acute, arachnoid-hairy, glabrescent; outer bracts ovate, middle oblong-lanceolate; 427 inner bracts almost linear; receptacle covered with unequal, up to 0.8 cm long scales. Florets pink, about 1.3 cm long, narrow part of tube 0.6–0.7 cm long, as long as its broad part including lobes of limb; appendages of anthers comose-woolly. Pappus double, outer pappus-bristles scabrous, small, inner ones plumose, four times as long as outer ones; achenes oblong, angular, with short apical corona.

Soviet Central Asia: Tien Shan. *General distribution*: China (the former Kuldzha District). Type in Leningrad.

Note. The species was described from specimens grown in the Petersburg Botanical Garden from seeds sent by Dr. A. Regel from "Chinese Turkestan." The authors of the species compared it with *S. salicifolia*, distinguishing it from the latter and all other closely related species by the glabrous leaves, of which the cauline leaves are decurrent as a rather broad wing, and also the setose-scaly receptacle. The latter character, introduced by Regel and Winkler, is characteristic for all members of series *Salicifoliae* Lipsch. In my view, *S. alberti* is closest to *S. larionovii* (cf. the note to the latter species).

Series 8. Pulviniformes Lipsch.—Plants forming pulvinate turf. Stem short, 1.5–2 cm long, one-headed. Leaves pinnatifid, small. Pappus bristles, according to Winkler, broader at apex.

33. *A. pulviniformis* Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1891) 377.

Perennial. Plants forming dense pulvinate turf, almost glabrous. Root thick, woody, with fibrously split bark, many-headed. Stems 1.5–2 cm long, numerous, at densely covered base with hard brown remains of old leaves. Leaves small, pinnate; basal leaves petiolate, sheathing at basally, pinnatilobate, lobes small, almost roundish, obtuse, entire or toothed, and then teeth subobtuse; terminal lobe larger, orbicular, subobtuse or less often elongate-subobtuse; cauline leaves few, like basal in shape, amplexicaul. Capitula up to 1 cm long and 0.5 cm wide, solitary, terminal on stem apex, glabrous. Involucre five- or six-rowed, all involucral bracts membranous; outer bracts ovate, subobtuse; inner bracts lanceolate or ovate-lanceolate, with short cusp or subobtuse; receptacle with numerous small scales; appendages of anthers woolly (?). Achenes obpyramidal, four-ribbed; pappus bristles long-plumose, broader at apex. Flowering V.

Found outside the USSR, in the Kuldzha District (Iren-khabirga and Taldy ranges). Possibly may be found in the USSR. Type in Leningrad.

Note. It has not been collected by anyone since A. Regel. The authentic specimen, which has been in the hands of Winkler and me, is incomplete and does not permit one to give a more detailed description of the floret and pappus (apparently, the latter is two-rowed). The species is tentatively included in section *Laguranthera*.

Section 3. Benedictia DC. Prodr. VI (1837) 533; Endlich. Gen. Pl. (1836–1840) 468.—*Eusaussurea* C.A.M. ex DC. op. cit. (1837) 522 (ined.).—Sect. *Lagurostemon* (Cass.) DC. ex Kitam. in Acta Phyt. et Geo-bot. IV (1935) 4 p. p.; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 150 p. p.—Sect. *Chaetocline* Franch. in Journ. de Bot. II, 18 (1888) 311.—Root and rhizome not fibrously split. Involucral bracts with or without herbaceous saber-shaped appendages. Receptacle with scales. Appendages of anthers ciliate, not comose-woolly. Pappus double.

— *Subsection 1. Odontolepis* Kitam. in Acta Phyt. et Geobot. IV (1935) 4; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 150.—Involucral bracts cristate-pinnatifid.

34. *S. odontolepis* Sch. Bip. ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 131 p. syn.; Maxim. in Mém. Biol. XI (1883) 803 (descr. emend.) and Bull. Acad. Sc. Pétersb. XXIX (1883) 176; Kom. Fl. Manchzh. III, 732; Nakai, Fl. Korean. II, 42; Ej. in Bot. Mag. Tokyo, XXIX, 206; Ej. Fl. sylv. Korean. XIV, 119; Kom. and Alis. Oprod. Rast. Dalnevost. Kr. II, 1071; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 150.—*Saussurea pectinata* β. *amurensis* Maxim. Prim. Fl. Amur. (1859) 171.—*S. ussuriensis* Maxim. δ. *odontolepis* Herd. op. cit. (1868) 13.—*lc.*: Kom. and Alis. op. cit. Plate 320.

Perennial. Rhizome strong, inclined, with fibrous roots. Stem erect, 40–100 cm high, densely leafy, sulcate-angular, sparsely pubescent or almost glabrous, branched or less often simple in upper part. Leaves sharply scabrous, especially above and along margin due to more or less numerous short spines, pubescent beneath and usually with numerous lustrous glandular hairs, less often subglabrous and not glandular, petiolate, deeply pinnatifid almost up to midrib, with numerous (10–16, sometimes less) lateral pairs of lobes; lateral lobes remote, in type form long, almost linear, acute, entire or in turn toothed with many pairs of teeth, their tips like primary lobe with cartilaginous spiny cusp; middle and upper cauline leaves not decurrent on stem; uppermost leaves reduced, sessile, cristate-pinnate. Capitula pedunculate, 1.2–2 cm long and 0.5–0.8 cm wide, in dense compound corymb. Involucre tubular, arachnoid-hairy. Involucral bracts with lustrous glandular hairs; outer bracts lanceolate, with straight or weakly deflexed saber-shaped

429 appendages, cristate-toothed, inner bracts longer, linear, dark red or violet at apex, usually entire. Receptacle with linear-subulate, lustrous, unequal, up to 0.4–0.5 cm, long scales. Florets pink, about 1–1.1 cm long, narrow part of tube 0.5–0.6 cm long, almost as long as its broad part with deeply divided lobes of limb; appendages of anthers ciliate. Pappus double, outer pappus-bristles less numerous, fragile, toothed, unequal, up to 2 mm long, inner ones about 6–8 mm long, plumose; achenes glabrous 3–5 mm long, about 2 mm wide, with short-toothed corona, narrowed toward base, dark mottly. Flowering VII–VIII.

Meadows, sandy-gravelly deposits, thickets of shrubs, oak forests, turf-covered rocks.—*Far East*: Zeya-Bureya, Ussuri. *General distribution*: Korea, northwestern China. Described from southern Amur and from the Burei Range. Type in Leningrad.

Note. The Chinese species *S. pectinata* Bge., which is not found in the USSR, also belongs to subsection *Odontolepis* Kitam. *S. odontolepis* Sch. Bip. differs from *S. pectinata* by having capitula only about half as large, narrower and more weakly pubescent involucre bracts, and also more numerous and narrower lateral lobes of the leaves.

Subsection 2. Hololepis Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 372.—Involucre bracts entire.

Series 1. Monocephalae Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 152, emend. Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 372.—Capitula solitary, less often two. Involucre ovoid or campanulate, bracts imbricate, acute or subacute. Leaves white-tomentose beneath, more or less pubescent or almost glabrous above, glabrous on both sides only in *S. sajanensis*, but arachnoid-hairy along margin, midrib, and petiole.

35. *S. jadrinzevii* (= *jadrinzevi*) Kryl. in Tr. Bot. Muz. XIV (1915) 143; Kryl. Fl. Zap. Sib. XI, 2922.—*Ic.*: Kryl. op. cit. (1915) 145, Plate 4 (colored).

430 Perennial. Rhizome inclined or ascending, dark brown, with fibrous roots in lower part. Stems 7–20 cm high and 1–2 mm thick, solitary, erect, simple, obtusely ribbed, somewhat tomentose; particularly densely in upper part, weakly leafy. Leaves, except uppermost, petiolate, coriaceous; basal leaves two to five, petiolate, petioles almost as long as lamina, 2–7 cm long and 1–2.5 cm wide, oblong-elliptical, obtuse or cuspidate, with roundish or less often somewhat cuneate, sometimes weakly cordate base, toothed throughout, teeth infrequent, unequal, with very short callose, erect or decurved cusp, teeth sometimes indistinct, very small; lamina bicolored, snow white-tomentose beneath excluding midrib, green above, covered with white-tomentum only along veins,

forming distinct white network; cauline leaves like basal, three or four, short-petiolate, narrower and long acuminate, lanceolate or elliptical-lanceolate; uppermost leaves small, sessile, linear or lanceolate-linear. Capitula solitary, terminal on stem, about 2 cm long at fruiting, up to 1.5 cm wide. Involucre ovoid, imbricate, four- or five-rowed, bracts unequal; outer bracts ovate, cuspidate, more or less tomentose and with sparse lustrous glandular hairs, 5–7 mm long and 3–4 mm wide; inner bracts oblong, subobtuse, 10–14 mm long and 2–3 mm wide, densely covered with straight, long, silky, stiff, appressed hairs and isolated lustrous glandular hairs. Receptacle densely covered with linear-subulate, lustrous, 0.5–0.8 cm long scales; florets lilac-pink, about 1.4 cm long, narrow part of tube about 0.6 cm long, almost as long as broad part along with lobes of limb; latter divided slightly deeper than half in linear, obtuse lobes; appendages of anthers ciliate. Pappus double, outer pappus-bristles serrate-scabrous, unequal, about 3–4 mm long, persistent, inner ones long-plumose about 1.2–1.3 cm long; achenes dark brown, smooth, 0.5–0.6 cm long. Flowering VII.

Limestone rocks and stony slopes.—*Western Siberia*: Altai (Kuldzha River Valley). Endemic. Described from the Chuya River. Type in Leningrad; isotype in Tomsk.

Note. Sergievskaja (Kryl. *Fl. Zap. Sib.* (Flora of Western Siberia), XI, 2923) reported a hybrid between *S. jadrincevii* Kryl. and *S. controversa* DC., which she named var. *intermedia* Serg. and characterized as having taller (up to 40 cm high) stems, two to five compactly arranged capitula, and a more weakly developed tomentum on the upper leaf surface.

36. *S. tomentosa* Kom. in Bot. Mat. Gerb. Glavn. Bot. Sada, II, 33–34 (1921) 135.

Perennial. Stem (4)15–20(25) cm high (occasional specimens with 2.5–3 cm high stem), pubescent, leafy, simple, one-headed, less often weakly branched at apex and then two-headed. Leaves lanceolate-oblong or linear, acuminate, sometimes subobtuse; basal and lower cauline leaves usually broader, (3)5.5–12 cm long and 1–2 cm wide, long-petiolate; upper cauline leaves short-petiolate, weakly toothed or entire, grayish or whitish-tomentose beneath, weakly arachnoid-hairy or almost glabrous above. Capitula solitary, less often two, in type form up to 2–2.5 cm wide, usually subtended by one to three linear bracteal leaves. Involucre four-rowed; involucre bracts almost glabrous, white-tomentose only along margin and apex, ovate-triangular, acuminate, recurved. Receptacle with about 0.6–0.7 cm long scales; florets pink-violet, about 1.2 cm long; narrow part of tube about 0.6 cm long, almost as long as broad part including lobes of limb; anthers lustrous, grayish-blue; appendages of

anthers ciliate. Pappus double, smoke-colored, outer pappus-bristles less numerous, serrate, fragile, small, about 2–3 mm long, inner ones long-plumose, about 1–1.1 cm long; achenes about 5 mm long, dark brown, glabrous, ribbed, with toothed corona. Flowering VII–VIII.

Rocks; stony-lichen tundra. *Far East*: Ussuri (Sikhote-Alin, 'Dusse-Alin'), ?Uda region Endemic. Described from the left bank of the Amur River in the Khabarovsk District. Type in Leningrad.

Note. In the original description it was compared with representatives of the group of *S. alpina* DC., from which it can be differentiated at once by the one-headed stem, broad receptacle and involucre bracts twisted in the upper part. Undoubtedly, it belongs to the series *Monocephalae* Kitam. of one-headed species, which mostly have bicolored leaves, white-tomentose beneath and green, glabrous or more or less pubescent above. It is particularly close to *S. porcellanea* Lipsch.; *S. tomentosa* Kom. differs from this species by larger capitula, up to 2–2.5 cm wide, distinctly acuminate, deflexed involucre bracts, and lower leaves lacking a cordate base and with weaker pubescence. (Plate XXXI, Fig. 1.)

37. ***S. porcellanea*** Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 455 (nomen).—*S. nivea* Kom. and I. Schischk. in Bot. Mat. Gerb. Sada, VI, I (1926) 17, non Turcz. 1837.—*S. nakaiana* Kom. in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 1–2 (1932) 220, saltem ex descriptone, non e typo.

Perennial. Stem erect, (6)8–15(20) cm high, densely white-tomentose, glabrescent, simple, one-headed, less often slightly branched at apex and then two-headed. Leaves cordate, petiolate, acuminate, toothed, teeth with blackish cusps, densely white-tomentose beneath, tomentose-arachnoid hairy above, glabrescent, and then green, basal leaves with petiole 5–12 cm long, 2–3(6) cm wide, petiole 2–4(5.5) cm long; cauline leaves gradually reduced toward stem apex, uppermost leaves linear-lanceolate or linear, narrow. Capitula solitary or less often two, usually subtended by one or two, linear white-tomentose bracts, about 2–2.5 cm long and 0.8–1.1 cm wide. Involucre four-rowed, outer involucre bracts ovate or ovate-triangular, pubescent or almost glabrous, white-tomentose only above; middle and inner bracts oblong, usually dark-colored, glabrous, white-tomentose only along margin, less often entirely pubescent; all bracts subobtusely. Receptacle with linear, about 0.5–0.7 cm long scales; florets pink-violet, about 1.3 cm long, narrow part of tube 0.5–0.6 cm long, as long as broad part together with lobes of limb; anthers brown-violet, appendages of anthers ciliate. Pappus dirty, double,
432 outer pappus-bristles serrate, fragile, less numerous, about 4 mm long,

inner ones long-plumose, about 1–1.1 cm long; achenes about 4–5 mm long, glabrous, with crown. Flowering VII–VIII.

Gravelly, heath-lichen alpine tundra, stony glades among the thickets of Japanese stone pine.—*Far East*: Ussuri Region (Sikhote-Alin Reserve). Endemic. Described from Sikhote-Alin. Type in Leningrad.

Note. *Saussurea nivea* Kom. and I. Schischk. was found to be identical with *S. nakaiana* Kom. Since the name *S. nivea* Kom. and Schischk. is a later homonym, it cannot be retained. True *S. sovietica* has been wrongly cited as the type specimen in the description of *S. nakaiana* Kom., although *S. nakaiana* Kom. itself was described correctly from a different specimen. In view of the confusion about this species, I was compelled to give it a new name. In the nature of pubescence of stems, leaves and involucre bracts, *S. porcellanea* is closest to *S. sovietica*, possibly its derivative; it differs by weaker growth and the presence of one or two capitula and connects the two series *Monocephalae* Kitam. and *Sovieticae* Lipsch.

38. ***S. kitamura*** Miyabe and Tatewaki in Trans. Sapporo Nat. Hist. Soc. XIV, 4 (1936) 267; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 152; Sugaw. Ill. Fl. Saghal, IV, 1883.—*S. komarovii* Soczawa in Sov. Bot. XIII, 1 (1945) 29 (nomen); Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 455.—**lc.**: Miyabe and Tatewaki, op. cit. (1936) fig. 16; Sugaw. op. cit. (1940) tab. 865.

Perennial. Rhizome short-creeping, sparsely covered with bases of previous year's leaves; stem short, 4.5–7 cm high, erect, simple, sulcate, arachnoid-hairy, glabrescent, one-headed. Leaves succulent, ovate, or ovate-oblong, somewhat acuminate, with cartilaginous cusp, cuneate or almost roundish at base, lamina about 6 cm long and 1–1.5(2) cm wide, crenate-toothed, teeth cartilaginous; basal leaves persisting up to flowering; lower cauline leaves petiolate, petioles 1.5–2 cm long; upper leaves lanceolate-oblong or lanceolate, smaller and narrower, 0.2–0.7(1.2) cm wide, short-petiolate or sessile. Capitula solitary, (0.5)1–2(2.5) cm wide, often with less numerous bracts near base, similar to involucre bracts. Involucre campanulate, imbricate; involucre bracts four-rowed, dark, outer and middle ovate, obtuse; inner bracts oblong or oblong-linear, far exceeding outer, acuminate, often flocculose bracts. Receptacle with linear-subulate, lustrous about 0.5–0.6 cm long scales; florets about 1.1–1.2 cm long, narrow part of tube about 0.6 cm long, almost as long as broad part including lobes of limb; appendages of anthers ciliate. Pappus double, outer pappus-bristles serrate-scabrous, fragile, about 1–3 mm long, inner ones long-plumose, about 0.9–1.1 cm long; achenes brown, 4–5 mm long, cylindrical, glabrous. Flowering VII–VIII. (Plate XXXI, Fig. 2.)

Alpine lichen tundra; stony areas in the high-mountain region.—*Far East*: Ussuri (northern Sikhote-Alin), Sakhalin. Endemic. *S. kitamura* was described from Sakhalin; type in Japan. The name *S. komarovii* Soczava was proposed for the plant described from northern Sakhalin; type in Leningrad.

Note. A comparison of specimens of *S. kitamura* and *S. komarovii* revealed their complete identity. Thus, *S. kitamura*, earlier believed to be a special Sakhalin endemic, is not endemic to this area but is also distributed on the continent. *S. kitamura* is quite close to *S. porcellanea*, from which it differs by leaves that are grayish arachnoid beneath (and not densely white-tomentose) and have a cuneate or almost roundish base (distinctly cordate in *S. porcellanea*).

39. ***S. sajanensis*** Gudoschnikov in *Sistemat. Zam. Gerb. Tomsk. Univ.* 77–78 (1954) 7; Lipschitz in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XXI, 372.—*lc.*: Gudosch—nikov, *op. cit.* 8.

Perennial. A miniature alpine plant. Stem solitary, 2–7 cm high, dark-colored, arachnoid-hairy, leafy throughout, wingless. Leaves somewhat hard, mainly below, green, glabrous on both sides, arachnoid-hairy along prominent midrib and margin; basal leaves petiolate, petioles one-third to half long less often as long as lamina, lamina lanceolate or almost ovate, basally cuneate or almost roundish, (1)2–5 cm long and 0.4–1 cm wide, shallow crenate-toothed, teeth remote, with short callose cusp or somewhat convolute; cauline leaves few, narrower and smaller, linear or lanceolate. Capitula solitary or in groups of two. Involucre cylindrical, 1.1–1.2 cm long and 6–10 mm wide; outer involucre bracts ovate, inner lanceolate, both obtuse, usually dark-colored, pubescent. Receptacle densely covered with linear-subulate, lustrous, up to 7 mm long scales; florets pink-lilac, about 1.2 cm long, narrow part of tube almost as long as broad part including lobes of limb; appendages of anthers hairy. Pappus double, outer pappus-bristles fragile, small, inner ones plumose, longer; achenes not mature, 3–4 mm long, brownish, ribbed, glabrous: Flowering VII. (Plate XXXI, Fig. 3.)

Rocks.—*Eastern Siberia*: Angara-Sayan (western Sayans). Endemic. Described from the Abakan River System (Lake Antyuzher-Kul). Type in Tomsk; isotype in Leningrad.

Note. The author considers his species to be close to *Saussurea parviflora* var. *contracta* Ldb. In my opinion, *S. sajanensis* belongs to the series *Monocephalae* Kitam., which includes the unique unicapitulate species found on rocks and stony outcrops, with a narrow range confined to the local mountain systems from Altai to Sikhote-Alin.

434 *Series 2. Sovieticae* Lipsch. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XXI (1961) 372.—Capitula numerous, in dense compact



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Plate XXXIII.

1—*Saussurea sachalinensis* Fr. Schm.; 2—*S. acuminata* Turcz.

corymb. Involucre ovoid or campanulate; involucre bracts imbricate, with short blackish cusp. Leaves cordate. Entire plant, including leaves on both sides, densely white-tomentose.

40. *C. sovietica* Kom. in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 1–2 (1932) 220; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1064.—*S. nakaiana* Kom. in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 1–2 (1932) 221 p. p. saltem quoad pl. No. 943.—**lc.**: Kom. and Alis. op. cit. (1932) Plate 319.

Perennial. Entire plant white-tomentose. Stem 25–60 cm high, erect, woody, simple, densely white-tomentose. Leaves densely white-tomentose on both sides (weakly above), acuminate, distinctly irregularly toothed, teeth terminating in short, callose black cusp; basal leaves hastate, acuminate, cordate or less often cuneate, long-petiolate, 10–15(18) cm long and 4–7 cm wide, petiole weakly sulcate, 2.5–8 cm long and about 3 mm wide; middle cauline leaves short-petiolate, broadly cuneate; upper leaves much smaller, lanceolate, narrowly cuneate. Capitula up to 13 in compact corymb; individual corymbs on hard, erect, short, whitish-pubescent peduncle; young capitula ovoid, white-tomentose, ovoid-campanulate when mature, somewhat swollen below, about 2 cm long. Involucre imbricate, four- to six-rowed, initially densely white-tomentose (bracts tomentose), later sometimes subglabrous in upper part; outer bracts ovate, inner oblong, longer than outer, erect; all bracts with short dark-colored cusp. Receptacle densely covered with linear, lustrous, about 0.9 cm long scales, almost as long as inner involucre bracts; florets pink; about 1.2 cm long, narrow part of tube about 0.6 cm long, as long as broad part including lobes of limb; appendages of anthers ciliate. Pappus double, outer pappus bristles serrate, fragile, about 3–4 mm long, inner ones plumose, about 1 cm long; achenes (immature) glabrous, ribbed, about 4 mm long. Flowering VIII–IX.

Rocks and stony heaths.—*Far East*: Ussuri (southern Sikhote-Alin). Endemic. Described from southern Sikhote-Alin. Type in Leningrad.

Note. Komarov compared his species with *S. erirolepis* Bge., from which it differs by leaves which are densely white-tomentose above, white-tomentose involucre bracts, and by hastate and not cordate lower leaves in the type specimen. It appears to me that *S. sovietica* is closer to *S. porcellanea* Lipsch., from which it can be distinguished instantly by the presence of numerous white-tomentose capitula (capitula are solitary in *S. porcellanea*, rarely 2; involucre bracts glabrous, only at apex white-lanate), and taller plants. In the list of typical specimens of *S. sovietica*, Komarov included the herbarium sheet No. 935 (Tazovskaya Mountain in southern Sikhote-Alin, B.K. Schischkin), which totally agrees with the diagnosis; I accept this specimen as the lectotype of *S. sovietica*.

Along with this specimen, Komarov wrongly mentioned No. 943; this specimen already belongs to *S. porcellanea* Lipsch. (compare the note to the latter). *S. sovietica* Kom. is one of the most ornamental species of *Saussurea*, which should be introduced into cultivation.

Series 3. Squarrosae Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 373.—Capitula usually numerous, in dense compact corymb. Involucral bracts imbricate, with long squarrose cusp. Leaves white-tomentose on both sides, more densely beneath, cuneate or cordate at base.

41. *S. squarrosa* Turcz. in Bull. Soc. Nat. Mosc. XX, 2 (1847) 44; Ej. Fl. baic.-dahur. II, 1, 117; Popov, Fl. Sr. Sib. II, 762; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI, 373.—**lc.**: Popov, op. cit. (1959) Plate 89, Fig. 1.

Perennial. Root collar covered with blackish-brown remains of old leaves. Stem arachnoid, glabrescent, reddish, simple, sometimes weakly branched only above, 10–20(30) cm long. Leaves sparsely flocculose-arachnoid hairy to villous above, white-tomentose beneath, variable in form and size, more or less serrate-toothed, teeth terminating in black, sometimes weakly curved cusp; basal and lower cauline leaves petiolate, lanceolate or oblong-lanceolate, 4–10 cm long including petiole, 1–2(2.5) cm wide, petiole arachnoid-white tomentose, 1.5–3 cm long; upper cauline leaves like lower, short-petiolate or sessile, not decurrent; all leaves distinctly cuneate. Capitula less numerous (three to seven), 1.2–1.4 cm long and 0.8–1 cm wide, pedunculate, in compact corymbs, usually subtended by bracts. Involucre four-rowed; involucral bracts usually dark-colored, ovate or oblong, acute; outer bracts in type form squarrose, white-tomentose, inner appressed, erect, pubescent. Receptacle with linear, lustrous, about 4–5 mm long scales; florets dark violet, about 0.8–1 cm long; narrow part of tube about 0.4–0.5 cm long, almost as long as broad part including lobes of limb; appendages of anthers ciliate-hairy. Pappus double, outer pappus-bristles quite numerous, unequal, toothed-scabrous, about 2–3 mm long, inner bristles long-plumose, about 0.8–0.9 cm long. Flowering VII–VIII.

Limestone rocks in the alpine zone.—*Eastern Siberia*: Angara-Sayans (Tunkin alpine zone). Endemic. Described “from alpine zone of Nukhu-Daban.” Type in Leningrad.

437 **Note.** A forgotten species, described by N.S. Turczaninow and subsequently not cited by anyone except M.G. Popov. I saw the authentic specimen of Turczaninow, and without any doubt I include the specimen from the Tunkin alpine zone under this unique, elegant species segregated by Turczaninow. While describing the new species, Turczaninow had a

few specimens, apparently dwarfs; Turczaninow's indication that the receptacle of *S. squarrosa* is glabrous is incorrect; it is distinctly scaly. This species differs from *S. jadrincevii* Kryl. by more or less numerous capitula in corymbs and unique squarrose involucre bracts; it differs from *S. porcellanea* Lipsch., with which it was identified by some authors, by capitula in a corymbose inflorescence, cuneate (and not cordate) leaves, and squarrose, distinctly pointed involucre bracts; from *S. lenensis* M. Pop. it differs by the shape of the leaves and pubescence on the upper leaf surface, as well as by smaller capitula on short peduncles. Popov collected a form very close to *S. squarrosa* Turcz. (eastern Sayans, Arshan health resort, alpine zone, cirque, 21, VIII, 1953, M.G. Popov), which has to be considered as a new species—*S. pseudosquarrosa* M. Pop. and Lipsch.

42. ***S. pseudosquarrosa*** M. Pop. and Lipsch. in Popov, Fl. Sr. Sib. II (1959) 762 (descr. ross); Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961), 373 (descr. lat.).—*S. foliosa* var. *dentosa* Turcz. in DC. Prodr. VI (1837) 536 p. p.; Turcz. Fl. baic.-dahur. II, 1, 116 p. p.; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 38 p. p.

Perennial. Root short, vertical, many-headed, root collar covered with hardened remains of previous year's leaves. Stem (10)15–20 cm long, cylindrical or often flattened, predominantly in upper part. Leaves of vegetative shoots on long glabrous petioles, with oblong, acute, lobed at base or almost cordate lamina, light green and glabrous above, white tomentose beneath, crenate-sharply toothed, 6–10 cm long, 2–4 cm wide; cauline leaves on shorter petioles, lanceolate-oblong or lanceolate, like basal leaves but narrower. Capitula 7–10, on short peduncles, with linear bracteal leaves, aggregated in dense, almost capitate corymb. Involucre imbricate, more or less arachnoid hairy-tomentose, about 10 mm long, outer involucre bracts ovate, terminating in long, deflexed or erect cusp. Florets purple, about 1 cm long, narrow part of tube almost as long as broad part including lobes of limb. Receptacle scaly; scales linear-subulate, lustrous, unequal. Pappus somewhat dark, outer pappus bristles unequal, small, fragile, scabrous, inner ones plumose, about 0.9–1 cm long; achenes about 5 mm long, glabrous, lustrous. Flowering VII–VIII.

Alpine and subalpine zone.—Grass plots, stony screes, gravelly slopes.—*Eastern Siberia*: Angara-Sayans (Tunkin alpine peaks, Sokhodno and other mountains). Endemic. Described from the alpine peaks of Arashan. Type in Leningrad.

Note. Evidently this species is of hybrid origin, involving *S. squarrosa*, *S. controversa* and, possibly, *S. pricei*, as well as *S. sukaczewii*. It differs from *S. squarrosa* Turcz. by its leaves that are glabrous above,

more strongly crenate-sharply toothed, and almost cordate or lobed at base. Earlier I wrongly included some specimens of this species under *S. sukaczewii* Lipsch.

Series 4. Bicolores Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 374.—Capitula more or less numerous, in simple corymb or paniculate-corymbose inflorescence. Involucral bracts imbricate, subobtusate or acute. Leaves distinctly cordate or less often truncate at base, bicolorous—densely white-tomentose beneath, and glabrous and green above.

43. *S. controversa* DC. in Ann. Mus. Paris, XVI (1810) 199; Kryl. Fl. Zap. Sib. XI, 2921.—*S. discolor* DC. Prodr. VI (1837) 534 p. p. and β . *elatior* DC. op. cit. (1837) 535 (excl. syn. *S. eriolepis* Bge.); Ldb. Ic. pl. Fl. Ross. I, 18; Ej. Fl. alt. IV, 27; Ej. Fl. Ross. II, 2, 668; Turcz. Fl. baic.-dahur. II, 1, 113; Kryl. Fl. Alt. III, 707; Popov. Fl. Sr. Sib. II, 758.—*S. discolor* β . *elatior* s. *sibirica* (Fisch. herb.) Herd. in Bull. Soc. Nat. Mosc., XLI, 3 (1868) 30.—*S. propinqua* Iljin in Pavl. in Byull. Mosc. Obshch. Isp. Prir. Ser. Biol. XXXVIII, 1–2 (1929) 146; Fl. Yugo-Vost. VI, 385.—*lc.*: Fl. Yugo-Vost. VI, 387.

Perennial. Root collar loosely covered with remains of petioles of previous year's leaves. Stems 25–100 cm high, erect, solitary (less often two), simple, often branched only in inflorescence, more or less arachnoid-hairy, usually dark, violet, or dark-brown. Leaves bicolorous, green, glabrous or at places weakly flocculose-arachnoid hairy above, white-tomentose beneath, toothed, teeth broad, unequal, callously-pointed; leaf in apical part usually entire; lower leaves long-petiolate, with cordate, ovate-triangular or ovate-oblong lamina, attenuate-acuminate, deeply cordate at base, 5–17 cm long and 2.5–9 cm wide, almost as long as pulvinate petiole; middle cauline leaves short-petiolate, like lower leaves but usually narrower, with obtuse, sometimes weakly not equilateral (but not cordate) base; upper leaves reduced, narrow-lanceolate, sessile. Capitula up to 1.5 cm long (including florets) and about 0.8–1 cm wide, sometimes aggregated in more dense solitary terminal corymb, sometimes at the apices of more or less numerous, lateral branches of lax panicle. Involucre arachnoid-hairy, imbricate; its bracts usually black-violet or rarely light colored; outer bracts broadly ovate, short-acuminate; inner
439 bracts oblong, narrowed above and obtuse, densely woolly-pubescent. Receptacle densely squamose, scales linear-subulate, lustrous, up to 0.5 cm long; florets lilac-violet, about 1.2 cm long; narrow part of tube about 0.6 cm long, almost as long as broad part including lobes of limb; appendages of anthers pubescent. Pappus double, outer pappus-bristles 2–3(4) mm long, serrate, fragile, inner ones plumose, about

0.9–1 cm long; achenes about 4 mm long, glabrous, with a narrow corona. Flowering VII–VIII.

Mountain forest-meadows, open forests (larch, birch and pine), forest-covered stony slopes of mountains, limestone deposits, chernozem steppe-meadows.—*European Part*: Dvina-Pechora (eastern part), Volga-Kama; *Western Siberia*: Ob', Upper Tobol, Irtysh (eastern part), Altai; *Eastern Siberia*: Yenisei, Angara-Sayans, Dauria, Lena-Kolyma. *General distribution*: Mongolia (northern). *S. controversa* DC. is described from Siberia; type in Geneva. *S. propinqua* Iljin is described from Mongolia; type in Leningrad.

Note. It hybridizes with: 1) *S. jadrinzevii* Kryl. (cf. note to this species); 2) *S. alpina* (L.) DC. (cf. below, *S. uralensis* Lipsch.); and 3) *S. parviflora* (Poir.) DC. The last hybrid is known from the Irkutsk District, and has been found in the materials of N. Malzev for the issue of the Herbarium of the Russian Flora. Malzev collected *S. parviflora* in 1903 from the former Balagansky District, near the village of Bazhevskoe, and this material included an "admixture" of several sheets of *S. controversa*. While studying a large number of specimens of *S. parviflora* (Poir.) DC., I found several sheets with specimens intermediate between *S. parviflora* and *S. controversa*, which undoubtedly should be considered as hybrids of the two species. These specimens are characterized by somewhat larger capitula than in *S. parviflora* (deviation towards *S. controversa*), much broader ovate-oblong leaves than in *S. parviflora*, and some of them with a distinct weakly cordate base (in others with an unequal, truncate base), leaves slightly arachnoid beneath (deviation towards *S. controversa*), as well as leaf petioles weakly or not at all decurrent. These hybrids were not mentioned in the literature.

44. ***S. discolor*** (Willd.) DC. in Ann. Mus. Paris, XVI (1810) 199; Ej. Prodr. VI, 534 p. p.; Hegi, Ill. Fl. VI, 2, 836; Vozn. Rosl. URSR, 562.—*Serratula discolor* Willd. Sp. pl. III (1800) 1641.—*Saussurea discolor* α . *genuina* s. *europaea* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 30.—**lc.**: Rchb. Ic. Fl. Germ. XV, tab. 818; Cusin. Herb. Fl. Franc. XIII, tab. 381; Hartinger, Atlas Alpenpfl. V, tab. 474; Bonnier, Fl. Compl. France, Suisse and Belg. VI, tab. 333; Hegi, Ill. Fl. VI, 2 fig. 533c, 534, 535.

Perennial. Quite close to previous species from which it differs by having a shorter (5–25 cm high, less often taller), usually slightly ascending stem, a more compact inflorescence, fewer (two or three, less often five) capitula, and a more weakly developed cordate bases of the basal and lower cauline leaves. Flowering VII–IX.

440 *Crevice*s in rocks.—*European Part*: Upper Dniestr. *General distribution*: Central Europe (from France to Austria). Described from Central Europe. Type was in Berlin.

Note. I did not see the herbarium specimens from the Soviet Carpathians. Judging from the numerous specimens of this species from Central Europe examined by me, *S. discolor* (Willd.) DC. is extremely close to *S. controversa* DC. The distinguishing characters of both species listed above are quite unstable and poorly developed. But since the ranges occupied by these species are sharply isolated, in the present treatment of *Saussurea* I consider the two species as morphologically weakly differentiated geographic races of a previously single species.

45. *S. hypargyrea* Lipsch. and Vved. in Byull. Mosc. Obshch. Isp. Prir., Otd. Biol. LIX, 6 (1954) 74.—*S. discolor* auct. fl. Jacutiae.

Perennial. Root collar loosely covered with remains of petioles and sheaths of previous year's leaves. Stem single, 25–45 cm high, erect, simple or more or less branched, usually dark violet, less often green, tomentose, glabrescent, weakly leafy. Leaves oblong-lanceolate or linear-lanceolate, bicolorous, green above, white-tomentose beneath, weakly toothed, teeth with dark callose, sometimes slightly curved cusp, more or less cuneate or, less often roundish-truncate at base but never cordate; basal and lower cauline leaves petiolate, 4–12(17.5) cm long (including 1–5(9) cm long petiole), 0.5–1.7(2) cm wide; middle and upper cauline leaves reduced, linear-lanceolate to linear, short-petiolate or almost sessile. Capitula 1.8–2 cm long and 0.7–0.8 cm wide, in terminal corymbs of two to five capitula, besides often solitary or in groups of three on long lateral branches arising at different heights on stem. Involucre imbricate, four-rowed, villous; outer involucre bracts ovate, inner oblong, all subobtusate, weakly lilac colored or concolorous, especially along margin. Receptacle densely covered with whitish, linear-subulate, lustrous, about 0.8 cm long scales; florets pink-violet, 1.1–1.2 cm long, narrow part of corolla tube about 6 mm long, almost as long as broad part including lobes of limb; anthers violet, their appendages hairy. Pappus double, outer pappus bristles serrate, less conspicuous, less numerous, short, fragile, inner ones plumose, about 1 cm long. Flowering VII–VIII.

Limestone rocks, pine forests.—*Eastern Siberia*: Lena-Kolyma (Aldan River and its tributary). Endemic. Described from Yakutia. Type in Leningrad.

Note. It is an elegant Yakutian race of *S. controversa* DC., forming hybrids with *S. pseudoangustifolia* Lipsch., which are distinguished by grayish (and not white-tomentose) pubescence on the lower leaf surface, and narrower basal and lower cauline leaves.

- 441 46. *S. ajanensis* (Rgl.) Lipsch. in Byull. Mosk. Obshch. Isp. Prir. Otd. Biol., LIX, 6 (1954) 73.—*S. discolor* β . *ajanensis* Rgl. in Nouv. Mém. Soc. Nat. Mosc. XI (1859) 107; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 30.

Perennial. Stem 15–20 cm high, erect, simple, tomentose, glabrescent, weakly leafy. Leaves bicolor, glabrous above, white-tomentose beneath; basal leaves elliptical-oblong or oblong-lanceolate, subobtusate or short acuminate, petiolate, 5.5–11 cm long (including 2.5–4.5 cm long petiole), 1–1.5(2) cm wide, cuneate (not cordate) at base, somewhat toothed, teeth terminating in black, scarcely curved cusps, or leaves almost entire; lower cauline leaves like basal, almost sessile or with extremely short petiole; uppermost leaves reduced, linear or linear-lanceolate, sessile. Capitula in compact corymbs, three or four in one corymb, almost sessile, less often solitary, about 1.5–1.7 cm long and 0.7–0.8 cm wide, sometimes subtended by one or two bracteal leaves. Involucre imbricate, four-rowed, hirsute; outer involucral bracts ovate, inner oblong, all obtuse; florets pink-violet, 1.2 cm long; narrow part of tube about 0.5 cm long, as long as broad part including lobes of limb; appendages of anthers pubescent. Pappus double, outer bristles poorly developed, less numerous, small, fragile, serrate, inner ones about 1 cm long, plumose. Flowering VII.

Stony slopes.—*Eastern Siberia*: Okhotsk (vicinity of Ayan). Endemic. Described from the vicinity of Ayan. Type in Leningrad.

Note. *S. ajanensis* (Rgl.) Lipsch. is closest to *S. lenensis* M. Pop., from which it differs by a shorter stem, almost sessile capitula in compact corymbs, obtuse involucral bracts, short acuminate and weakly toothed leaves (in *S. lenensis* M. Pop. the involucral bracts are distinctly acuminate, the leaves are acute and deeply toothed). From *S. hypargyrea* Lipsch. and Vved. it differs by a shorter stem, sessile capitula, three or four in a corymb, or less often solitary (*S. hypargyrea* has pedunculate capitula in terminal corymbs; besides, there are lateral capitula on long branches).

47. *S. lenensis* M. Pop. ex Lipsch. in Byull. Mosk. Obshch. Isp. Prir. Otd. Biol. LIX, 6 (1954) 75; Popov, Fl. Sr. Sib. II, 763.

Perennial. Stem 30–35 cm long, erect or weakly flexuous, sometimes dark red, tomentose, glabrescent, branched above, weakly leafy. Leaves lanceolate or oblong-lanceolate, attenuate-acuminate, almost coriaceous, bicolor, glabrous and green above, white-tomentose beneath, with numerous teeth terminating in blackish somewhat curved cusps, weakly cuneate at base but not cordate, basal and lower cauline leaves petiolate up to 13 cm long and about 1–1.3 cm wide; middle and upper cauline leaves reduced, almost sessile or short-petiolate. Capitula two to four,

442 about 2 cm long, on long peduncles. Involucre imbricate, four-rowed, villous; outer bracts ovate or ovately triangular, inner oblong; all bracts distinctly acuminate, florets about 1.2 cm long; narrow part of tube 6 mm long, as long as broad part including lobes or limbs; appendages of anthers hairy. Pappus double, outer pappus bristles numerous, serrate, fragile about 3–4 mm long; inner ones long-plumose, about 1 cm long; achenes 3–4 mm long, glabrous. Flowering VII.

Stony slopes.—*Eastern Siberia*: Yenisei (Kirensk District, along Lena River). Endemic. Described from the Kirensk District. Type in Leningrad.

Note. It is closest to *S. ajanensis* (Rgl.) Lipsch., from which it differs by a taller stem, attenuate-acuminate, strongly toothed leaves, long-pedunculate capitula, distinctly acuminate involucre bracts, and more strongly developed outer pappus-bristles. Undoubtedly, *S. hypargyrea* Lipsch. and Vved. is also related phylogenetically, from which it differs by more attenuate-acuminate and distinctly toothed leaves, as well as acute involucre bracts.

48. × *S. uralensis* Lipsch. in Byull. Mosk. Obshch. Prir. Otd. Biol. LIX, 6 (1954) 75.—*S. controversa* DC. × *S. alpina* DC. in Lipsch. op. cit. (1954) 75.

Perennial. Root collar loosely covered with brown remains of leaves. Stem solitary (less often two), (3.5)5–20 cm long, often violet, erect, simple, more or less arachnoid-hairy. Leaves bicolorous, green and glabrous above, white-tomentose beneath, flat along margin, toothed, teeth callose, unequal; lower leaves long-petiolate, with oblong-lanceolate, roundish-truncate at base (not cordate) or weakly cuneate lamina, attenuate-acuminate, (2.5)4.5–10 cm long and (0.8)1.5–2.5(3.5) cm wide, petiole sheathing; middle leaves like lower, short-petiolate; upper leaves reduced, sessile, linear or lanceolate. Capitula cupuliform, up to 1.5–2 cm long and about 1 cm wide, in dense corymb of less numerous (two to five) capitula, less often solitary. Involucre 0.8–1(1.2) cm wide, imbricate, villous; bracts usually dark colored; outer bracts broadly ovate, short acuminate, sometimes glabrescent, inner oblong, subobtusate, densely woolly. Receptacle with linear-subulate, lustrous, unequal, up to 5 mm long scales; florets lilac-violet, about 1.1 cm long, narrow part of corolla tube about 6 mm long, almost as long as broad part including lobes of limb; appendages of anthers slightly hairy. Pappus double, outer pappus bristles 2–3 mm long, serrate, fragile, inner ones about 0.9–1 cm long, plumose; achenes (immature) 3 mm long, brownish. Flowering VII–VIII.

443 Mountain lichen-shrub tundra, birch-cedar dwarf forests, stony screes of alpine zone. Also found in upper part of subalpine zone at tree-line

(larch-birch open forests) and sometimes descending on "tongues" of stony screes in the lower part of this belt.—*European Part*: Volga-Kama (middle and southern Urals). Endemic. Described from Konzhakovskii Kamen. Type in Leningrad.

Note. This species is the hybrid *S. controversa* DC. × *S. alpina* DC. It is widely distributed over the entire Ural Range. It has inherited the white-tomentose pubescence of the lower leaf surface and the shape and size of the capitulum from *S. controversa* and the plant height, shape of the leaf base, nature of the involucre bracts, and compactness of the terminal corymb from *S. alpina*. It can immediately be distinguished from *S. controversa* by the shorter height, shorter and narrower, basally roundish or weakly cuneate (and not cordate) lower cauline leaves, and compact, few-headed corymb. It is also easily distinguished from the type specimen of *S. alpina* DC. by the white-tomentose pubescence of lower leaf surface and larger capitula.

Section 5. Splendidae Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 374.—Stem, lateral branches of inflorescence, and outer involucre bracts glandular-hairy. Leaves large, bicolored, green above, white-tomentose beneath. Involucre bracts with saber-shaped, erect or curved appendage.

49. *S. splendida* Kom. in Tr. Peterb. Bot. Sada, XVIII, 3 (1901) 424; Kom. Fl. Manchzh. III, 736; Kom. and Alis. Oprod. Rast. Dalnevost. Kr. II, 1063.—*lc.*: Kom. op. cit. (1907) Plate 15.

Perennial. Stem strong, erect, 90–120 cm high, sulcate, pubescent with grayish-yellow or dark brown, articulate sticky hairs. Leaves bicolored, green above, white-tomentose beneath; basal leaves long-petiolate (petioles winged at base, semiamplexicaul, pubescent), up to 16 cm long excluding petiole, 9–11 cm wide, ovate, with almost cordate base, acute, toothed (teeth with fine cusp) and ciliate under lens, short-ciliate above, densely white arachnoid hairy-tomentose below; middle cauline leaves short-petiolate, 10–11 cm long and 9 cm wide; upper leaves weakly toothed, sometimes almost entire, ovate-lanceolate or lanceolate, sessile, like middle leaves white-tomentose below. Inflorescence paniculate, many-headed, comprising corymbs; corymbs three to five-headed, terminal on lateral ferruginous, glandular-hairy branches with sticky hairs; bracts lanceolate-linear, acute, ferruginous, glandular-hairy. Capitula 1.5–2 cm long and 0.7–1 cm wide, on short peduncles. Involucre imbricate, five-rowed; outer involucre bracts ferruginous at base, ovate, with small, saber-shaped, erect or curved appendage, glandular-hairy along margin and apex; inner bracts linear-lanceolate, acuminate, densely lanate, sometimes glabrescent.

444 Receptacle almost conical, densely covered with linear-subulate, white-lustrous, about 6 mm long scales, florets light pink, up to 1.2 cm long, narrow part of tube about 6 mm long, as long as broad part including lobes of limb; appendages of anthers hairy. Pappus double, outer pappus bristles less numerous, serrate-scabrous, fragile, about 1 mm long, inner ones long-plumose, ferruginous at base, whitish above, about 9 mm long. Flowering VIII-IX.

Maple forests, meadow-covered slopes(?).—*Far East*: Ussuri (Birobidzhan). Endemic. Described from the Sutar River Valley. Type in Leningrad.

Note. Komarov did not compare his species with any other species. In my view, *S. splendida* Kom. is a part of the group of *Saussurea* with bicolored leaves, and should be placed in a separate series; it is similar to *S. controversa* DC., from which it differs by larger leaves, the presence of a strong paniculate inflorescence, comprising numerous individual corymbs, pink (and not lilac-violet) florets, a dark brown pubescent stem, sticky articulate hairs, glandular hairy outer involucre bracts, terminating in a small saber-shaped appendage, and glandular-hairy lateral branches of the inflorescence, bearing individual corymbs.

Series 6. Intermediae Kitam. in Acta Phyt. et Geo-bot. IV (1935) 8; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 151, 152.—Capitula in compact corymbs, sessile in type specimen, less often pedunculate. Involucre globose-campanulate; outer bracts attenuate or acuminate, erect or recurved. Leaves usually pinnatisect, sometimes entire or shallow large-toothed. Meadow and forest herbs.

50. *S. elongata* DC. in Ann. Mus. Paris, XVI (1810) 201; DC. Prodr. VI, 534; Ldb. Fl. Ross. II, 2, 666; Turcz. Fl. baic.-dahur. II, 1, 109; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 11 saltem α . *genuina* and β . *polypodiifolia* DC.; Kom. Fl. Manchzh. III, 722 p. p.; Grubov, Kosp. Fl. Mong. 275; Popov, Fl. Sr. Sib. II, 756.—*S. polypodiifolia* DC. in Ann. Mus. Paris, XVI (1810) 201.—*S. elongata* β . *polypodiifolia* DC. Prodr. VI (1837) 534; Turcz. op. cit. 109.—*S. scabiosaefolia* Turcz. ex Ldb. Fl. Ross. II, 2 (1845-1846) 666, nomen.—*S. elongata scabiosaefolia* Turcz. ex DC. Prodr. VI (1837) 534 nomen; Turcz. Fl. baic.-dah. II, 1, 110.—*Serratula stelleri* Steph. ex DC. Prodr. VI (1837) 534 nomen.—*Heterotrichum stelleri* MB. ex DC. Prodr. VI (1837) 534 nomen.—*IC.*: DC. op. cit. (1810) tab. VI.—*Exs.*: GRF No. 3991.

Perennial. Rhizome short, strong, with numerous fibrous roots; stem 25-80 cm (up to 1 m) high, solitary, erect, glabrous, smooth, sulcate, simple or branched in inflorescence. Leaves, except upper, long-petiolate (petioles narrow-winged); lamina irregularly divided, oblong-ovate or

445 oval, deeply pinnatisect in type specimen (var. *polypodiifolia* DC.), less often almost entire or shallow large-toothed, primary lobes of deeply pinnatisect leaves straight or sometimes weakly decurved, linear or oblong, cuspidate, cusp cartilaginous, usually slightly convolute and often crenate-toothed (teeth with cartilaginous cusp) or entire; all leaves green and scabrous above, slightly grayish beneath, with more or less glandular and curved hairs, particularly along prominent midrib and primary lobes of leaf, as well as in sinuses between primary lobes; upper leaves sessile or short-petiolate, linear-lanceolate or linear, predominantly entire, less often pinnatifid. Capitula 1.5–1.8(2) cm long with florets, about 0.8 cm wide, in compact corymb at stem apex or on lateral peduncles in individual corymbs (mostly three in each), and then forming more or less lax, paniculate-corymbose inflorescence. Involucre oblong, imbricate, six- or seven-rowed; involucre bracts not recurved, usually blackish-violet, less often light colored; outer bracts ovate, inner oblong; all bracts, especially along margin and at apex, weakly pubescent, often glabrescent. Receptacle densely covered with 0.7–0.8 cm long scales; florets pink, about 1.2 cm long, narrow part of tube about 0.7 cm long, broad part of tube including lobes of limb about 0.5 cm long; anthers violet, strongly exerted, about 0.6 cm long, their appendages ciliate. Pappus dirty white, double, outer pappus bristles fragile, about 0.5 cm long, inner ones about 1 cm long, long-plumose; achenes cylindrical, glabrous, about 0.4–0.5 cm long. Flowering VII–VIII.

Forest meadows, forests and their edges, stony screes and slopes, limestone deposits.—*Eastern Siberia*: Angara-Sayans (Baikal Shore), Dauria, Lena-Kolyma. *General distribution*: Northern Mongolia. Described from Siberia. Type in Geneva.

Note. The form with distinctly pinnatisect leaves (var. *polypodiifolia* DC.) is predominant in the Trans-Baikal Region. The leaves are sometimes thicker and coriaceous, sometimes thinner. The capitula are also variable in size and shape, sometimes being smaller and narrower. A whole series of transitional forms for these characters is found. M.G. Popov (op. cit. 1959) erroneously referred *S. elongata* DC., lacking membranous appendages on the involucre bracts, to section *Theodorea* DC.

51. *S. recurvata* (Maxim.) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 374.—*S. elongata* β . *recurvata* Maxim. Prim. Fl. Amur. (1859) 167; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 12; Nakai, Fl. sylv. Korean. XIV, 117; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 153.—*S. elongata* δ . *pectinata* Herd. op. cit. (1868) 12.—*S. elongata* δ . *glehniiana* Maxim. in Mém. Biol. IX, 3 (1874) 338.—*S. elongata* auct. Fl. Ross.: Kom. Fl. Manzh. III (1907) 723 p. max. p.;

Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1072.—*S. polyodiifolia* auct. Fl. Ross.: Kom. and Alis. op. cit. (1932) 1071.—*S. asperifolia* Sch. 446 Bip. ex Herd. op. cit. 12, nomen.—*S. pectinata* β . *amurensis* Maxim. op. cit. 171.—**Ic.**: Kom. and Alis. op. cit. Plates 321, 323.

Perennial. Species extremely close to the previous one. It differs by having involucre bracts that are recurved, often arachnoid-hairy or subglabrous, sometimes narrowed from ovate or triangular base to more or less long herbaceous saber-shaped, recurved cusp (cusp sometimes toothed along margin), sometimes involucre bracts short-acuminate, without saber-shaped cusp but with recurved apex. Leaves hard, also strongly variable in serration, as in previous species from predominantly undivided, toothed to medium and deeply pinnatisect; lamina triangular, oval or oblong-ovate. Florets about 1.3 cm long, narrow part of tube about 0.7 cm long, almost as long as broad part including lobes of limb. Pappus double, outer pappus bristles short-plumose, fragile, about 2 mm long, inner bristles 1–1.1 cm long, long-plumose. Achenes 0.5 cm long. Flowering VII–VIII.

Forests and flooded meadows, forests and their edges, shrubby areas.—*Far East*: Zeya-Bureya, Uda, Ussuri. *General distribution*: Korea, China. Described from Amur. Type in Leningrad.

Note. It is a Far Eastern race of *S. elongata* DC. Some specimens characterized by having herbaceous, saber-shaped tips of the involucre bracts are possibly of hybrid origin (hybrids with *S. odontolepis* Sch. Bip. or *S. umbrosa* Kom.) or progeny of hybrids. At one time, they were separated as *S. elongata* δ . *pectinata* Herd. or *S. elongata* δ . *glehniana* Maxim. (*S. recurvata* (Maxim.) Lipsch. var. *glehniana* Lipsch. comb. nova = *S. elongata* δ . *glehniana* Maxim. in *Mél. biol.* IX, 3 (1874) 338).

Series 7. Ussurienses Lipsch.—*Ser. Acuminatae* Kitam. in *Acta Phyt. et Geobot.* IV (1935) 5 p. min. p.; Ej. in *Mém. Coll. Sc. Kyoto Univ.* ser. B, XIII (1937) 159 p. min. p.—*Ser. Imbricatae* Kitam. in *Acta Phyt. et Geobot.* IV (1935) 11 p. min. p.; Ej. in *Mem. Coll. Sc. Kyoto Univ.* ser. B, XIII (1937) 198 p. min. p.—Rhizome fibrous along length, and branched (in respect of this character, it is closer to the section *Laguranthera* (C.A.M.) Lipsch.). Capitula numerous, relatively smaller, on short peduncles, in compact, corymbs on more or less long peduncles, forming lax panicle. Involucre cylindrical, imbricate, arachnoid-hairy; outer involucre bracts reduced, ovate, with very short cusp; inner bracts subobtuse or obtuse. Pappus double, outer pappus bristles unequal, persistent. Leaves coriaceous, pinnatifid, pinnatisect, or less often shallow incised, lobes of lamina toothed. Usually tall herbs of meadows and forests.

447 52. *S. ussuriensis* Maxim. in Mém. Acad. Sc. Pétersb. par. div. sav. IX (1859) 167; Ej. in Mém. Biol. IX, 3, 340; Kom. Fl. Manchzh. III, 739; Nakai, Fl. Korean. II, 43; Ej. in Bot. Mag. Tokyo, XXIX, 205; Ej. Fl. sylv. Korean. XIV, 120; Ling. in Contr. Inst Bot. Nat. Acad. Peip. III, 171; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 166 (excl. var. *nivea* Kitamura).—*S. ussuriensis* α . *genuina* Maxim. op. cit. (1859) 168; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 13; Kom. op. cit. 740; Nakai in Bot. Mag. Tokyo, XXIX, 205; Kom. and Alis. Oprod. Rast. Dalnevost. Kr. II, 1072.—*S. ussuriensis* β . *incisa* Maxim. op. cit. (1859) 168; Ej. in Mém. Biol. IX, 3, 340; Herd. op. cit. 13; Kom. Fl. Manchzh. III, 740; Nakai, op. cit. (1915) 205; Kom. and Alis. op. cit. 1071; Ling. op. cit. (1935) 171.—*S. ussuriensis* γ . *pinnatifida* Maxim. op. cit. (1859) 168; Ej. op. cit. (1874) 340; Kom. Fl. Manchzh. III, 741; Ling. op. cit. (1935) 171.—**lc.**: Kom. and Alis. op. cit. Plate 325.

Perennial. Rhizome prostrate, with numerous roots, fibrous, yellow. Stems 30–100 cm high, densely leafy, erect, sulcate-angular, wingless, sparsely pubescent or almost glabrous, usually branched above, branches ascending. Leaves predominantly hard, sometimes softer, quite variable in shape of lamina, especially in its incision, scabrous above, weakly scabrous beneath due to short cilia, especially along veins, and with numerous, sessile, lustrous glandular hairs; sometimes leaves tomentose beneath (var. *firmifolia* Lipsch.); basal leaves persistent or withering before flowering, like long-petiolate lower cauline leaves, petioles 4.5–15 cm long, not winged; lamina oval or oblong, 7–18 cm long, long- or short-acuminate, cordate at base, truncate or less often weakly hastate, gradually reduced toward stem apex; all leaves gradually reduced upward; middle cauline leaves short-petiolate, uppermost leaves sessile or almost sessile, lanceolate, oblong-ovate, lanceolate-linear, acuminate, at base truncate or cuneate, almost entire or toothed, sometimes serrate-toothed with unequal spinescent teeth, or sometimes crenate-lobate, somewhat convolute, lobes unequal, sometimes broader and shorter, or sometimes narrower and long (var. *incisa* Maxim.), pinnatifid, with a gamut of transitional forms between them, segments sometimes reaching up to midrib, sometimes less deep, often segments at apex broader and more or less deeply redivided, toothed (var. *pinnatifida* Maxim.). Capitula numerous, relatively small, 4–14 mm long, on short peduncles in compact corymbs, terminal on stem and branches, forming corymbose-panicle. Involucre tubular, about 1 cm long and 4–6 mm wide; involucral bracts numerous, imbricate, five-rowed, appressed, arachnoid-hairy, often colored; outer bracts about 2 mm long, ovate, with short cusp; inner bracts linear, obtuse. Florets dark red, about 1–1.2 cm long, narrow part of tube about 5–6 mm long, as long as broad part including linear lobes of limbs, latter about 3.5–4 mm long; appendages of anthers ciliate.

448 Receptacle densely covered with 5–6 mm long scales. Achenes about 5 mm long, 1–1.2 mm wide, with short corona at apex, weakly narrowed toward base, slightly compressed, lustrous, densely black-purple punctate; pappus double, outer pappus bristles up to 2 mm long, unequal, serrate, fragile, but persistent, inner ones 7–8 mm long, long-plumose. Flowering VII–IX.

Shrub thickets, oak forests, dry mountain slopes, flooded meadows.—*Far East: Ussuri. General distribution: Korea, Japan, China.* Described from Ussuri. Type in Leningrad.

Note. This species is close to *S. elongata* DC., from which it differs by having many smaller capitula and a more densely arachnoid-hairy involucre and by the nature of the involucre bracts (smaller, numerous, cuspidate), the darker leaves, divided into broader lobes in the pinnatifid varieties, and the teeth terminating in long cusps.

Apparently, it hybridizes with *S. odontolepis* Sch. Bip. I place here the specimens from the floodplains of the Bei-Chi-Khe River, in the vicinity of the village of Dukhovskoe (1913, No. 617, N.V. Shipchinskii). The involucre bracts have a saber-shaped cristate-toothed appendage, partly recurved.

The specimens from the limestone hill “Zmeinaya” in the Shkotovo Region (1932, No. 26, D.P. Vorobev) are distinguished by leaves that are more firm and strongly scabrous and arachnoid hairy-tomentose beneath (var. *firmifolia* Lipsch; probably, this variety is identical with *S. firma* (Kitag.) Kitam. in *Acta Phyt. et Geobot.* IX, 3 (1940) 112. Specimens of which I have not seen). Additional field observations of this variety are needed in order to make a final judgment about it as a separate species. Cf. also note to *S. maximoviczii* Herd.

53. *S. maximoviczii* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 14; Maxim. in Mel. Biol. IX, 3, 337; Kom. Fl. Manchzh. III, 731; Nakai in Bot. Mag. Tokyo, XXIX, 202; Ej. Fl. sylv. Korean. XIV, 119; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1071; Kitam. in Acta Phyt. et Geobot. IV, 11; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 198 (excl. f. *serrata* (Nakai) Kitam. and var. *triceps* (Level. and Vaniot) Kitam.).

Perennial. Rhizome woody, prostrate, hairy; stem 40–100 cm high, erect, sulcate-angular, wingless, almost glabrous or weakly hispid, scatteredly punctate, simple more or less branched at apex, branches somewhat divergent, angular. Leaves pinnatifid, green above, more pale beneath, scabrous on both sides, weakly hispid, their veins, especially midrib, prominent; basal and lower cauline leaves persistent up to blooming, up to 70 cm long and 15 cm wide, on 5–20 cm long petioles, lyrate-pinnatisect, with four to six pairs of lateral, oblanceolate, cuspidate,

449 finely toothed lobes, teeth spinescent; terminal lobes usually large and broad; leaf base narrow-cuneately decurrent; middle cauline leaves smaller, with narrower lateral lobes and shorter petioles, some weakly crenate or entire, sessile, semiamplexicaul; uppermost leaves smaller and narrower, oblong-lanceolate or lanceolate, almost entire, cuspidate. Capitula numerous, erect at anthesis, 5–7 mm wide, in corymbose-paniculate inflorescence, individual corymbs on more or less long lateral peduncles, with three to six compactly arranged capitula, sometimes peduncles two-headed. Involucre narrow tubular, imbricate, about 1–1.4 cm long, about 6 mm wide; bracts coriaceous and hard when dry, arachnoid-hairy especially along margin, usually colored, five-rowed; outer involucre bracts reduced, ovate, with short cusp, obtuse-callose; inner bracts obtuse. Receptacle with unequal, up to 7 mm long scales; florets violet-purple, 1.1–1.3 cm long, narrow part of tube about 6–7 mm long, broad part including lobes of limb about 5–6 mm long, lobes of limb 3–3.5 mm long; anthers about 5 mm long, appendages of anthers woolly. Pappus slightly exerted from involucre, brownish, double, outer pappus bristles short, unequal, up to 5 mm long, serrate, persistent, inner ones about 1 cm long, long-plumose; achenes about 5 mm long, 1.5–2 mm wide, truncate at apex, weakly narrowed at base, achene entirely black, glabrous, smooth. Flowering VII–VIII.

Meadows (especially marshy meadows with clayey soils), dry mountain herb slopes, oak forests, shrub thickets.—*Far East*: Ussuri. *General distribution*: China, Korea, Japan. Described from the Novik Inlet on the Russkii Island. Type in Leningrad.

Note. One of the tallest and most typical species of the genus in the Soviet flora. It varies in the shape, width and length of the leaf segments, and also of their terminal lobes, which are sometimes large and broad, crowning the leaf, giving it a typical lyrate shape and sometimes less differentiated from the lateral lobes, and then the habit is similar to *S. ussuriensis* var. *pinnatifida*. In a number of forms *S. maximoviczii* Herd. is closest to *S. ussuriensis* var. *pinnatifida*, from which it differs by larger capitula, less densely arachnoid involucre bracts (they are broader and less acute), as well as by the woolly appendages of anthers. Cf. above about the nature of leaves of both species. It may be added that the base of the basal and lower cauline leaves in *S. maximoviczii* is narrowly cuneate, tapering toward the petiole.

Series 8. Nupuripoensae Kitam. in Acta Phyt. et Geobot. IV, (1935) 8 emend. Lipsch., hoc loco; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, 450 XIII (1937) 180.—Capitula relatively large, in compact corymbs, subtended by approximate bracteal leaves. Lower and middle cauline leaves coriaceous, ovate or deltoid, more or less oblong-cuspidate,



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Plate XXXIV.

1—*Saussurea neo-serrata* Nakai; 2—*S. parviflora* (Poir.) DC.

cordate, sagittate, or truncate at base, lamina not crenate but fine or large-toothed; petiole winged in type specimen. Stem more or less winged; receptacle with short and sparse scales.

Note. In the interpretation of Kitamura (1937), this series includes only one species—*S. nupuripoensis*. I find two more closely related species in this series: *S. kurilensis* and *S. riederi*, and, therefore, change the characters of the series. Kitamura considered the presence of villous pubescence on the involucre bracts, which is actually present in *S. nupuripoensis* but absent in two other species included in this series, typical for it. However, based on the sum total of other characters and the general appearance of the plants, these three species undoubtedly form a single phylogenetic group.

54. ***S. nupuripoensis*** Miyabe and Miyake, Fl. Saghal. (1915) 277; Kitam. in Acta Phyt. et Geobot. IV, 8; Nemoto, Fl. Jap. Suppl. 800; Sugaw. Pl. of Saghal. (1937) 312; Kitam. in Mem. Coll. Sc. Kyoto Univ. Ser. B, XIII, 180; Honda, Nom. Pl. Jap. 368; Sugaw. Ill. Fl. Saghal., IV, 1871.—*lc.*: Sugaw op. cit. (1940) tab. 859.

Perennial. Rhizome thick, woody, oblique, developing numerous fibrous roots; stem 20–30 cm long, erect, strong, sulcate, puberulent, leafy, corymbosely branched above, branches ascending, densely hirsute, with mixture of capitate glandular hairs. Basal leaves large, persistent up to anthesis, like lower cauline leaves, long-petiolate, more or less broadly decurrent; petioles 4–11 cm long, usually broad-winged; lamina ovate or deltoid, 4–12 cm long, 4.5–8(10) cm wide, more or less oblong-cuspidate, cordate, sagittate, or truncate at base, not crenate, with short-cuspidate teeth, sinuses finely ciliate; all leaves coriaceous, green above, lighter colored beneath, weakly pubescent on both sides; middle and upper cauline leaves broadly ovate or oblong, gradually reduced upward, short-petiolate or sessile, broadly decurrent. Capitula three to seven, relatively large, on short and thick peduncles, in corymbs, often enclosed in uppermost lanceolate bracteal leaves, as long as or longer than capitulum. Involucre campanulate, roundish at base, about 1.5 cm long, 1.2–1.8 cm wide; involucre bracts five-rowed, outer and middle bracts lanceolate, as long or almost as long as inner, bracts, acuminate, densely
452 hirsute along dorsal surface and margins. Receptacle with short scattered scales; florets purple, about 1.1–1.2 cm long; narrow part of corolla tube about 0.5 cm long, almost as long as broad part including lobes of limb, lobes of limb unequal, almost half as long as broad part of corolla tube; appendages of anthers ciliate. Pappus double, outer pappus bristles unequal, short, up to 2–3 mm long, fragile, scabrous, finely sulcate or short-plumose, inner ones about 1–1.1 cm long, dirty brown, long-plumose, connate at base in ring; achenes narrow, 7 mm long and about

2 mm wide, glabrous, brownish, with indistinct purple stripes, slightly compressed, truncate at apex, narrowed at base. Flowering VII–VIII.

Far East: Sakhalin. Endemic. Described from Nupuripo Mountain. The type specimen was in the Herbarium of the Hokkaido University.

Note. Only one herbarium sheet of this species is preserved in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR. The plant was described from the sheet with additions from Kitamura (1937).

55. *S. kurilensis* Tatewaki in Journ. Fac. Agr. Hokkaido Univ. XXIX, 5 (1933) 214; Kitam. in Acta Phyt. et Geobot. IV, 8; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 154.

Perennial. Rhizome thick, densely covered with brown bases of old leaves; stem 10–20(40) cm high, fistular, erect, simple, sometimes narrow-winged, densely leafy, sparsely arachnoid-hairy, more strongly above, below inflorescence. Basal and lower cauline leaves long-petiolate, persistent until flowering, petioles narrow, 7–10 cm long, lamina hard, deltoid or ovate, with long cusp, cordate or truncate at base, 4–7.5 cm long, toothed, teeth terminating in callose obtuse cusp, green above, pale beneath, flocculose-arachnoid hairy pubescent on both sides (var. *arachnoidea* Tatewaki, op. cit. 238); middle and upper cauline leaves similar in shape, gradually reduced, short-petiolate, sessile above; uppermost leaves approximate with inflorescence. Capitula 1.2–1.5 cm wide, numerous, on short peduncles or sessile, terminal on stem in compact leafy globules. Involucre globose-campanulate, 1.5–1.6 cm long, 1.1–1.2 cm wide, arachnoid-hairy; involucre bracts four-rowed; outer bracts almost as long as middle, ovate-oblong, 3–4 mm wide, like middle, attenuate-cuspidate, deflexed; middle bracts oblong, inner oblong-lanceolate, acuminate. Florets pink, 1.1–1.2 cm long, narrow part of tube as long as broad part including lobes of limb, limb two and one-half times as long as broad part of corolla tube. Pappus dirty brown, 0.9–1 cm long, double, outer pappus bristles fragile, short, inner ones long-plumose; achenes cylindrical, blackish, 5.5–6 mm long, with many small ribs, slightly narrowed at base, glabrous. Flowering VIII. (Plate XXXII, Fig. 1.)

453 Herb meadows.—*Far East:* Sakhalin (Kuril Islands). Endemic. Described from Urup Island. Type preserved in the Hokkaido Herbarium.

Note. A small number of specimens of this species is preserved in the Herbarium of Botanical Institute, Academy of Sciences of the USSR. The above description of the species is based on these specimens, supplemented with the data of Kitamura (1937).

56. *S. riederi* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 35; Maxim. Prim. Fl. Amur. 167 in nota; Ej. in Mém. Biol. IX, 2, 343;

Kom. Fl. Kamch. III, 178; Hult. Fl. Kamtsch. IV, 209; Kitam. in Acta Phyt. et Geobot. IV, 7; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 170 (excl. subsp. *yezoensis* (Maxim.) Kitam. and variet.); Sugaw. III, fl. Saghal. IV (1940) 1879.—**lc.**: Hult. op. cit. fig. 9.

Perennial. Rhizome creeping or inclined, with numerous lateral roots, covered at apex with hard bases of previous year's leaves; stem (10)15–30 cm high, erect, densely leafy, simple, terminating with dense corymbs of capitula, sometimes winged due to decurrent leaves or wingless, sulcate, puberulent with crisped hairs in upper part, especially in inflorescence, almost glabrous below. Leaves succulent, ovate to almost triangular, long-cuspidate, cordate or truncate at base; basal leaves usually withering before flowering; lower cauline leaves long-petiolate, petioles 2.5–7 cm long, usually broad-winged, lamina 4–10 cm long and 2–6 cm wide, toothed, teeth short-cuspidate, green above, pale beneath, puberulent on both sides; middle cauline leaves with short, winged petiole, upper leaves sessile, decurrent with lamina, gradually reduced and narrower. Capitula numerous, about 1–1.2 cm long and 0.7–0.8 cm wide, in dense terminal compound corymb, individual corymbs, subtended by less numerous bracteal leaves, usually longer or as long as it. Involucre three- or four-rowed, turbinate-globose, arachnoid-hairy; involucre bracts dark purple in upper part; outer bracts somewhat shorter than inner, narrowed from ovate base to cusp, or lanceolate; inner bracts oblong or broadly linear, apiculate, receptacle with scattered, linear-subulate, up to 4.5 mm long scales; florets purple, about 1 cm long, narrow part of tube as long as broad part including lobes, almost three times as long as broad part of corolla tube. Pappus strongly exerted from involucre, brownish, double, outer pappus bristles numerous, short, unequal, up to 3 mm long, scabrous, short-plumose, shedding, inner bristles long-plumose, about 8–9 mm long. Flowering VII–VIII. (Plate XXXII, Fig. 2.)

Dryland and subalpine meadows, lichen tundra, sea coasts.—*Far East*: Kamchatka (southern), Sakhalin (Kuril Islands). Endemic. Described from Kamchatka. Type in Leningrad.

454 *Note.* A closely related race, subsp. *yezoensis* (Maxim.) Kitam. is distributed on the Kuril Islands (from Urup to northern Honda). The illustration given by Sugawara (op. cit., 1940, tab. 863) pertains to the latter subspecies. According to Kitamura, *S. riederi* subsp. *yezoensis* (Maxim.) Kitam. [*Mem. Coll. Sc. Kyoto Univ. ser. B, XIII* (1937) 169; *S. riederi* var. *yezoensis* Maxim. in *Mél. Biol. IX* (1874) 343] is characterized by a more narrowly winged stem and on involucre 8–11 mm long, always with many rows of bracts (four to six rows). This subspecies is practically unrepresented in the herbaria of the Soviet Union and is, therefore, obscure to me.

Series 9. Acuminatae Kitam. in Acta Phyt. et Geobot. IV (1935) 5 p. p.; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 159 p. p.—Capitula on short peduncles or sessile, in compact corymbs. Involucre tubular; outer and middle involucral bracts imbricate, acute or cuspidate with long herbaceous, saber-shaped cusp, sometimes acuminate.

Note. Series *Acuminatae* Kitam., in my view, is an unnatural aggregate and should be divided into several independent series, as has been done here.

57. *S. acuminata* Turcz. ex Fisch. and Mey. Ind. sem. hort. Petrop. 1 (1835) 37; Linnaea, X, Litt. Ber. 101; DC. Prodr. VI, 536; Ldb. Fl. Ross. II, 2, 667; Turcz. Fl. baic.-dahur. II, 1, 117; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 23 (excl. β . *sachalinensis* and γ . *gracilis*); Freyn. in Oest. bot. Zeitschr. LII, 7, 281; Kom. Fl. Manchzh. III, 741; Kitam. in Acta Phyt. et Geobot. IV, 7 (excl. subsp. *sachalinensis* Kitam.); in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 174 (p. p. excl. subsp. *sachalinensis* Kitam.); Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 453; Popov. Fl. Sr. Sib. II, 763.—*S. compacta* Fisch. ex Herd. op. cit. (1868) 23 (nomen).

Perennial. Rhizome inclined, developing numerous fibrous roots, covered with hard remains of old leaves at apex; stem 25–60 cm (up to 1 m) high, erect, strongly leafy, sulcate, more or less narrow-winged due to decurrent leaves, slightly crisped-pubescent or glabrous; simple, with one (rarely several) compact corymbs at apex. Leaves aeruginous, glossy above, lighter colored beneath, glabrous, strongly scabrous due to spiny appendages only along margin, weakly convolute, undivided or distinctly toothed, then teeth not frequent, small; lamina oblong-lanceolate or lanceolate, acuminate; basal leaves usually withering before flowering; lower cauline leaves petiolate (with petiole 12–25(30) cm long) and up to 2–2.5 cm wide; petioles 5–20 cm long; middle cauline leaves 10–20 cm long, short-petiolate or almost sessile, petioles or leaf bases decurrent; all leaves gradually reduced upward; apical leaves, linear or linear-lanceolate, narrowed. Capitula numerous, about 1.5–1.6 cm long, including florets, about 0.5–0.6 cm wide, in compact terminal corymbs, latter 4–6 cm wide when dry; less often, lateral corymbs also observed besides central ones. Involucre cylindrical, four-rowed, arachnoid-hairy; involucral bracts unequal, outer bracts green, ovate, narrowed from middle in long, herbaceous, saber-shaped cusp; middle bracts narrowly oblong, acuminate; inner bracts linear or linear-lanceolate, dark colored, distinctly acuminate. Receptacle densely covered with linear-subulate, about 6 mm long scales; florets purple, 1.3–1.4 cm long, narrow part of corolla tube about 8 mm long, broad part weakly developed, about 0.5–1 mm long, lobes of limb 4–5 mm long, narrowly linear; appendages of

anthers ciliate. Pappus double, outer pappus bristles short, fragile, scabrous, short-plumose, inner up to 1.4 cm long. Flowering VII–VIII. (Plate XXXIII, Fig. 2.)

Note. According to Turczaninow, outer pappus bristles are almost absent in the ray florets but evident in the disk florets; I did not observe this.

Meadows, thickets of shrubs, birch forests.—*Eastern Siberia*: Dauria. *General distribution*: Mongolia (northern), northeastern China. Described from Dauria. Type in Leningrad.

58. *S. sachalinensis* Fr. Schm. in Mém. Acad. Sc. Pétersb. sér. VII, XII, 2 (1868) 152; Miyabe and Miyake Fl. Saghal. 280; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 453.—*S. acuminata* β. *sachalinensis* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 23.—*S. acuminata* subsp. *sachalinensis* Kitam. in Acta Phyt. et Geobot. IV (1935) 7, excl. *S. yezoensis*; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 175; Honda, Nom. Pl. Japon. 366; Sugaw. Ill. fl. Saghal. IV, (1940) 1877.—*S. miyagii* Miyabe and Kudo in Miyabe and Miyake, Fl. Saghal. (1915) 279.—*lc.*: Sugaw. op. cit. (1940) tab. 862.

Perennial. Quite similar to preceding species. Stem densely leafy up to apex. Distinguished by nonglossy leaves, glabrous above, sparsely arachnoid-hairy beneath, more broadly lanceolate in type specimen, distinctly serrate-crenate, teeth more or less cuspidate; basal leaves large, about 3–4.5 cm wide, lanceolate, sometimes weakly cordate at base, and with more or less long petiole. Outer and middle involucrel bracts usually (but not always!) with short, herbaceous, saber-shaped apical appendages. Flowering VII–VIII. (Plate XXXIII, Fig. 1.)

Montane, lowland and coastal meadows.—*Far East*: Sakhalin. *General distribution*: Japan (Hokkaido Island). Endemic. Described from Sakhalin (slopes near Dui). Type in Leningrad.

Note. It is a Sakhalin-northern Japanese race, close to *S. acuminata* Turcz., and morphologically is relatively weakly isolated. The characters listed above in the description of *S. sachalinensis*, nevertheless, permit us to consider this as a separate race. In my opinion, true *S. acuminata* Turcz. is not found in Sakhalin, and specimens mentioned under this name by Japanese authors, evidently not familiar with typical material of *S. acuminata* Turcz., should be referred to *S. sachalinensis* Fr. Schm. (compare papers of Kitamura, Sugawara, and others). *S. miyagii* Miyabe and Kudo is known to me only from the figure in the publication of Sugawara (op. cit. 1940); the plant shown in this plate leaves no doubt about its affinity to typical *S. sachalinensis* Fr. Schm. Kitamura included *S. miyagii* in the synonymy of *S. acuminata* Turcz., interpreting ssp.

sachalinensis Kitam. as a subspecies of the latter. Compare also the note to *S. duiensis* Fr. Schm.

Series 10. Amurenses Lipsch.—Ser. *Acuminatae* Kitam. in Acta Phyt. et Geobot. IV (1935) 7 p. and in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 159 p. p.—Capitula terminal on stem, usually in corymbose panicles, less often corymbs solitary, dense, few-headed. Basal leaves long-petiolate, large, broadly lanceolate, elliptical or ovate. Involucre tubular, outer and middle bracts acuminate or subobtuse, without recurved, saber-shaped appendages; inner bracts (also outer and middle bracts in type specimens) sericeous-villous. Meadow and forest herbs.

59. ***S. amurensis*** Turcz. in DC. Prodr. VI (1837) 534; Ldb. Fl. Ross. II, 2, 668; Turcz. Fl. baic.-dahur. II, 1, 112; Maxim. Prim. Fl. Amur. 170; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 27 excl. δ . *macrocephala* Herd.; Kom. Fl. Manchzh. III, 719; Kom. and Alis. Oprod. Rast. Dalnevost. Kr. II (1932) 1063; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 160 excl. subsp. *duiensis* (Fr. Schm.) Kitam.; Lipschitz in Sp. Rast. Gerb. Flory SSSR, XIII, 124; Popov in Sp. Rast. Gerb. Flory SSSR, XIV, 30; Popov, Fl. Sr. Sib. II, 759.—*S. denticulata* Ldb. Ic. pl. Fl. Ross. I (1829) 18, tab. 74; Ej. Fl. alt. IV, 27 (in nota); Ej. Fl. Ross. II, 2, 668; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 24, saltem α . *genuina* (excl. β . *duiensis* and γ . *viluensis*), non *S. denticulata* Wall.—*S. stenophylla* Freyn in Oest. Bot. Zeitschr. LII, 7 (1902) 280; LII, 8 (1902) 313.—? *S. amurensis* var. *stenophylla* Nakai in Bot. Mag. Tokyo XLV (1931) 513 excl. syn.—*S. amurensis* subsp. *stenophylla* Kitam. in Acta Phyt. et Geobot. IV (1935) 6.—*S. odontophylla* Freyn, op. cit. LII, 7 (1902) 282 (in clave) and LII, 8 (1902) 315.—*S. intermedia* Freynn, op. cit. LII, 7 (1902) 280 (in clave) and LII, 8 (1902) 317 p. p.—*S. amaurolepis* Freyn, op. cit. LII, 7 (1902) 280 (in clave); LII 8 (1902) 312.—**Ic.**: Kom. and Alis. op. cit. (1932) Plate 318.—**Exs.**: GRF Nos. 3989b, 4049.

Perennial. Rhizome slender, not long, creeping; stem (30)50–100(115) cm high, loosely flocculose-arachnoid hairy or almost glabrous, sulcate, sometimes rather distinctly narrow-winged due to decurrent bases of cauline leaves, simple, sometimes with floriferous branches only above. Leaves hard, glabrous above, snow-white-tomentose or arachnoid-woolly beneath in typical specimen, pubescence quite variable beneath, sometimes weakly pubescent; all leaves somewhat involute, cuneate at base, long petiolate, large, broadly lanceolate or ovate, more or less large-toothed, usually withering before full bloom; lower cauline leaves narrower and usually with shorter petiole, lanceolate, linear-lanceolate

or linear, sometimes more or less horizontal, reduced and narrower upward; middle cauline leaves petiolate, with indistinct teeth, upper sessile, linear-lanceolate or linear, entire or with inconspicuous solitary teeth; all leaves decurrent on stem. Capitula tubular, in individual corymbs, sometimes aggregated in more or less dense compound corymb, at same height, sometimes few lateral axillary corymbs also present besides compound corymb, sometimes inflorescence paniculate. Involucre four- or five-rowed, imbricate, in typical specimen woolly-villous; outer involucre bracts ovate, green or dark-colored, subobtusate or with short cusp; inner bracts lanceolate or oblong-lanceolate, subobtusate, densely villous, especially at apex, often glochidiate. Florets pink-violet when dry, about 1.1–1.2(1.3) cm long, narrow part of tube 5–6 mm long, broad part about 1.5–2 mm long, lobes of limb linear, with lustrous glandular hairs, about 4 mm long; anther appendages ciliate. Receptacle densely covered with scales; scales linear-subulate, glossy, about 5–6 mm long; pappus double, outer pappus bristles about 2–3 mm long, fragile, less numerous, toothed scabrous, inner 0.9–1 cm long, numerous, long-plumose. Young achenes glabrous. Flowering VI–VIII.

Lowland, montane and forest meadows; deciduous, coniferous, and mixed forests; forest edges; borders of marshes.—*Eastern Siberia*: Angara-Sayan, Dauria, Lena-Kolyma; *Far East*: Zeya-Bureya, Ussuri, ?Uda. *General distribution*: Northeastern China. *S. amurensis* Turcz. described from grassy meadows along Amur River. Type in Leningrad. *S. stenophylla* Freyn and *S. odontophylla* described from Zeisk. Their types evidently are preserved in the Herbarium of Freyn in Brno(?). *S. amaurolepis* Freyn described from the vicinity of Blagoveshchensk; apparently the type is preserved there as well and an isotype in Leningrad. *S. denticulata* Ldb. described from collections of Krause in eastern Siberia, without precise indication of location. Type in Leningrad.

Note. An unusually polymorphic species, which was reported in a paper by Freyn, V.L. Komorov, M.G. Popov and S.Yu. Lipschitz. The shape and width of the leaves, pubescence on their lower surface, color and pubescence of the involucre bracts, shape of inflorescence, etc., all vary. This provided a basis for Freyn (op. cit.) to separate and describe 11 subspecies and forms of *S. amurensis*, 7 of them with binominal names. Most of the “species” and “forms” described by Freyn do not deserve recognition as they represent descriptions of individual specimens, apparently collected from a hybrid complex. Only *S. dubia* Freyn (cf. note to this species), in my opinion, deserves recognition. Comparison with the authentic specimen of *S. denticulata* Ldb. showed that this species should be included under *S. amurensis* Turcz. Ledebour himself
458 (Fl. Ross. II, 2, 668), in his note to *S. amurensis*, writes that *S. denticulata* is close to it, but distinguishes *S. amurensis* by the presence of much

wider lower leaves in comparison with the upper ones, with all the involucre bracts being obtuse and densely tomentose. At the same time, the lower part of the stem with leaves is absent in the authentic specimen of *S. denticulata*, but involucre bracts are also subobtusate, and most of them are densely tomentose.

60. *S. duiensis* Fr. Schm. in Mém. Acad. Sc. Pétersb. VII sér. XII, 2 (1868) 152; Sugaw. Ill. Fl. Saghal. IV (1940) 1875.—*S. denticulata* β. *duiensis* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 25.—*S. amurensis* subsp. *duiensis* (Fr. Schm.) Kitam. in Acta Phyt. et Geobot. IV (1935) 6; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 161; Honda, Nom. Pl. Jap. 366.—*S. susuyensis* Miyabe and Miyake ex Sugaw. Ill. Fl. Saghal. IV (1940) 1875 nomen.—**lc.**: Sugaw., op. cit. (1940) tab. 861.

Perennial. Stem 30–60(100) cm high, erect, simple, sometimes weakly branched only above, loosely flocculose-arachnoid-hairy or almost glabrous, sulcate, less often weakly narrow-winged due to decurrent leaves; fistular. Leaves dark green and weakly scabrous above, smooth, sparsely pubescent beneath, with isolated sessile lustrous glandular hairs and more prominent midrib, lateral veins weakly prominent; sparsely crenate-toothed, with cuspidate teeth, less often almost entire; lower leaves long-petiolate, oblong-lanceolate or broadly lanceolate, up to 15–25 cm long with petiole and up to 4 cm wide, petioles 4.5–7.5 cm long, long acuminate, abruptly narrowed at base into winged petiole; middle cauline leaves oblong-linear or lanceolate, narrower, short-petiolate, more or less decurrent on stem; upper cauline leaves linear-lanceolate to linear, sessile, weakly decurrent. Capitula about 1–1.2 cm long with florets and about 4–5 mm wide, in dense, almost leafless corymbs at stem apex and lateral floriferous branches, often forming corymbose panicle. Involucre four-rowed; involucre bracts pigmented, sometimes light colored or green, arachnoid-hairy, glochidiate at apex; outer bracts smaller, ovate, usually acuminate, without recurved saber-shaped appendages, less often obtuse; inner bracts oblong-lanceolate, somewhat obtuse, almost as long as pappus. Florets about 1–1.1 cm long, narrow part of tube about 4–5 mm long, broad part 1–1.5 mm long, lobes of limb about 3–4 mm long; anther appendages hairy. Receptacle densely covered with white, short, about 5 mm long scales; pappus double, outer pappus bristles about 2 mm long, fragile, scabrous; inner bristles long-plumose, about 8–8.5 mm long, somewhat exerted from involucre. Flowering VII–VIII.

Forests and forest edges, thickets of shrubs, meadows.—*Far East*: Sakhalin. Endemic. Described from mountains in the vicinity of Dui. Type in Leningrad.

Note. The author of this species correctly pointed out in his original description that *S. duiensis* is hardly distinct in its appearance. He compared his own species with *S. acuminata* Turcz. and *S. sachalinensis* Fr. Schm. As is known, the latter is considered by many Japanese botanists as a subspecies of *S. acuminata*. *S. duiensis* is also very close to *S. amurensis* Turcz. It differs at once from the latter by the green (and not snow-white-tomentose) lower surface of the leaves. *S. duiensis* sharply differs from *S. acuminata* Turcz. by the absence of saber-shaped appendages on the involucre bracts. The relationship between *S. duiensis* and *S. sachalinensis* Fr. Schm. is more complex. The most reliable characters distinguishing the former from the latter are: less densely leafy stem, less distinct dentation of leaves which are narrower in the type specimen of *S. duiensis*; less leafy corymbs; short-pointed outer involucre bracts not extended into saber-shaped appendages (which is a characteristic feature of *S. acuminata* and *S. sachalinensis*). A few specimens are found among the Sakhalin materials of *S. duiensis* and *S. sachalinensis* which spoil the "purity" of both species. These specimens, identified as *S. sachalinensis*, have almost entire or weakly serrate-dentate leaves, and also less marked saber-shaped appendages than on the involucre bracts of typical specimens of *S. sachalinensis*. These specimens are close to *S. duiensis* in this respect. Most probably, it would be correct to consider these specimens as hybrids between the two species. Compare also the note to the next species.

61. *S. shiretokoensis* Sugaw. in *Plants of Saghal.* (1937) 312 (nomen); *Ej. Fl. E. and N. Mit-rang. S. Saghal.* 75 (opusc. non v.); Honda, *Nom. Pl. Jap.*, 369; Sugaw. *Ill. Fl. Saghal.* IV, 1881.—*lc.*: Sugawara op. cit. (1940) tab. 864.

Perennial. Rhizome creeping; stem 20–60 cm high, glandular-pubescent especially in upper part, or almost glabrous, weakly leafy. Simple, cauline leaves distinct, sometimes weakly decurrent, lanceolate, with short apical cusp, flat along margin, shallow-toothed with teeth terminating in thin cusp, concolorous, weakly pubescent, with scattered sessile, glossy glandular hairs above; lower and middle cauline leaves with truncate base, narrowed into petiole, which is as long as lamina or shorter; upper cauline leaves sessile or short-petiolate; uppermost leaves sessile, narrower and shorter, linear or linear-lanceolate, almost entire. Capitula narrow-cylindrical, about 1.3–1.4 cm long including florets, and about 4–5 mm wide, on peduncles in individual three-headed corymbs, forming terminal, dense, almost leafless corymbose inflorescence at apex; besides main compressed corymb, lateral axillary corymbs may be present. Involucre imbricate, four-rowed; involucre

bracts green, violet along margin, entirely sericeous-villous; outer bracts broadly ovate, attenuate in dark, more or less short cusp at apex, but not with saber-shaped herbaceous appendage; inner bracts longer, subacute, glochidiate. Florets pink-purple(?), about 1.1 cm long, narrow part of tube about 5 mm long, as long as broad part with lobes of limb; anther appendages hairy. Receptacle densely covered with white, linear-subulate, glossy, about 5 mm long scales; pappus double; outer pappus bristles 2–3 mm long, serrate, fragile, inner 8–9 mm long, long-plumose. Flowering VII–VIII.

Forests (larch), meadows.—*Far East*: Sakhalin (endemic). Described from Sakhalin Island. Location of type specimen not known.

Note. The species is known to me only from the figure in the cited publication of Sugawara (1940) and only on the basis of one specimen from southern Sakhalin (S.M. Kravchenko, No. 392), which is preserved in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR. The above description of *S. shiretokoensis* Sugaw. is prepared from these two sources, because, evidently, the species diagnosis was not published in Latin by Sugawara, and the publication in Japanese is not available to me. In all probability, further study of *S. shiretokoensis* Sugaw., including the type material, will lead to reducing it to synonymy in *S. duiensis* Fr. Schm. The possibility of the hybridization of *S. duiensis* with *S. sachalinensis* and the presence of several intermediate forms between them in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR was mentioned in the note to the description of the previous species. It appears that in the spread of the hybrid segregates between these species, some specimens inherited a larger number of characters from *S. sachalinensis*; consequently, I refer them to this species. Other specimens show an inclination towards *S. duiensis* in their characters and, therefore, are included under this species. At present, it appears reasonable to accept *S. shiretokoensis* Sugaw. as a taxon extremely close to *S. duiensis* Fr. Schm., possibly, arising as a result of its hybridization with *S. sachalinensis*; this conclusion is confirmed by the shape of the outer involucre bracts and the presence of a cusp on the outside of the bracts as well as by the toothed margin of leaves.

Series 11. Umbrosae Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 375.—Ser. *Acuminatae* Kitam. in Acta Phyt. et Geobot. IV (1935) 5 p. min. p.; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 159 p. min. p.—Ser. *Tohiren* Kitam. op. cit. (1935) 8 p. min. p.; Ej. op. cit. (1937) 181 p. min. p., excl. syn.—Stem distinctly winged. Capitula campanulate, sometimes large, sometimes small, on long peduncles, in broad corymb or panicle. Outer involucre bracts

ovate or triangular-ovate, attenuate into more or less long, often colored apical cusp (saber-shaped appendage), usually recurved. Leaves, especially basal, large, more or less toothed. Forest and meadow plants.

62. *S. dubia* Freyn in Oest. Bot. Zeitschr. LII, 7 (1902) 282 (in clave); LII, 9 (1902) 349 (descriptio); Lipschitz in Sp. Rast. Gerb. Flory SSSR, XIII, 124, in textu; Karavaev, Konsp. Fl. Yakutii, 176.—*S. intermedia* Freyn. op. cit. (1902) 280 (in clave); LII, 8 (1902) 317 (descriptio) p. p. non Turcz. (1832).—*S. virescens* Freyn, op. cit. LII, 7 (1902) 283 (in clave); LII, 9 (1902) 347 (descriptio).—*S. contracta* Freyn, op. cit. LII, 7 (1902) 283 (in clave); LII, 9 (1902) 348 (descriptio).—?
 461 *S. zeaensis* Freyn, op. cit. LII, 7 (1902) (in clave); LII, 8 (1902) 314 (descriptio).—*S. rosea* Kom. in Bot. Mat. Bot. Inst. Akad. Nauk SSSR, VI, 1 (1926) 17.

Perennial. Stem 25–80 cm high, erect, angular, pubescent with curly hairs, distinctly winged due to decurrent leaves, wings green, about 1–2 mm wide. Basal and lower cauline leaves often withering before anthesis, broad-lanceolate, ovate or oblong-lanceolate, up to 30 cm long with petiole and up to 6 mm wide, weakly cuneate or somewhat roundish at base, narrowed into more or less long, slightly winged petiole, midrib of lamina prominent, lateral veins less distinct; all leaves unequally toothed, teeth with thin cusps; sparsely pubescent above, arachnoid-hairy beneath, less often weakly pubescent, and throughout with fine, lustrous, sessile glandular hairs; cauline leaves reduced upward, lanceolate, linear-lanceolate, or linear, sessile, decurrent, usually entire, somewhat horizontally divergent or slightly falcate. Inflorescence more or less dense, many-headed panicle (up to 15 cm long), consisting of individual corymbs, terminal on lateral branches, upper peduncles with corymbs of capitula usually approximate, lower peduncles usually distant 3–10 cm long, slightly winged, arachnoid-hairy, panicle reduced in many specimens to terminal, more or less large corymb and fewer poorly developed lateral branches, terminating in solitary or less numerous capitula. Capitula in individual corymbs on 1–2 mm, less often up to 5 mm long peduncles, campanulate, rather small. Involucre about 0.8–0.9 cm long and about 0.6–0.7 cm wide, arachnoid-hairy; outer rows of involucre bracts attenuate into more or less long saber-shaped, herbaceous or dark-colored, usually recurved apical appendage; inner bracts longer, acuminate, but usually without appendage. Receptacle densely covered with scales, scales linear-subulate, snow-white or sulfur-yellow, lustrous, about 5 mm long; florets pink or purple(?), about 1 cm long, narrow part of tube about 5 mm long, broad part covered with lustrous glandular hairs, about 2 mm long, lobes of limb 2.5–3 mm long; anther appendages ciliate; pappus one-rowed or double, in latter case outer pappus bristles less numerous, fragile, serrate,

about 1 mm long, inner bristles long-plumose, about 8 mm long. Achenes about 3 mm long, glabrous, weakly narrowed toward base, light brown, with whitish thin ribs. Flowering VII–IX.

Forests, shrubs, meadows.—*Eastern Siberia*: Lena-Kolyma, Dauria (eastern part); *Far East*: Zeya-Bureya. Ussuri, ?Uda., Okhotsk. *S. dubia* Freyn is described from Zeisk; type specimen, evidently, in the Herbarium of Freyn in Brno(?), *S. intermedia* Freyn described from Zeisk. The type specimen is probably also there. *S. virescens* Freyn and *S. contracta* Freyn described from Zeisk; isotypes in Leningrad; *S. zeaensis* Freyn from Zeisk (from a single plant), the type specimen evidently in the Herbarium of Freyn; *S. rosea* Kom. described from maritime province (Grossevichi); type in Leningrad.

462 *Note.* Freyn's series of "species," the typical characters of which are a campanulate capitulum and the presence on the outer involuclral bracts of green (herbaceous) or colored, saber-shaped, usually recurved appendages, was found to be quite widely represented in the Far East and in Yakutia. These "species" essentially represent only one taxon, for which I accept the name *Saussurea dubia* Freyn and include the later described *Saussurea rosea* Kom. among its synonyms. To me *S. dubia* Freyn appears to be a hybrid species; apparently, it evolved as a result of hybridization between *S. umbrosa* Kom. (see below) and *S. amurensis* Turcz. The recurved, saber-shaped appendages of the involuclral bracts were inherited from *S. umbrosa* Kom. and the pubescence of the lower leaf surface, as well as the smaller size of the capitulum, nature of the pubescence on the involuclral bracts, etc. from *S. amurensis*. *S. dubia*, referred by me to series *Umbrosae*, morphologically connects this series with series *Amurenses*. The later species *S. rosea* Kom. was compared with *S. dubia* Freyn. V.L. Komarov distinguished his species (*S. rosea*) from *S. dubia* by the leaves which are arachnoid-hairy beneath with glandular hairs (the first character was noted by Freyn also for *S. dubia*, while he was silent about the second, but it is present in all the material studied by me), a smaller capitulum and snow-white receptacular scales (for *S. dubia* Freyn states that the receptacular scales are sulfur-yellow; it is more appropriate to describe them as lustrous; according to my observations, based on the examination of the receptacular scales of capitula from different areas of the range of *S. dubia*, the scales are sometimes snow-white, sometimes sulfur-yellow). Thus, there is no doubt about the identical nature of *S. rosea* Kom. and *S. dubia* Freyn.

63. *S. umbrosa* Kom. in Tr. Peterb. Bot. Sada, XVIII, 3 (1900) 423; Kom. Fl. Manchzh. III, 739; Nakai in Bot. Mag. Tokyo, XXIX, 200 (excl. var. *herbicola* Nakai); Ej. Fl. sylv. Korean. XIV, 120; Kom.

and Alis. Oprod. Rast. Dalnevost. Kr. II, 1064; Kitam. in Acta. Phyt. et Geobot. IV, 10; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 192 (excl. var. *herbicola* Nakai); Popov, Fl. Sr. Sib. II, 758.—*Saussurea karoï* Freyn in Oest. bot. Zeitschr. LII, 7 (1902) 279 (in clave); LII, 8 (1902) 310 (descriptio); Kom. Fl. Manchzh. III, 743; Kom. and Alis. Oprod. Rast. Dalnevost. Kr. II (1932) 1064; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 453.—**lc.**: Kom. op. cit. (1907) Plate XVI.

Perennial. Rhizome creeping, somewhat thick, producing fibrous roots; stem 20–75(100) cm high, with remains of old leaves at base, erect, angular, sulcate, leafy, more or less winged, sometimes more or less densely covered with hyaline, curled, articulated hairs (especially above), sometimes almost glabrous, smooth, simple, branched at apex, branches weakly bent or upward spreading. Leaves dark green above, pubescent with curly hairs, particularly distinctly along margin, besides 463 appressed hairs, lower surface light colored, with prominent midrib and less distinct lateral veins, pubescent with brown hairs along veins, glabrous in remaining part, thin, sometimes thick and hard, all unequally toothed, teeth cuspidate; basal leaves usually withering before anthesis, largest 20 cm long and 6.5 cm wide, less numerous, rosulate, elliptical, oblong-lanceolate or broadly lanceolate, with almost roundish or somewhat cordate, sometimes weakly truncate at base, narrowed into short winged petiole; lower leaves like basal, oblong, oblong-lanceolate or lanceolate; middle cauline leaves oblong-lanceolate or lanceolate; 9–12(18) cm long and 2.5–3 cm wide, sessile, decurrent with more or less broadly toothed or entire wing; upper cauline leaves gradually reduced, lanceolate, acuminate, entire or toothed, sessile. Capitula campanulate, lax, terminal on stem or branches, in groups of three in individual corymbs, sometimes two each on 2–6 mm long peduncles on lateral 1.5–3.5 cm long branches, pubescent with brown partly glandular hairs, sometimes one each on rather long, 3.5–6 mm long, branches, all together forming lax panicle. Capitula with 1.7–2 cm long and about 1–1.2(1.4) cm wide flowers; involucre campanulate, roundish at base, 1.1–1.3 cm long and about 1–1.2 cm wide when dry, sometimes weakly arachnoid-hairy, glandular-pubescent, glandular hairs on short stalks, sometimes almost glabrous; involucre bracts four-rowed; outer bracts often reaching middle of inner ones, ovate, acuminate into saber-shaped, usually dark colored, recurved appendage; middle bracts, ovate, straight or recurved; inner bracts linear or lanceolate, acuminate. Receptacle hemispherical, densely squarrose, scales linear-subulate, lustrous, about 4–5(6) mm long. Florets dark violet, about 1.1 cm long; narrow part of tube about 5 mm long, broad part 1–1.5 mm long, lobes of limb linear, about 4–5 mm long; anther appendages

ciliate-hairy. Pappus double, dirty brown; outer pappus bristles short, about 3–4 mm long, scabrous, short-plumose or finely barbate; inner bristles 9–10 mm long, long-plumose. Immature achenes about 3 mm long, dark brown, smooth, lustrous. Flowering VII–VIII.

Shady places in mixed forests, moss-covered forests.—*Eastern Siberia*: Dauria (eastern part); Lena-Kolyma (Olekma, rarely); *Far East*: Zeya-Bureya, Ussuri. *General distribution*: Korea. *S. karoii* Freyn described from the region of the Zeisk dock; isotype in Leningrad. *S. umbrosa* Kom. described from northeastern China and Korea; type in Leningrad.

Note. Freyn (op. cit. 1902) did not compare his species *S. karoii* with *S. umbrosa* Kom., described in 1900. Groundlessly, he compared *S. karoii* with *S. latifolia* Ldb., a species without appendages on the involucre bracts and phylogenetically distant from the former. In 464 publications of 1907 and 1932, V.L. Komarov recognized both species (*S. umbrosa* and *S. karoii*) in the Far East. He distinguished them as follows: in *S. karoii* supposedly the lower cauline leaves are petiolate with a cordate or broadly cuneate base, but in *S. umbrosa* they are sessile, uniformly narrowed towards base. A comparison of the authentic specimens and study of materials of both species show that these characters are not stable, and both species should be combined under the prior name *S. umbrosa* Kom.

Series 12. Grandifoliae Lipsch.—Ser. *Tohiren* Kitam. in Acta Phytot. et Geobot. IV (1935) 8 p. p.; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 181 p. p.—Capitula less numerous, large, often solitary, on long peduncles, in lax corymbs, sometimes forming lax panicle if corymbs several, occasionally in racemose inflorescence. Involucre globose-campanulate or turbinate; outer involucre bracts ovate or lanceolate, with or without long, saber-shaped, less often recurved appendages. Tall meadow or forest herbs usually with large, serrate toothed or crenate leaves, almost triangular in type specimen; leaf base truncate, slightly cuneate, or weakly cordate; stem wingless.

64. *S. grandifolia* Maxim. in Mém. Acad. Sc. Pétersb. par div. sav. IX (1859) 169; Ej. in Mém. Biol. IX, 342 p. max. p.; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 15; Kom. Fl. Manchzh. III, 725 excl. *ε. caudata* (Herd.) Kom.; Nakai, Fl. sylv. Korean. XIV, 118; Kom. and Alis. Opređ. Rast. Dalnevost. Kr. II, 1072; Kitam. in Acta Phyt. et Geobot. IV (1935) 9; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 186 excl. var. *caudata* (Herd.) Kom. and var. *microcephala* Nakai.—*S. grandifolia* *α. genuina* seu *Maximovicziana* Herd. op. cit. (1868) 15 nom. nud.; Kom. Fl.

Manchzh. III, 726; Nakai in Bot. Mag. Tokyo, XXIX, 203.—*S. grandifolia* β . *tenuior* seu *Raddeana* Herd. op. cit. (1868) 16; Kom. op. cit. 726.—*S. grandifolia* γ . *asperifolia* Herd. op. cit. (1868) 16; Kom. op. cit. 726.—*S. coarctata* (Herd.) Kitam. in Iconogr. pl. As. Orient. V, 1 (1950) 461, tab. CXLII.—*S. grandifolia* δ . *coarctata* seu *wilfordiana* Herd. op. cit. 16; Kom. op. cit. 726.—**lc.**: Kom. and Alis. op. cit. Plate 324.

Perennial. Rhizome prostrate, with numerous roots; stem 35–120 cm high, erect, more or less leafy, wingless, sulcate-angular, more or less rough due to stiff hairs, especially below, or almost glabrous, simple, branched at apex, branches divergent or weakly bent, puberulent. Leaves in typical specimen hard, dark green above, light colored beneath, both sides pubescent, scabrous, variable in shape; basal leaves withering before anthesis; lower and middle cauline leaves almost ovate or deltoid, attenuate-long cuspidate, more or less deeply cordate or truncate at base, narrowed into 3–9(13) cm long petiole; lamina 8–20 cm long and 4.5–13 cm wide, toothed-serrate; teeth cuspidate, somewhat larger toward base of lamina; upper leaves reduced upward, short-petiolate or sessile, ovate-triangular, ovate-rhombic or lanceolate, often cuneate at base, long acuminate; bracteal leaves 2–4 cm long, linear. Capitula up to 2 cm long with florets and about 1.2–1.4 cm wide, 3–18, solitary or in groups of two or three on lateral, more or less long peduncles, forming broad corymb or panicle, sometimes in racemes. Involucre campanulate, involucre bracts numerous, five- or six-rowed, imbricate, appressed, arachnoid-hairy dorsally and along margin, often with dark border; outer bracts one-fifth to one-fourth as long as inner, ovate, like middle short acuminate with blackish cusps; middle bracts oblong, inner linear, acuminate like middle, dark brown at apex and flocculose. Receptacle densely squamous, scales linear-subulate, white, lustrous, 7–8 mm long. Florets dark pink, 1.3(1.5) cm long; narrow part of tube about 0.7 cm long, almost as long as broad part with lobes of limb; anthers prominent, about 0.5 cm long, anther appendages ciliate. Pappus whitish, turning yellow at base, double; outer pappus bristles short, usually less numerous, scabrous or finely plumose, fragile; inner bristles long-plumose, 10–11 mm long. Flowering VII–VIII.

Forests, forest edges, rock crevices, shrubby thickets.—*Far East*: Zeya-Bureya (southeast), Ussuri. *General distribution*: Korea, northeastern China. Described from Amur (north slopes in the Amur gaps through the Burei Mountains). Type in Leningrad.

Note. A highly variable species; depending on ecological conditions, the consistency of leaves is sometimes more firm and coriaceous, as in plants of drier and open habitats, and sometimes softer, more delicate, as in specimens collected from shady places. The shape of the

inflorescence is also quite variable. Forms with few capitula may be segregated in var. *oligocephala* Lipsch. A plant preserved in the Herbarium of Botanical Institute, Academy of Sciences of the USSR (Loonezala Mountain in southern Sikhote-Alin, No. 1054, I.K. Schischkin), was taken to be a new species, *S. petiolata* Kom. (in Herb.), by V.L. Komarov. This lone specimen is very close to *S. grandifolia* Maxim., to the shade forms of which I tentatively refer it for the present, until new, more abundant material becomes available. The specimen identified by V.L. Komarov as *S. petiolata* Kom. differs by leaf blades that are up to 14 cm long and 11 cm wide on petioles up to 15 cm long; smaller and narrower, densely borne capitula; inner involucre bracts more heavily pubescent at the tip, with brushes of woolly hairs; and smaller florets.

466 65. ***S. subtriangulata*** Kom. in Tr. Glavn. Bot. Sada, XXXIX, 1 (1923) 119 (nomen); Bot. Mat. Gerb. Bot. Sada, VI (1926) 18 (descriptio); Kom. and Alis. Opređ. Rast. Dalnevost. Kr. II, 1072.—*S. eriolepis* γ. *caudata* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 32.—*S. grandifolia* var. *caudata* (Herd.) Kom. Fl. Manchzh. III (1907) 727; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 187.—*S. grandifolia* Maxim. in Mém. Biol. IX (1874) 342 p. p.—*S. subhastata* Kom. nomen in Herb.—**lc.**: Kom. and Alis. op. cit. Plate 322.

Perennial. Rhizome short, oblique, with numerous lateral roots; stem (30)40–75(100) cm high, wingless, erect, almost glabrous, smooth or sparsely pubescent, somewhat scabrous, sulcate-angular, leafy. Leaves thin, tender, dark green above, light-colored beneath, usually sparsely covered with papilliform hairs on both sides, margin ciliate, less often more or less glabrous; basal and lower cauline leaves with up to 12 cm long petioles, deltoid, oblong-hastate, or almost triangular, attenuate-acuminate, hastate-cordate or truncate at base, sharp toothed, teeth finely pointed, lamina 7–13 cm long; upper cauline leaves oblong-lanceolate or lanceolate, short-petiolate or almost sessile, narrow cuneate at base; uppermost leaves lanceolate-linear, almost entire. Capitula campanulate, 1.5–2.5 cm long including florets and 1.5(2) cm wide, numerous, solitary on long peduncles, forming elongate racemes with less numerous capitula. Involucre five-rowed, about 1.5 cm long, involucre bracts imbricate, appressed; outer bracts ovate, villous-woolly or almost glabrous, attenuate into narrow, long (0.5–1 cm long), dark colored, recurved, saber-shaped appendage; inner bracts elongate, oblong, somewhat obtuse, usually without appendage, flocculose-woolly at apex. Receptacle densely squamose, scales linear-subulate, white, lustrous, numerous, 1–1.2 cm long. Florets violet, 1.3–1.5 cm long, narrow part of tube 0.7–0.8 cm long, broad part 2–2.5 mm long, lobes of limb about 0.4 cm long;

anthers prominent, about 0.5 cm long, anther appendages ciliate. Pappus double, outer pappus bristles few, unequal, up to 3–4 mm long, serrate, inner bristles long-plumose, rusty near base, about 1 cm long; achenes about 5 mm long and about 1 mm across, narrow-cylindrical, slightly narrowed towards base, dark mottled glabrous. Flowering VII–IX.

Shady forests, rock crevices in forests.—*Far East*: Ussuri. *General distribution*: Korea. Described from a few herbarium sheets from the Ussuri Region. Authentic specimens in Leningrad. I designate the specimens of Maximovicz from the region of Bruse (now Slavyanka) Inlet as the lectotype.

Note. V.L. Komarov was inclined to consider this species closer to *S. triangulata* than to *S. grandifolia*. But *S. triangulata* differs sharply in its capitula from *S. subtriangulata*, although the leaves of the two species are, in fact, similar. *S. subtriangulata* is extremely close to *S. grandifolia*, from which it differs by the shape (narrower and elongate-hastate) and consistency of the leaves, smaller number of capitula and, most importantly, by the outer involucre bracts, which are furnished with long, recurved, saber-shaped appendages. The plant that is annotated *S. subhastata* Kom. (1933) in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR, does not differ at all from *S. subtriangulata*. Hybridization between *S. subtriangulata* and *S. grandifolia* is a likely possibility.

66. *S. sinuata* Kom. Fl. Manchzh. III (1907) 735; Kom. and Alis. Opređ. Rast. Dalnevost. Kr. II, 1071; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVII, 441.—*S. mongolica* auct.: Hand.-Mazz. in Acta hort. Gotoburg. XII (1938) 320, p. p. non Franch.—*lc.*: Kom. op. cit. (1907) Plate XIV.

Perennial. Rhizome short; stem 40–90 cm high, solitary, erect, simple, branched only above, angular-sulcate, smooth, wingless. Leaves thin, dark green above, pale green beneath, slightly lustrous, basal leaves usually withering before anthesis, lower and middle cauline leaves with up to 13 cm long petioles, with short ciliate hairs on both sides, particularly dense along margin; lamina up to 12 cm long, 10 cm wide, oval-oblong, oval or even somewhat attenuately triangular, attenuate-cuspidate, almost cordate or truncate at base, with two to four deep roundish notches on each side along margin, lobes acute, two- or three-toothed, cuspidate; uppermost leaves lanceolate or linear-lanceolate, narrower, almost entire, cuneately narrowed toward base into short petiole or almost sessile; bracteal leaves subulate, sessile. Capitula one to seven (nine), solitary terminal on lateral, long (up to 7 cm long), pubescent peduncles with stiff hairs, forming racemose inflorescence. Involucre five-rowed, turbinate, 1.2–1.8 cm long; outer involucre bracts ovate or



oblong, with green, erect or recurved, saber-shaped, 5–15 mm long appendages; innermost bracts linear, acuminate, with or without appendages; all bracts puberulent or weakly arachnoid-hairy. Receptacle densely squamose, scales linear-subulate, white, lustrous, about 7 mm long. Florets pale pink, about 1.3(1.4) cm long; narrow part of tube about 0.6 cm long, almost as long as broad part together with lobes of limb; anthers prominent, 0.5–0.6 cm long, anther appendages more or less pubescent. Pappus double, outer pappus bristles less numerous, unequal, up to 3 mm long, serrate, fragile, inner bristles long-plumose, about 1 cm long, straw yellow in lower part, dirty white above; mature achenes about 7 mm long, narrow-cylindrical, slightly narrowed toward base, dark brown, glabrous, immature achenes dark mottley. Flowering VIII.

Broad-leaved, coniferous, and cedar-broad-leaved forests.—*Far East*: Ussuri. *General distribution*: Northeastern China. Described from northeastern China; type in Leningrad.

469 *Note*. Close to *S. grandifolia* Maxim. and *S. subtriangulata* Kom. It can be distinguished at once from *S. grandifolia* by its deeply divided leaves (sometimes almost pinnatilobate) and long, saber-shaped, usually recurved appendages of the involucre bracts, as a result of which the imbricate arrangement becomes indistinct. From *S. subtriangulata* it differs by the presence of deep notches in the leaves, the turbinate shape of the capitula, and the absence of flocculose-woolly pubescence (glochidia) at the tip of inner involucre bracts.

Series 13. Triangulatae Lipsch.—Ser. *Imbricatae* Kitam. in Acta Phyt. et Geobot. IV (1935) 11 p. p.; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 198 p. p.—Capitula on long peduncles, aggregated in independent corymbs, forming lax panicle, sometimes on short peduncles in appressed compound corymbs. Involucre bracts dark colored or green; outer bracts reduced, ovate, obtuse or subobtuse. Leaves elongate-triangular, not glandular. Stem wingless.

Members of the series resemble species of series *Fauriei* Kitam. in the nature of the capitula and inflorescence.

67. *S. triangulata* Trautv. and Mey. in Fl. Ochot. (1856) 58; Maxim. Prim. Fl. Amur. 167; Fr. Schm. in Mém. Acad. Sc. Pétersb. sér. VII, XIII, 2, 152; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 33 (incl. α . *genuina* Herd. (p. 33) and β . *elatior* Herd. (p. 34)); Kom. Fl. Manchzh. III, 737; Nakai in Bot. Mag. Tokyo, XXIX, 203; Ej. Fl. sylv. Korean. XIV, 120; Kom. and Alis. Oprod. Rast. Dalnevost. Kr. II, 1072; Kitam. in Acta Phyt. et Geobot. IV, 11; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 199 (excl. β . *alpina* Nakai; subsp. *manshurica* (Kom.) Kitam.;

var. *pinnatifida* (Nakai) Kitam.); Sugaw. Ill. Fl. Saghal. IV, 1873; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 452.—*S. derbeckii* Kom. in Izv. Peterb. Bot. Sada, X, 4 (1910) 119; Kom. and Alis. op. cit. 1072.—*S. schischkinii* Kom. in Bot. Mat. Gerb. Glavn. Bot. Sada SSSR, VI, 1 (1926) 17; Kom. and Alis. op. cit. (1932) 1071.—**Ic.**: Fl. Ochot. (1856) Plate 29.

470 Perennial. Rhizome prostrate; stem erect, 30–70(100) cm high, angular-sulcate, glabrous or sometimes pubescent with curly hairs in upper part, often simple, less often branched above, branches straight, appressed or somewhat spreading. Leaves distant, thin, more pale beneath with prominent midrib and less distinct lateral veins, toothed or shallow crenate-toothed, teeth sharp; lamina glabrous or slightly crisped-pubescent on both sides, sparsely ciliate; basal leaves usually withering before anthesis, less often persistent; lower and middle cauline leaves petiolate, petioles up to 10 cm long, gradually reduced upward, sometimes winged, broadened at base into narrow and short sheath; lamina usually oblong-triangular, triangular-hastate, sometimes oblong or ovate, 4–12 cm long, acuminate, less often attenuate-acuminate, cordate at base, truncate or cuneate more frequently in middle cauline leaves; upper cauline leaves reduced upward, sessile on very short-petiolate, oblong, ovate or lanceolate, acuminate, truncate-cuneate at base or weakly cuneate, less often rounded; more or less toothed or almost entire. Capitula about 1.2 cm long and wide, almost sessile in typical specimen, terminal on stem in globule of compressed corymbs, sometimes terminal on more or less long, angular, slender peduncles aggregated with central corymb in paniculate or racemose lax inflorescence, capitula 3–20. Involucre tubular, roundish at base, 1.2(1.3) cm long and about 0.7 cm wide, four- or five-rowed, involucre bracts imbricate, usually entirely dark-colored, less often green, colored only at apex, without appendage, almost glabrous, sometimes with less numerous hairs or slightly arachnoid-hairy on dorsal surface and near tip, as well as along margin; outer involucre bracts half as long as inner, ovate, subobtusate or obtuse like middle bracts; inner bracts linear, subobtusate. Receptacle squamous, scales linear-subulate, about 7 mm long, lustrous; florets purple, about 1(1.2) cm long, narrow part of tube about 0.5(0.6) mm long, as long as broad part together with lobes of limb; lobes of limb almost as long as broad part of tube. Pappus smoky, double, outer pappus bristles less numerous, short, up to 3 mm long, serrate or finely plumose, inner bristles long-plumose, about 9 mm long; achenes narrowly cylindrical, about 6 mm long and 1 mm wide, mature achenes dark brown, glabrous. Flowering VII–VIII.

Deciduous and coniferous forests, groves of *Chosenia*, meadows, grassy patches near sea coast.—*Far East*: Zeya-Bureya, Ussuri, Uda,

Okhotsk regions, Sakhalin. *General distribution*: Korea. *S. triangulata* is described from the Shantar Islands; type in Leningrad. *S. derbeckii* Kom. from the De-Castri Bay; type in Leningrad. *S. schischkinii* Kom. from Sikhote-Alin; type in Leningrad.

Note. Herder (op. cit., 1868, p. 34) rightly reported that *S. triangulata* is extremely variable: 1) in the number, position and size of capitula (corymb sometimes compressed, sometimes more lax, and then with a series of lateral corymbs on more or less long peduncles, forming paniculate or racemose inflorescence; 2) in the color of the involucre bracts (green, dark-colored); and 3) in the size of the plant and its leaves. The shape of the leaf base and the number of rows of involucre bracts should also be added to this. V.L. Komarov described *S. derbeckii* in 1910 and *S. schischkinii* in 1926 but did not compare them with *S. triangulata* with which they should have been compared, being phylogenetically closest to it. *S. derbeckii* is compared with *S. acuminata* Turcz. and *S. sachalinensis* Fr. Schm., *S. schischkinii* is compared with *S. elongata* DC. Among the typical characters of *S. derbeckii* are the cuneate base of the lower leaves, violet-black involucre bracts, thin leaves, etc. Comparison of *S. derbeckii* with *S. triangulata* shows them to be identical. As regards *S. schischkinii*, its author considers the dense inflorescence comprising only a few
471 capitula to be the main character; the same picture is observed in the authentic specimen of *S. triangulata*. Cf. also the note to *S. manshurica* Kom.

68. ***S. manshurica*** Kom. in Tr. Peterb. Bot. Sada, XVIII, 3 (1900) 424; Kom. Fl. Manchzh. III, 730; Kom. and Alis. Oprod. Rast. Dalnevost. Kr. II, 1072; Ling in Contr. Inst. Bot. Nat. Acad. Peip. III, 172; Sugaw. III. Fl. Saghal. IV, 1873.—*S. triangulata* subsp. *manshurica* (Kom.) Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 201, excl. var. *pinnatifida* (Nakai) Kitam.—*S. triangulata* auct. fl. Sachal. et Orientalis Extremi p. p.—**lc.**: Kom. Fl. Manchzh. III, Plate XII; Sugaw. op. cit. (1940) tab. 860.

Perennial. Rhizome prostrate; stem (25)50–90 cm high, erect, slender, with narrow furrows, sometimes thick, fistular below, glabrous, simple, branched only in inflorescence. Leaves thin, green, more pale beneath, triangular-hastate, less often ovate or oblong, acuminate, less often attenuate-acuminate, toothed or shallow crenate-toothed, teeth sharp; lamina glabrous on both sides, sometimes sparsely hairy, ciliate, cordate or cuneate, less often truncate at base, with prominent midrib and less distinct lateral veins; basal leaves usually withering before anthesis, long-petiolate like lower cauline leaves; middle leaves short-petiolate, uppermost sessile, reduced, lanceolate or oblong, cuspidate, entire.

Inflorescence in typical specimen many-headed; however, often compound; capitula solitary on long bent or erect peduncles on lateral floriferous branches, forming dense corymbs, enclosing two or three capitula; lateral peduncles often forming lax panicle, crowded at stem apex or in its upper one-third part. Capitula narrow, 5 mm wide in lower part, up to 12 mm in upper part. Involucre five- to seven-rowed, imbricate; involucre bracts glabrous, shining, weakly pubescent only along margin and apex; outer bracts ovate, obtuse, innermost bracts oblong, much longer than in first outer row, obtuse; all bracts usually entirely, or along margin dark-colored or entirely green. Receptacle squamous, scales linear-subulate, lustrous, about 7 mm long. Florets dark violet, about 1–1.1 cm long, narrow part of tube about 5(6) mm long, as long as broad part together with lobes of limb; lobes of limb 3–4 mm long, slightly longer than broad part of tube; anther appendages hairy. Pappus double, smoky, outer pappus bristles less numerous, serrate, fragile, up to 4 mm long, inner pappus bristles long-plumose, about 0.9–1 cm long; achenes 4–5 mm long, glabrous, dark brown. Flowering VII–VIII.

Crevices of rocks, stony slopes, outcrops of crystalline shales in mixed or coniferous forests, Erman's birch forests.—*Far East*: Zeya-Bureya, Ussuri, Uda, Sakhalin. *General distribution*: Northeastern China, Korea. Described from the Burei Mountain. Type in Leningrad.

472 *Note*. V.L. Komarov distinguished his species from *S. triangulata* Trautv. and Mey. by the following characters: narrow capitula on long peduncles, a five-rowed involucre and lax inflorescence. The extreme forms of *S. manshurica*, originally designated by the author in the description as *S. manshuriensis*, distinctly differ from *S. triangulata* by their general appearance. The inflorescence of *S. manshurica* is lax, many-headed, and with numerous floriferous branches, whereas the inflorescence of *S. triangulata* is compressed, and few-headed. The character cited for distinguishing the two species, namely, differing numbers of rows of involucre bracts, does not hold up. Some forms of both species are difficult to separate from each other, and constitute a transition. In accordance with the tradition of the *Flora of the USSR*, I accept the binomial name for the species, although Japanese botanists have reduced *S. manshurica* to the status of a subspecies of *S. triangulata*.

Series 14. Fauriei Kitam. in Acta Phyt. et Geobot. IV (1935) 5; Éj. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 179.—Stem more or less winged. Capitula sessile or on very short peduncles, in dense corymbs. Involucre narrow-tubular; involucre bracts imbricate, outer bracts ovate or deltoid, together with middle bracts obtuse or rounded at apex. Usually tall meadow and forest herbs.

69. *S. parviflora* (Poir.) DC.: in Ann. Mus. Paris, XVI (1810) 200; Ej. Prodr. VI, 534; Turcz. Fl. baic.-dahur. II, 1, 110; Kryl. Fl. Zap. Sib. XI, 2916; Lipschitz in Sp. Rast. Gerb. Flory SSSR, XIII, 126.—*Serratula parviflora* Poir. Encycl. Meth. VI (1805) 554.—*Saussurea serrata* DC. in Ann. Mus. Paris, XVI (1810) 199; Ldb. Ic. pl. Fl. Ross. 1, 17, 18; Ldb. Fl. alt. IV, 25; DC. Prodr. VI, 534; Ldb. Fl. Ross. II, 2, 666; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 18, excl. *C. amurensis* Herd. and β . *corymbo contracto*; Kryl. Fl. Alt. III, 705; Popov, Fl. Sr. Sib. II, 759.—*S. elata* auct.: Turcz. in herb. (non Ldb.).—*S. atriplicifolia* Fisch. ex Herd. op. cit. (1868) 19 and herb.—*Heterotrichum atriplicifolium* MB. ex Herd. op. cit. (1868) 19.—*S. purpurata* Fisch. ex Herd. op. cit. (1868) 20.—*Heterotrichum glabellum* MB. ex C.A.M. in DC. Prodr. VI (1837) 534; Herd. op. cit. 20.—*Serratula multiflora* Pall. ex Herd. op. cit. (1868) 20.—**Ic.:** Ldb. Ic. Fl. Ross. I, tab. 71 and 72.—**Exs.:** Smirnow Pl. alt. No. 96 (1930) (sub nom. *S. serrata* DC.); GRF No. 3992.

Perennial. Rhizome prostrate; stem solitary, 20–100 cm high, erect, simple or branched above, fistular, strongly leafy in typical specimen, sulcate, glabrous or weakly hispid, usually more or less winged due to decurrent leaves, less often wingless, wings more or less narrow, with entire margin. Leaves green above, glaucous beneath, glabrous on both sides or with stiff ciliate hairs on lower surface, especially along veins and margin; midrib prominent, numerous lateral veins poorly noticeable; basal leaves usually withering before anthesis, like lower cauline leaves
 473 petiolate, elliptical or oblong-elliptical acuminate, usually serrate-toothed, teeth small and infrequent, terminating in callose cusp, less often lamina entire, unequal in length and width; 8–30 cm long together with petiole and 1.5–2.5(4) cm wide; middle leaves lanceolate or elliptical-lanceolate, attenuate-acuminate, sessile, usually strongly decurrent, cuneate at base, not cordate; upper leaves reduced, lanceolate or linear-lanceolate, entire, sessile, usually not decurrent. Capitula terminal on main stem and floriferous branches in corymbs; corymbs sometimes broad, numerous, and many-headed, forming paniculate inflorescence (var. *patens* Ldb. *Fl. Ross.* II, 2 (1845–1846) 667), sometimes solitary, terminal dense (var. *contracta* Ldb. op. cit., 667); peduncles of capitula and corymbs pubescent, scabrous or almost glabrous, smooth. Involucre narrow-tubular, 3–3.5 mm wide, three- or four-rowed, imbricate; involucre bracts usually entirely or in upper half dark-colored, glabrous, sometimes hairy along margin or less often entirely floccose-tomentose at apex, especially in inner bracts, outer bracts smaller, orbicular-ovate, obtuse or subobtuse; inner bracts oblong, obtuse or roundish. Receptacle densely squamose, scales linear-subulate, white, lustrous, about 6–7 mm long. Florets violet lilac (in ssp. *purpurata* (Fisch.) Lipsch.), about 1–1.2 cm long, narrow part of tube about 5–6 mm long, almost as long as broad part together

with lobes of limb; lobes of limb almost as long as broad part of tube; anther appendages hairy. Pappus double; outer pappus bristles unequal, 2–4 mm long, serrate or finely plumose, inner bristles 8–9 mm long, long-plumose; mature achenes 3–3.5 mm long, whitish or yellowish with dark spots. Flowering VII–VIII. (Plate XXXIV, Fig. 2.)

Wet meadows, marshes, river banks, thickets of shrubs, deciduous and mixed forests, coniferous forests, alpine meadows, tundras, stony slopes, rocks.—*European Part*: Dvina-Pechora (extreme western location: the former Ust-Sysolsk District), Volga-Kama (Ural part), Trans-Volga Region (Ural part); *Western Siberia*: Upper Tobol, Ob', Irtysh (eastern part), Altai; *Eastern Siberia*: Yenisei, Angara-Sayans, Dauria, Lena-Kolyma. *General distribution*: Mongolia, China (northern)? Described from Siberia; type specimen in Geneva(?).

Note. An extremely polymorphic species; varies in the following characters: 1) size of leaves; 2) pubescence of their lower surface; 3) cutting of margin or leaves almost entire; margin of leaf sometimes almost flat, sometimes slightly involute; 4) leaf base; 5) shape of inflorescence; 6) color and degree of pubescence of involucre bracts; 7) pubescence of peduncles of capitula; and 8) stem height (specimens from alpine tundra are usually much smaller than from lower regions). M.G. Popov (op. cit., 1959) reported hybrids of this species with *S. latifolia* Ldb.

Ssp. *purpurata* (Fisch. ex Herd.) Lipsch. in Sp. Rast. Gerb. Flory SSSR, XIII (1955) 127; in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 375.—*S. purpurata* Fisch. ex Herd. in Bull. Soc. Nat. Mosc. XLI (1868) 20.—*S. serrata* α. *purpurata* Herd. op. cit. (1868) 20.—
474 *Heterotrichum glabellum* MB. ex C.A.M. in DC. Prodr. VI (1837) 534; Herd. op. cit. (1868) 20.—*Serratula multiflora* Pall. ex Herd. op. cit. (1868) 30.—*Saussurea acuminata* Turcz. γ. *gracilis* Herd. op. cit. (1868) 23.—Entire plant, especially stem, usually purple, somewhat woody, glabrous, root collar sparsely covered with fibrously split sheaths; upper cauline leaves usually narrower, lanceolate or linear-lanceolate, almost entire, glabrous beneath, slightly involute, with weakly decurrent bases, often not at all decurrent on stem, and then wingless in typical specimens. Corymbs compact, less numerous, comprising capitula on short peduncles. Involucre bracts usually longer than in type specimen, usually dark-colored, almost glabrous, less often pubescent; florets purple. Described from "Dauria" (Vlasov). Type in Leningrad. The subspecies is distributed in the Trans-Baikal Region (but also found in Tomsk, Angara-Sayan); with many forms intermediate between it and *S. parviflora*.

A unique variety of *S. parviflora*, distinguished by deeply sinuate leaves, producing, however, a whole gamut of intermediates to simply repand leaves was collected by V.N. Sukaczev and his collectors on

the eastern bank of Baikal, between the Ust-Barguzin Station and the Maksimikha Station; I have described it as var. *incisa* Lipsch. (*Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XXI (1961) 375).

Quite a few specimens were collected from the Chuno-Angara watershed, which, in my opinion, are hybrids between *S. parviflora* (Poir.) DC. and *S. stubendorffii* Herd. They strongly resemble *S. parviflora* in having prominently winged stems and in their leaf shape, but the lower surface of the leaves has arachnoid-hairy pubescence and the capitula are larger; the involucre bracts are strongly pubescent, and the florets are bright red. These specimens are closer to *S. stubendorffii* in the latter characters.

Hybrids between *S. parviflora* (Poir.) DC. and *S. controversa* DC. are known from the Balagan Region. Cf. the description in the note to *S. controversa* DC.

70. **S. porcii** Degen in *Mag. Bot. Lapok* 12 (1904) 311; Wilczynski in *Mag. Bot. Lapok*, XXVI, 65.—*S. serrata* auct.: Jánka in *Oest. bot. Zeitschr.* VIII, 6 (1858) 200; and auct. fl. Transsylv.; Herd in *Bull. Soc. Nat. Mosc.* XLI, 3, 22 in nota, non DC.—*S. parviflora* auct.: Jánka in *Linnaea*, XXX (1859) 585; non Poir. nec DC.—*S. alata* auct.: Porcius and Czetv. ap. *Porc. Fl. phanerog. din. fost. distr. alu Naseud* (1881) 118, non DC.

Perennial. Rhizome dark brown, woody, almost horizontal, strongly filamentous; stems 30–80 cm high, almost glabrous or rather sparsely arachnoid-hairy when young, smooth, densely leafy. Leaves fleshy, narrow-lanceolate, acute, with broad base, wing-like decurrent on stem, entire; middle cauline leaves slightly broader, lanceolate, acute, entire, involute and sparsely toothed; upper cauline leaves shorter and narrower, uniformly lanceolate or almost linear, acute, entire; all leaves broadly wing-like decurrent along stem, glabrous above, young leaves rather 475 sparsely flocculose-arachnoid hairy beneath, however, glabrescent, lower surface of adult leaves with few crisped hairs, slightly scabrous or almost glabrous, pubescent or glabrous along margin. Inflorescence terminal of more or less globose corymbs; inflorescence branches somewhat flat, winged, slightly longer than corymbs; capitula obconical. Involucre bracts imbricate, three- to five-rowed; outer bracts ovate-lanceolate, obtuse; middle bracts ovate, acuminate; inner slightly oblong, lanceolate-ovate, obtuse; all bracts green at base, dark red above middle, dorsal surface covered with less numerous but long villous hairs, or sometimes entirely arachnoid-hairy, woolly along margin, glabrous inside. Florets lilac colored, five-fid above middle; anthers two times as long as filaments, with hairy appendages at base. Receptacle squamous; pappus double, outer pappus bristles subulate, short-plumose, inner pappus

bristles long-plumose; young achenes dark brown, slightly compressed, glabrous, deeply sulcate.

Marshy meadows at about 1,500 m.—*European Part*: Upper Dniestr. *General distribution*: Central Europe. Described from specimens of Porcius. Collected in eastern Transylvania. Type evidently in Budapest.

Note. This species is not represented in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR. Its description is taken from Degen and Wilczynski; the latter collected *S. porcii* in the Carpathians (in the eastern part of the Lyudovan Mountains).

These authors distinguish *S. porcii* from *S. parviflora* by the following suite of characters: lanceolate (and not elliptical-lanceolate), entire, acute leaves; larger capitula; obconical involucre (not narrow-tubular, as in *S. parviflora*); much more densely leafy stems; broadly (not narrowly) winged broader, less acute involucre bracts; long villous dorsally (and not glabrous or arachnoid-ciliate only along margin), less deeply divided corolla (divided two-thirds of the length in *S. parviflora*); anthers twice as long as filaments; and longer pappus. *S. porcii* is a species which needs to be compared with the large amount of material accumulated for *S. parviflora*.

71. *S. neoserrata* Nakai in Bot. Mag. Tokyo, XLV (1931) 519; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 179.—*S. serrata* c. *amurensis* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 19; Kom. Fl. Manchzh. III, 735.—*S. serrata* in Kom. and Alis. Opred. Rast. Dalnevost. Kr. II (1932) 1064 and auct. plur. Fl. Extr.-Orient.—*Exs.*: Karo Plantae Amuricae et Zeaensae curav. Dörfler. No. 441 (sub nom. *S. serrata* DC.).

476 Perennial. Rhizome prostrate; stem erect, 50–100 cm high, winged-angular, crisped hairy, more or less glabrous above, fistular, densely leafy, branched above with ascending branches, less often simple. Leave coriaceous, green above, glabrous or sparsely ciliate-hairy, glaucous or light glaucous beneath, glabrous or less often with bent, scattered, somewhat stiff hairs and then scabrous, with prominent midrib beneath and less distinct lateral veins; basal and lower cauline leaves withering before anthesis; cauline leaves broadly lanceolate, elliptical-lanceolate, 12–20 cm long and up to 8 cm wide, attenuate-acute, distinctly and sharply toothed-serrate, cuneately narrowed at base into a broad, up to 1 cm wide, petiole, wing-like decurrent; upper cauline leaves gradually reduced, narrow-lanceolate or linear-lanceolate. Capitula about 1–1.2 cm long and about 0.4–0.5 cm wide, rather numerous, on short peduncles, in dense corymbs, terminal on main stem and lateral branches, forming paniculate inflorescence. Involucre tubular, with turbinate base, imbricate, four- or five-rowed; involucre bracts usually green, often dark red along

margin (less often entirely colored); all bracts obtuse, dorsally smooth, sparsely arachnoid-hairy along margin; outer bracts ovate, reduced, one-fourth as long as inner; middle bracts oblong, inner oblong-linear. Florets purple or pale purple, about 0.9 cm long, narrow part of tube about 5 mm long, broad part with lobes of limb about 4 mm long; anther appendages hairy. Receptacle squamose, scales narrow-linear, lustrous, about 6–7 mm long. Pappus double, outer pappus bristles reduced, unequal, about 1–2 mm long, fragile, serrate or finely plumose, inner bristles about 6–7 mm long, long-plumose; achenes 5 mm long, glabrous, sulcate, truncate at apex, gradually tapered at base throughout, with dark spots. Flowering VII–VIII. (Plate XXXIV, Fig. 1.)

Moist meadows, hummocky marshes, among shrubs, edges of mixed forests, broad-leaved and coniferous forests, sedge-willow-dwarf Arctic birch forest, thickets of filbert.—*Eastern Siberia*: Dauria; *Far East*: Zeya-Bureya, Ussuri, ?Uda Region. *General distribution*: Korea. Described from Korea. Type probably in Tokyo.

Note. It hybridizes with *S. umbrosa* Kom. I include specimens from the northern Sikhote-Alin (Botchi River Valley, 1924) among these hybrids, in which the involucre bracts, especially the outer ones, have small, leafy, saber-shaped, recurved appendages.

S. neoserrata appears in Trans-Baikal, where it begins to replace the fairly polymorphic species *S. parviflora*; as it moves eastward, it gives rise to a series of transitional forms, possibly through hybridization.

72. *S. fauriei* Franch. in Bull. Herb. Boiss. V, 7 (1897) 542; Matsumura, Ind. pl. Jap. II, 661; Kitam. in Acta Phyt. et Geobot. IV, 5; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 180; Ej. in Iconogr. pl. As. Orient. V, 1 (1950) 463.—*Ic.*: Kitam. op. cit. (1950) tab. CXLIII.

Perennial. Rhizome oblique, woody, developing numerous fibrous roots; stem strong, straight, 150–200 cm high, up to 2 cm thick at base, sulcate, winged, densely leafy, puberulent with crisped hairs, branched
477 above. Leaves hard; basal leaves withering before anthesis; cauline leaves broad, ovate, ovate-oblong or elliptical-lanceolate, up to 25–30 cm long and 5–8 cm wide, cordate, truncate, or less often cuneate at base, with short weakly winged petiole, decurrent on stem, more or less long attenuate, irregularly serrate-toothed, teeth poorly developed, callose at apex, cuspidate; lamina green above, grayish pubescent beneath and under lens with usually numerous, lustrous, scattered glandular hairs; uppermost cauline leaves reduced, linear-lanceolate, approximate with inflorescence, sometimes entire. Inflorescence many-branched, of numerous dense corymbs, forming more or less broad panicle; capitula numerous, on short peduncles, narrow-cylindrical, compactly arranged

in individual corymbs. Involucre imbricate, five-rowed, green, 10–12 mm long and 4–5 mm wide; outer involucre bracts reduced, orbicular; middle bracts ovate, inner linear; all bracts obtuse, slightly brownish, and arachnoid-hairy at apex, as well as along margin. Receptacle squamose, scales linear-subulate, lustrous, unequal. Florets 10 mm long, narrow part of tube 5 mm long, as long as broad part with lobes of limb; lobes of limb three times as long as broad part of tube; anther appendages ciliate. Pappus double, outer pappus bristles numerous, reduced, unequal, up to 3 mm long, fragile, serrate-scabrous; inner pappus bristles long-plumose, 8–8.5 mm long; achenes immature, about 3 mm long, with small ribs. Flowering VII–VIII.

Coastal tall herb meadows.—*Far East*: Sakhalin (southern Kurils, Kunashir Island, Shikotan). *General distribution*: Japan. Described from Ezo Island. Type apparently in the Herbarium of Franchet in Paris.

Note. Franchet compared this species with *S. parviflora* (Poir.) DC. In my view, it is closest to *S. neoserrata* Nakai, from which it differs by taller growth, leaves that are grayish pubescent underneath (and not glaucous and glabrescent, glabrous), less pronounced marginal teeth, as well as more rounded bases of the blade and shorter winged petioles. The relationship of *S. fauriei* Franch. and *S. neoserrata* Nakai requires further study in nature.

Series 15. Latifoliae Lipsch.—Stem more or less winged, densely leafy. Leaves ovate or elliptical, green on both sides, obtuse or weakly attenuate at apex, slightly acuminate. Capitula in dense terminal corymbs, less often also on lateral branches; upper cauline leaves sometimes approximate with inflorescence. Involucre imbricate; involucre bracts in typical specimen lustrous, obtuse or subobtuse. More or less tall forest and subalpine herbs.

Note 1 The members of series *Latifoliae* are morphologically close to the members of series *Faurieae*, but differ from the latter by the 478 larger size and shape of the capitula and less attenuate-acuminate middle cauline leaves. *Latifoliae* is readily distinguished from the closely related series *Foliosae* Lipsch. by the large size of the leaves, blades that are similarly colored on both sides, and the different shape and size of the outer involucre bracts.

Note 2. *S. americana* Eaton, growing in North America, is closest to series *Latifoliae*. I find great phytogeographical significance in the closeness of *S. latifolia* Ldb. with *S. americana* Eaton, indicating a common origin of the herb cover of the Siberian and North American taiga. Evidently, *S. americana* Eaton should be placed in a different series, *Americanae* Lipsch., parallel to series *Latifoliae* Lipsch.; similarly the Siberian series *Foliosae*, corresponds to a series *Pseudofoliosae*

Lipsch. in America, with the only species being *S. pseudofoliosa* Lipsch. sp. nova. Its description will be given in another place.

73. *S. latifolia* Ldb. Ic. pl. Fl. Ross. I (1829) 17; Ej. Fl. alt. IV, 24; DC. Prodr. VI, 534; Ldb. Fl. Ross. II, 2, 666; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 17; Kryl. Fl. Alt. III, 704; Kryl. Fl. Zap. Sib. XI, 2914; Popov, Fl. Sr. Sib. II, 758.—*S. macrophylla* Bge. ex Herd. op. cit. (1868) 17.—**Ic.:** Ldb. Ic. pl. Fl. Ross. I (1829) tab. 70.—**Exs.:** Smirnov. Pl. alt. No. 95.

Perennial. Plants 30–120 cm high, glabrous or weakly pubescent, with prostrate rhizome, producing one or less often two or three stems; stem erect, simple, sulcate, winged or less often wingless (f. *exalata* Kryl.), strongly leafy; leaves ovate or elliptical, acuminate, but only slightly attenuate at apex, scabrous above, more or less pubescent beneath, occasionally quite strongly (f. *pubescens* Lipsch.) or less often glabrous, serrate-toothed and puberulent along margin, teeth terminating in short cusp; basal and lower cauline leaves petiolate, somewhat cordate at base, 6–15 cm long and 4–9 cm wide; upper leaves smaller, sessile or with shorter petioles, decurrent along internodes and then latter winged; uppermost leaves narrow-lanceolate or linear-lanceolate; width of wings variable, less often weakly toothed, sometimes wings absent (f. *exalata* Kryl.). Capitula campanulate, about 1.5–1.8 cm long and 0.5–0.6(0.8) cm wide, slightly enlarged in fruits, in terminal, usually dense corymbs or, with lateral corymbs, forming corymbose panicle. Involucre four- or five-rowed; involucre bracts imbricate, light-colored or often dark violet; outer bracts ovate, obtuse or subacute; inner bracts oblong or lanceolate, subobtuse or acuminate; all involucre bracts more or less pubescent, especially along margin and at apex, glabrescent and, therefore, involucre bracts in typical specimen almost glabrous and shining. Receptacle with sparse lustrous scales; florets purple-violet, about 10(11) mm long, narrow part of tube about 5(6) mm long, almost as long as broad part including lobes of limb; anthers violet, anther appendages hairy. Pappus double; outer pappus bristles unequal, up to 3–4 mm long, fragile, short-plumose or serrate-scabrous, inner bristles about 9–10 mm long, long-plumose; achenes smooth, half to two-thirds as long as pappus. Flowering VII–VIII.

Coniferous and mixed forests; forest, subalpine and alpine meadows, less often moss-lichen tundras in the lower part of alpine belt.—*Western Siberia:* Irtysh (eastern part), Altai; *Eastern Siberia:* Angara-Sayans, Dauria (southwestern part). *Soviet Central Asia:* Dzhungaria-Tarbagatai. *General distribution:* Mongolia (Mongolian Altai). Reported by P.N. Krylov (*Flora of Western Siberia*, XI, 2915) for Tarbagatai; I did not see the specimens. Described from Altai; type in Leningrad.

Note. As was mentioned above, the American species *S. americana* Eaton is closest to *S. latifolia*. The former differs slightly from the Siberian species by somewhat narrower leaves with more pronounced cuneate bases, less decurrent on the stem, and thus the stem is almost wingless, and by stronger pubescence on the involucrel bracts.

Series 16. Foliosae Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 376.—Stem taller, sometimes (in alpine forms) shorter, or plants almost without stem, more or less densely leafy up to tip, sometimes, especially in *S. foliosa* Ldb., hidden under leaves; leaf bases nondecurrent or weakly decurrent on stem. Leaves white-tomentose beneath, less often glabrous on both sides, green, toothed in type specimen. Capitula sometimes in terminal capitate corymbs (then corymbs usually not observed on lateral branches), subtended by upper cauline leaves, sometimes in more lax corymbs, then capitula on distinctly compressed, glandular-pubescent or almost glabrous peduncles. Capitula campanulate or tubular. Involucre indistinctly or distinctly imbricate; outermost bracts lanceolate, usually as long as inner bracts in type specimen or sometimes shorter; inner bracts more or less densely covered with long, somewhat stiff or soft appressed hairs; outer and middle series of bracts long acuminate. Transitions present from distinctly to indistinctly imbricate involucre. Receptacle squamous.

74. *S. foliosa* Ldb. Ic. pl. Fl. Ross. I (1829) 17; Ej. Fl. alt. IV, 23; DC. Prodr. VI, 535 (excl. var. β .); Ldb. Fl. Ross. II, 2, 669; Turcz. Fl. baic-dahur. II, 1, 116 (excl. var. β . *dentosa* Turcz. and γ . *pygmaea* Turcz.); Kryl. Fl. Alt. III, 705; Kryl. Fl. Zap. Sib. XI, 2915.—*S. alpina foliosa* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 38.—*Ic.*: Ldb. op. cit. (1829), tab. 69.

Perennial. Rhizome prostrate, developing several or solitary stems; stems erect, unbranched, 10–35 cm high, slightly pubescent or usually glabrous, sulcate, densely leafy up to inflorescence, usually hidden under leaves. Leaves hard, oblong-ovate or long-elliptical, subacute, involute, toothed with cuspidate teeth; white-tomentose beneath, green and glabrous above (var. *altaica* Turcz. op. cit. 1856, 116 = var. *tomentosa* Kryl. *Flora of Altai*, III, 1904, 705) or green on both sides, almost glabrous or sparsely covered with short, somewhat stiff hairs (var. *glabrata* Kryl. *Fl. Alt.* (*Flora of Altai*), III, 1904, 705), lamina 3–9 cm long and 1.5–3 cm wide; basal leaves usually withering before anthesis, narrowed into short petiole; upper cauline leaves sessile, with weakly decurrent base. Capitula narrow-campanulate, about 15 mm long and 5–6 mm wide with florets, crowded at stem apex in dense corymb, subtended by apical leaves; stem usually somewhat flattened below inflorescence, less

often besides terminal corymb, solitary capitula originate from axils of upper leaves. Involucre usually blackish-violet, pubescent; outermost involucre bracts in type specimens herbaceous, green, lanceolate, acuminate, almost as long as inner bracts or slightly shorter, less often almost half as long, more or less pubescent along margin and surface; subsequent bracts usually dark-colored, ovate, acuminate, shorter; inner bracts oblong, subobtusate, colored, somewhat densely hirsute, longer than middle bracts. Receptacle squamose, scales linear-subulate, lustrous, about 6–7 mm long mostly in middle; florets pink-lilac, about 10–11 mm long, narrow part of tube about 5–6 mm long, broad part about 2 mm long, lobes of limb about 3 mm long; anthers violet, anther appendages hairy. Pappus double; outer pappus bristles unequal, 1 to 4–5 mm long, fragile, scabrous or finely plumose; inner bristles long-plumose, 8–10 mm long. Flowering VII–VIII.

Rocks, stony screes, tundras, gravelly river banks in alpine and upper subalpine belt.—*Western Siberia*: Irtysh (eastern part), Altai; *Eastern Siberia*: Angara-Sayans (southeastern part). *General distribution*: Mongolia. Described on the basis of specimens from Riddersk. Type in Leningrad.

Note. The type material is characterized by leaves that are white-tomentose on the lower surface; transitions to leaves glabrous or almost glabrous on both sides are found. Var. *tomentosa* Kryl. was described earlier (1856) as var. *altaica* Turcz.

S. foliosa Ldb. is phylogenetically very close to the North American species *S. pseudofoliosa* Lipsch., which I split off from *S. americana* Eaton. See also the note to *S. sukaczewii* Lipsch.

75. *S. pricei* Simps. in Journ. Linn. Soc. Bot. XLI (1913) 426; Kryl. Fl. Zap. Sib. XI, 2919; Popov, Fl. Sr. Sib. II, 762.—*S. alpina* β . *subacaulis* Ldb. Ic. pl. Fl. Ross. I (1829) 17; Ej. Fl. alt. IV, 27; DC. Prodr. VI, 535; Ldb. Fl. Ross. II, 2, 669; Kryl. Fl. Alt. III, 707.—*S. subacaulis* (Ldb.) Serg. in Sistem. Zam. Gerb. Tomsk. Univ. 2 (1941) 4.—*S. pumilio* Fisch. ex DC. Prodr. VI (1837) 535 nomen.—*S. foliosa* γ . *pygmaea* Turcz. Fl. baic.-dahur. II, 1 (1856) 116 and Herb.—*S. alpina* δ . *hypoleuca* α . *minima* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 40.—*Ic.*: Simps. op. cit. (1913) t. 21, fig. 1–7; Ldb. op. cit. (1829) tab. 73.

481 Perennial. Typical small alpine plants with rhizome, often many-headed, developing floriferous shoots and rosettes of basal leaves; stems usually densely covered at base with blackish-brown remains of previous year's basal leaves, (1)3–10(12) cm high in type specimen, arachnoid-hairy or glabrous, sometimes reddish-violet together with leaves, usually densely leafy up to inflorescence. Leaves hard, coriaceous, distinctly bicolored, green and glabrous above, densely white-tomentose beneath;

lower and middle leaves lanceolate, oblong-ovate or oblong, indistinctly cuneate at base, lamina 3–8 cm long and 0.5–1.2 cm wide and petiole one-fourth to half as long as lamina, less often almost as long; lower leaves persistent even after anthesis, often as long as inflorescence or longer in small, particularly stemless specimens; upper leaves sessile, not decurrent, oblong or linear-lanceolate, in most specimens approximate with inflorescence; all leaves distinctly toothed, teeth callose with horizontal or decurved cusp. Capitula, including florets, 1–1.3 cm long, aggregated in groups of 5–15(20) in dense corymbs. Involucre 5–6 mm wide; involucre bracts light-colored, sometimes reddish-violet; outer bracts ovate or lanceolate, usually attenuate in subulate, sometimes recurved cusp, almost as long as innermost bracts or slightly shorter; outer and middle bracts covered with long white hairs along margin and outside (pubescence on several bracts sometimes glabrescent); inner bracts densely villous above. Receptacle sparsely squamose, scales linear-subulate, unequal, up to 3 mm long, lustrous; florets pink-violet, 8–9 mm long, narrow part of tube about 5 mm long, almost as long as broad part with lobes of limb; anthers dark, anther appendages ciliate. Pappus double, outer pappus bristles about 2–3 mm long, serrate-scabrous or short-plumose, inner bristles 7–8 mm long, long-plumose; achenes 5–6.5 mm long, ribbed, mottled, often dark-colored above. Flowering VII–VIII.

Gravelly and moss-lichen tundras, rocks, glacial moraines and cirques in alpine belt.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayans (Sayans), Dauria (southeastern part), Lena-Kolyma (Vitim Plateau). *General distribution*: Northern Mongolia. Described from the Tannu-Ola Range in the Tuva Republic. Type in Kew(?).

Note. It is closest to *S. congesta* Turcz., from which it is distinguished by the white-tomentose back side of the leaves, and to *S. sukaczevii* Lipsch. It differs from the latter species by the shorter height, the outer involucre bracts in type form subulate-acuminate to almost equal to or slightly shorter than the innermost bracts (in typical *S. sukaczevii*, involucre bracts are clearly imbricate), and more dense corymbs. However, in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR, there is a series of specimens (hybrids?) intermediate between *S. sukaczevii* and *S. pricei*. The limited Altai material of *S. pricei* is not fully analogous to the Sayan material (the middle involucre bracts in several specimens are distinctly shorter than the inner ones; the outer involucre bracts are equal, shorter, or longer than the inner; the leaves are sometimes almost entire).

482 Detailed comparative observations in nature are needed for both *S. pricei* and *S. congesta*. There probably are hybrids between them. Compare also the note to *S. congesta*.

76. *S. congesta* Turcz. in DC. Prodr. VI (1837) 535; Ldb. Fl. Ross. II, 2, 662; Turcz. Fl. baic.-dahur. II, 1, 115; Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 44 (incl. α . *humilior* s. *kiriloviana* Herd. and β . *elator* s. *kusnetzoviana* Herd.); Popov, Fl. Sr. Sib. II, 763.

Perennial. Plants vary from almost stemless forms (2–4 cm high) to forms with distinctly developed stem (7–12 cm high); stem often weakly flattened, sulcate, simple, almost glabrous or pubescent especially below inflorescence. Leaves thicker, hard (compare type material), sometimes thinner, soft, oblong-lanceolate or lanceolate; all leaves acuminate, more or less toothed, teeth callose at apex with horizontal or recurved short cusps, lamina almost glabrous on both sides, with punctate glandular hairs beneath; lower leaves usually broader (up to 1.5 cm wide), short petiolate (in cauline leaves, petiole sometimes almost as long as lamina and weakly woolly), narrow-cuneate at base; middle and upper leaves almost sessile or short-petiolate, not decurrent, 0.5–1 cm wide; uppermost leaves usually linear or lanceolate-linear in type specimen, narrow, approximate with inflorescence. Capitula usually numerous, on short peduncles, forming dense corymb. Involucre dark or light colored, 5–7 mm wide; involucre bracts ovate or triangular-acuminate, dorsally pubescent as also at apex, especially inner bracts, with long, stiff, white hairs; outer bracts almost as long as or slightly shorter than inner. Receptacle squamose, scales linear-subulate, unequal, lustrous. Florets (according to Truczaninow) scarlet, about 9(10) mm long, narrow part of tube about 5 mm, almost as long as broad part including lobes of limb; anther appendages ciliate. Pappus dirty white, double, outer pappus bristles numerous, unequal, up to 2 mm long, serrate-scabrous, fragile, inner bristles long-plumose, about 8 mm long. Flowering VII–VIII.

Meadow, gravelly, shrubby and moss-lichen tundras, rocks in alpine zone.—*Eastern Siberia*: Angara-Sayans (Sayans), Tuva Republic, Lena-Kolyma (? Vitim, Yablonovyi Range). Endemic. Described from alpine zone of Tsagan-Gol (eastern Sayans). Type in Leningrad.

Note. The species is very close to *S. poljakovii* Glehn; compare the discussion in the note to the latter. Specimens collected from the Vitim Plateau are very close to *S. congesta* Turcz. in the nature of their involucre bracts, shape and consistency of leaves, etc., but the leaves in some of them are white-arachnoid-woolly on lower side (with the gamut of transitions to weak pubescence). With such pubescence they approach *S. pricei* Simps. To all appearance, these are natural hybrids of *S. congesta* Turcz. \times *S. pricei* Simps. (= *S. korotkyi* Lipsch. in sched).

483 77. *S. poljakovii* (= *poljakowi*) Glehn. in Tr. Peterb. Bot. Sada, IV, 1 (1876) 60; Popov, Fl. Sr. Sib. II, 759.

Perennial. Stem 10–20 cm high, sulcate, weakly flattened, simple, sparsely pubescent with short crisped hairs or almost glabrous. Leaves thin, glabrous, with more or less numerous, sessile, punctate glandular hairs beneath, sometimes with occasional white hairs along midrib; middle leaves ovate or ovate-triangular, acute, petiolate, petioles not decurrent or slightly decurrent as weakly distinctly toothed wings; lower leaves persistent up to anthesis, ovate, 3.5–6 cm wide, with indistinctly cuneate base and longer petiole; upper leaves narrower, long-acuminate, sessile, often approximate with corymb; all leaves distinctly and frequently toothed, teeth unequal, subulately acuminate at apex; leaf margin more or less glandular-hairy between teeth. Capitula on glandular-hairy peduncles, in dense corymb. Involucre distinctly three- or four-rowed; involucre bracts almost equal; outer bracts lanceolate, terminating from broader base into long subulate cusp. Receptacle squamose, scales linear-subulate, unequal, 2–4 mm long, lustrous; florets about 8–9 mm long, narrow part of tube about 4 mm long, almost as long as broad part with lobes of limb; anther appendages ciliate. Pappus double; outer pappus bristles minute, fragile, unequal, serrate-scabrous, inner bristles about 8 mm long, long-plumose; immature achenes about 4 mm long, glabrous, sulcate. Flowering VII–VIII. (Plate XXXV, Fig. 2.)

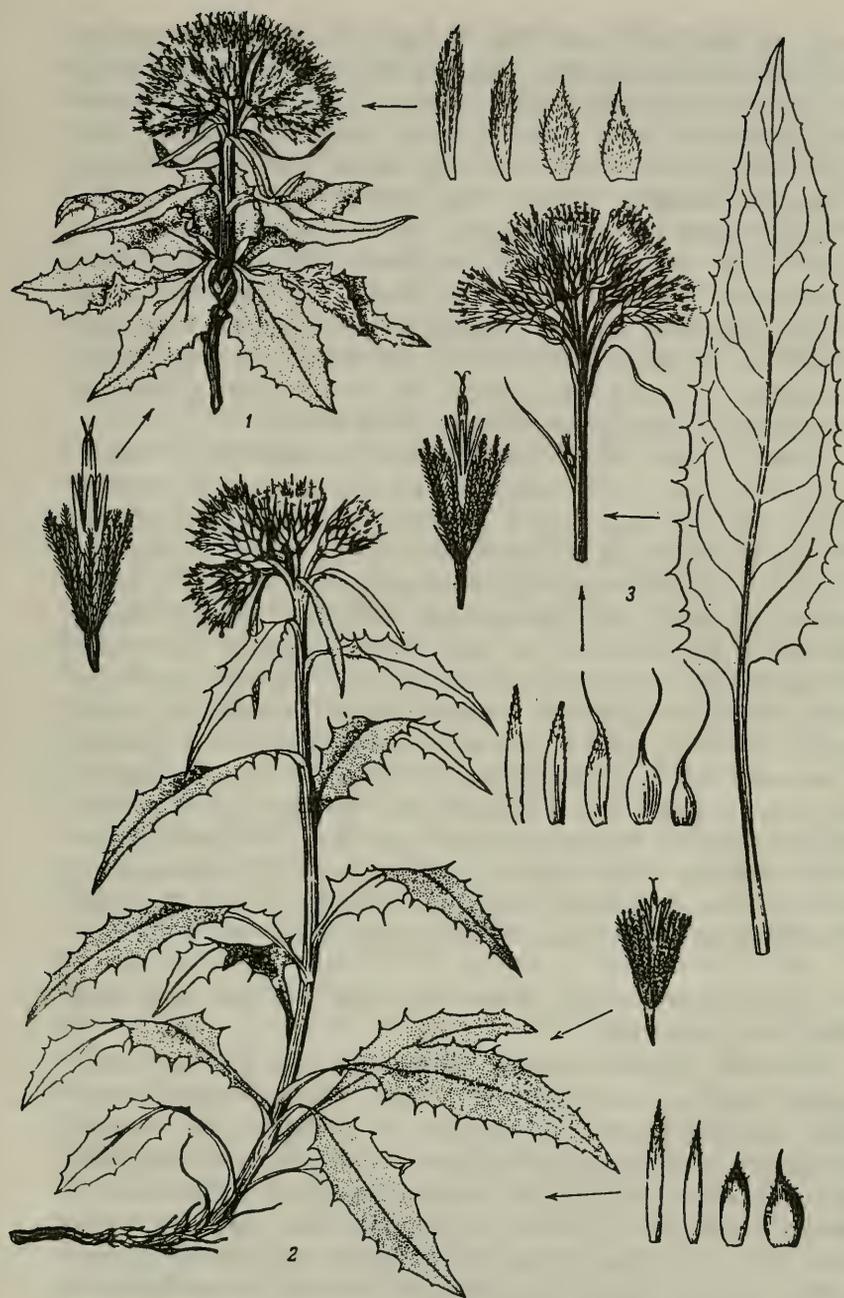
Alpine meadow patches, outcrops of stones.—*Eastern Siberia*: Lena-Kolyma (along the Vitim and Barguzin rivers, and Udokan Range). Endemic. Described from the Uksumikit Valley (Vitim River). Type in Leningrad.

Note. Quite close to *S. congesta* Turcz. The specimens, on the basis of which Turczaninow described *S. congesta*, are almost stemless, small-leaved, and typically alpine. The specimens, on the basis of which Glehn separated *S. poljakovii*, are distinctly stemmed and, evidently, originate from lower altitudes. Glehn distinguished *S. poljakovii* from *S. congesta* by the following characters: broader, thin ovate leaves, larger, more strongly acuminate unequal teeth along the leaf margin, more strongly developed stem, dense equal receptacular scales (outer ones not shorter). *S. poljakovii* needs further observations in nature because, besides the authentic specimens in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR, it is represented only by the single sheet of L. Tyulina from the Barguzin Region (No. 768) and the two sheets of Sviridenko from the Kalar Region. It is very probable that in the future it will have to be combined with *S. congesta* Turcz. into a single species for the following reasons. Even Herder (*Bull. Soc. Nat. Mosc.*, XLI, 3 (1868) 45) already described two varieties in *S. congesta*: *humilior* seu *kiriloviana* Herd., with broader and unequally dentate leaves, and *elatior* seu *kusnetzoviana* Herd., with narrower and uniformly toothed leaves. The limited material of *S. congesta* and *S. poljakovii* shows:

484 1) the shape, width, consistency and dentation of the leaves vary greatly; 2) stem height also varies (stemless, intermediate, and distinctly stemmed forms are known in *S. congesta*). As regards the receptacular scales in the authentic specimen of *S. poljakovii*, there is no difference from the dwarf forms and the type material of *S. congesta*—on closer examination, the receptacular scales in *S. poljakovii* were found to be unequal in length. However, I have decided not to combine *S. poljakovii* with *S. congesta* Turcz. until new material is obtained on the former species.

78. *S. tilesii* Ldb. Ic. pl. Fl. Ross. I (1829) 15; Ej. Fl. alt. IV, 15, in nota; DC. Prodr. VI, 536; Ldb. Fl. Ross. II, 2, 662; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 450.—*S. tilesii* f. *subacaulis* Kom. Fl. Kamch. III (1930) 180.—*Serratula tilesii* Ldb. in Mém. Acad. Sc. Pétersb. V (1815) 562.—*Saussurea nuda* γ. *tilesii* Rgl. in Nouv. Mém. Soc. Nat. Mosc. XI (1859) 106.—*S. ledebouri* δ. *tilesii* Rgl. in Herd. Bull. Soc. Nat. Mosc. XLI, 3 (1868) 41.—*S. ledebouri* auct. (non Herd.): Tolmatchev in Tr. Polyarn. Komiss. Akad. Nauk SSSR, 13 (1932) 169.—*S. alpina* var. *subacaulis* auct. fl. Arct. (non Ldb.) p. max. p.—*Heterotrichum arcticum* MB. ex Herd. op. cit. (1868) 43.—**Ic.:** Ldb. op. cit. (1829) Plate LX.

Perennial. Rhizome oblique, woody; plants usually prostrate, (3)5–10 cm high, rarely, up to 15 cm, densely leafy; root collar densely covered with brownish remains of leaves; stems often weakly swollen or flattened, sulcate, usually arachnoid hairy-tomentose, especially below inflorescence, mixed with lustrous glandular hairs, less often almost glabrous. Leaves oblong or oblong-lanceolate, crowded in basal part, fairly unequal in width, from 3–5 mm to 15 mm, usually more or less strongly attenuate-acuminate, green above, white-tomentose or arachnoid hairy-pubescent beneath with more or less numerous lustrous glandular hairs on both sides (sometimes absent); sometimes weakly involute, crenate-toothed in type specimen, teeth with callose-cartilaginous cusps; basal leaves larger, almost as long as stem in small plants, petiolate, petioles winged, cuneate at base; cauline leaves sessile or short-petiolate; upper leaves linear or oblong-lanceolate, usually approximate with inflorescence, of these one to three often larger than it or as long. Capitula in type specimen numerous, pedunculate, compactly aggregated at stem apex in globose or semiglobose dense corymb, corymbs absent on lateral branches. Involucre densely sericeous-villous, involucre bracts acute, but without long cusps; outer bracts in type specimen shorter than linear-lanceolate inner, less often as long or almost as long, and
486 both with numerous, long, white, squarrose, hairs, glochidiate. Receptacle densely squamose; scales linear-subulate, white, lustrous, unequal, longest scales about 6 mm long; florets dark pink, about 1.2 cm long, narrow



part of the tube about 6 mm long, as long as broad part with lobes of limb; anther appendages ciliate. Pappus double, outer pappus bristles up to 2 mm long, persistent, short-plumose, inner bristles bicolor, ferruginous below, white above, all bristles equal, long-plumose, about 13 mm long; achenes about 5 mm long, sulcate, glabrous, dark brown or blackish. Flowering VII–VIII. (Plate XXXVI, Fig. 1.)

Moss, lichen and shrubby tundras, alpine meadows, stony screes, rocks.—*Arctic*: Arctic Siberia; *Eastern Siberia*: Yenisei (northern part), Lena-Kolyma (northern part); *Far East*: Chukotka, Anadyr, ?Kamchatka (only in alpine belt). Endemic. Purportedly described from Kamchatka on the basis of collections of Tilesius; type in Leningrad. Apparently, the authentic specimen was collected not from Kamchatka, but from another more northern, most probably, Arctic location.

Note. "*S. tilesii*" of the authors of the Kamchatka flora is sharply distinguished from *S. tilesii* Ldb. s. str. and was described as a separate species, *S. pseudo-tilesii* Lipsch. For details about the relationship of this pair of species see the article of Lipschitz (op. cit. 1954). The extreme southern outposts of the distribution of *S. tilesii* Ldb. on the continent are taken to be the upper reaches of Bureya (Dusse-Alin Range) and Sikhote-Alin. However, the study of new specimens from Dusse-Alin showed that they represent a unique race: *S. soczavae* Lipsch. (cf. below). The recently described species by Hulten from Alaska, *S. viscida* Hult. is close to *S. tilesii* Ldb. The author characterized it by the presence of numerous scattered, sticky hairs on the upper and lower leaf surfaces and along the margin as well as on the stem. The specimens of *S. tilesii* Ldb. collected from Wrangel Island (B.N. Gorodkov, 1938) and preserved in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR are close to *S. viscida* Hult. in the nature of the pubescence, but otherwise show no differences from typical *S. tilesii* Ldb.

79. *S. soczavae* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 376.

Perennial. Rhizomes prostrate; stem erect, 10–18 cm high, simple, sulcate, wingless, almost glabrous or weakly arachnoid-hairy, sparsely leafy, internodes long. Leaves lanceolate or oblong-lanceolate, up to 6 cm long and 1.5–2 cm wide, almost cuneate at base, bicolor, dark green, almost glabrous or with punctate glandular hairs above, white-tomentose beneath, toothed, teeth unequal, cuspidate; basal, lower, and middle cauline leaves on 2–2.5 cm long petioles, weakly winged, not decurrent on stem; middle and upper cauline leaves gradually reduced, narrow-lanceolate, sessile, uppermost leaves approximate with inflorescence, linear or linear lanceolate, almost entire. Capitula campanulate, 10–12 mm wide, usually numerous, less often two, pedunculate, in terminal corymb, which is

not compact or capitate. Involucre campanulate, imbricate, dark-colored, weakly arachnoid-hairy, glabrescent, 10–11 mm long and 10 mm wide; involucre bracts three- or four-rowed; outer bracts ovate or lanceolate, terminating in cusp, shorter than inner, less often almost equal; inner bracts lanceolate, acute or subacute. Receptacle squamose, scales linear-subulate, lustrous, unequal, up to 6–7 mm long; florets dark violet(?), about 10 mm long, narrow part of tube about 5 mm long, as long as broad part together with lobes of limb; anther appendages ciliate. Pappus double, slightly exerted from involucre, outer pappus bristles unequal, up to 5 mm long, fragile, scabrous or finely plumose, inner bristles plumose, about 9–10 mm long; achenes glabrous. Flowering VIII. (Plate XXXVI, Fig. 2.)

Stony slopes of mountains,(?) alpine tundras.—*Far East*: Uda. (Dusse-Alin Range). Endemic. Described from the Suluka River. Type in Leningrad.

80. *S. pseudo-tilesii* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 451.—*S. tilesii* auct. fl. Kamtsch. non Ldb.: Kom. Fl. Kamch. III (1930) 178 (incl. f. *glabrata* (180) and *alpicola* Kom. excl. f. *subacaulis* Kom.); Hult. Fl. of Kamtch. IV (1930) 211.—*S. alpina* δ . *maxima* Ldb. Fl. Ross. II, 2 (1845–1846) 669.—*S. tilesii* var. *exaltata* Maxim. Prim. Fl. Amur. (1859) 170.—*S. ledebouri* ϵ . *exaltata* C.A.M. and Maxim. ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 43.—*S. nuda* var. *exaltata* (Maxim.) Trautv. ex Fedtsch. Fl. III. Comm. (1906) 77.—*lc.*: Hult. op. cit. (1930) 213 (florets).

Perennial. Rhizome short, oblique, woody; stem 40–60 (up to 100) cm high, erect, simple, sometimes branched only in inflorescence, glabrous or weakly arachnoid-hairy, sulcate, wingless. Leaves ovate, oblong-linear or broadly linear, acuminate, all leaves except uppermost on long and weakly winged petiole (petioles of basal leaves as long as or almost as long as lamina); lamina 5–20 cm long and up to 5–6 cm wide, cuneate or indistinctly roundish at base, serrate-toothed, teeth with straight or weakly bent cusp, green and almost glabrous above, finely white-tomentose beneath. Capitula campanulate, 1–1.2 cm long with florets and 0.8–1 cm wide, on more or less long, densely arachnoid-hairy peduncles, aggregated in dense terminal corymb or corymbose panicles. Involucre usually white-violet, involucre bracts arachnoid hairy-pubescent, or almost glabrous, sometimes with scattered white hairs only in upper part and along margin; all bracts, especially outer, attenuate at apex into long, thin, usually recurved cusp; outermost bracts linear, linear-lanceolate or ovate, almost as long as even longer than inner ones, however not deforming imbricate aestivation of involucre. Florets pink-violet, about 8–9 mm long; narrow part of tube slightly broadened at

base, hollow, about 4–5 mm long, almost as long as broad part with lobes of limb; anthers blackish-blue, anther appendages ciliate. Receptacle densely squamose, scales linear-subulate, lustrous, unequal, up to 6 mm long; pappus double, outer pappus bristles unequal, up to 2 mm long, serrate, scabrous, fragile, inner bristles long-plumose about 8 mm long, brownish in lower part, with pure white tips; achenes glabrous. Flowering VII–VIII. (Plate XXXVI, Fig. 3.)

Valley and subalpine meadows, grass plots, small patches of tundra, forests of Erman's birch and larch, alder thickets, thickety outcrops of lava and slag.—*Far East*: Kamchatka, Commander Islands. Endemic (replaced by *S. oxyodonta* Hult. in the Anadyr Region and on the Kuril Islands). Described from Kamchatka. Type in Leningrad.

Note. I am designating the specimens of Mertens from Kamchatka, preserved in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR, as the type of the species which was not indicated by me in my publication of 1954. *S. pseudo-tilesii* m. is a tall, lowland *Saussurea*, replacing the short, arctic species *S. tilesii* Ldb. s. str., in Kamchatka, under which it was wrongly placed by the authors of Kamchatka flora. The type of *S. tilesii* Ldb. s. str. evidently does not originate from Kamchatka. The alpine form of *S. pseudo-tilesii* m. from Kamchatka is distinguished by shorter height, crowded reduced leaves, and a compact inflorescence. However, its characteristic feature is the presence of a long cusp on the involucre bracts, always present in this form. This form was described under the name *S. tilesii* f. *alpicola* Kom.; since I have included the latter under *S. pseudo-tilesii* and consider it as a variety, a new combination had to be made: *S. pseudo-tilesii* var. *alpicola* (Kom.) Lipsch. [Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 377].

81. *S. oxyodonta* Hult. Fl. of Kamtch. IV (1930) 207; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B. XIII, 178.—*S. ledebouri* γ. *kruhseana* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 43.—*S. tilesii* var. *kurilensis* Kudo Fl. Param. (1922) 172; Tatewaki, Vasc. Pl. North. Kuril. 305.—*S. subsinuata* auct.: Kom. Fl. Kamch. III (1930) 181; Kom. Izbr. Soch. VIII, 486 p. p. (non Ldb.).—*lc.*: Hult. op. cit. (1930) tab. 4a.

Perennial. Plants almost glabrous. Rhizome oblique, covered with less numerous fibrous roots; root collar covered with remains of old leaves; stem 10–30(50) cm high, wingless, uniformly and usually sparsely leafy, simple, sulcate, almost glabrous or with few crisped hairs. Leaves green above, pale beneath, weakly crisped-pubescent only along veins and margin on both sides; basal leaves usually persistent till anthesis, sometimes withering; lower cauline leaves long-petiolate, petioles narrow-winged, up to 6–10 cm long in vegetative branches; leaves in type specimen lanceolate or less often ovate and oblong-lanceolate, 6–12 cm

long and 1–2.5 cm wide, more or less attenuate-acuminate, basally cuneate or truncate, unequally dentate, teeth acuminate; middle leaves short-petiolate, up to 10 cm long and up to 2 cm wide; upper leaves sessile, narrow-lanceolate or linear, with less numerous teeth or entire. Capitula campanulate, 10–12 cm wide, numerous, in more or less compact corymb in type specimen, on distinctly glandular hairy peduncles, 0.5–1 cm, less often 1.5(3.5) cm long. Involucre imbricate, usually dark-colored, arachnoid hairy-pubescent, three- or four-rowed; outer involucre bracts lanceolate or ovate, long-attenuate-acuminate, almost as long as inner bracts; middle bracts narrowed from broad ovate base; inner bracts lanceolate or linear, short-acuminate, more or less pubescent on dorsal surface, glochidiate with white hairs at apex. Receptacle squamose, scales numerous, unequal, up to 6 mm long, lustrous; florets pink-violet, about 10 mm long, narrow part of tube about 5 mm long, as long as broad part with lobes of limb; anther appendages ciliate. Pappus double, outer pappus bristles rather numerous, unequal, up to 2–3 mm long, serrate-scabrous or finely plumose, persistent on achenes, inner bristles long-plumose, about 8–9 mm long, ferruginous below, white above; achenes glabrous, mature achenes dark brown with dark spots. Flowering VII–VIII.

Moist meadows, moss-covered marshes, small patches of tundra, birch forests, thickets of shrubs, pebbled floodplains.—*Far East*: Anadyr, Kamchatka, Sakhalin (Kuril Islands). Endemic. Described from Kamchatka. Type in Stockholm.

Note. Where it is in contact, it hybridizes with *S. nuda* Ldb., imitating *S. oxyodonta* Hult. in growth habit but always having a smooth and not a chaffy receptacle. Alpine specimens of *S. oxyodonta* Hult. are 12–15 cm high, with smaller and usually narrower leaves, about 5 cm long and up to 0.7 cm wide, and a lax corymb. A few vigorous specimens from Kamchatka, with a tall stem, broader leaves with truncate-cuneate base and a broad, winged petiole, appear to be hybrids between *S. oxyodonta* Hult. and *S. riederi* Herd.

Series 17. Alpinae Lipsch.—Stem wingless, less often (in *S. stubendorffii*) with distinct wings, weakly leafy. Leaves ovate, lanceolate and linear, glabrous and green above, grayish beneath due to arachnoid-hairy pubescence or white-tomentose, sometimes glabrous, green, entire or toothed, flat or weakly revolute. Capitula ovoid or cylindrical, in terminal, more or less compact corymb, less often in panicle, of individual corymbs. Involucre distinctly imbricate; outer involucre bracts ovate, often hardening subsequently, and like other bracts subobtusely, sometimes acuminate, usually pubescent inner bracts more strongly. Capitula base usually with one to three lanceolate appendages. Receptacle squamous.

82. *S. alpina* (L.) DC. in Ann. Mus. Paris, XVI (1810) 198; Ej. Prodr. VI (1837) 535 p. p. (excl. β . *subacaulis* Ldb.); Ldb. Fl. alt. IV, 27 p. p. (excl. β . *subacaulis* Ldb. and synonym. *Serratula angustifolia* Willd.); Ej. Fl. Ross. II, 2, 669 p. p. (excl. γ . *subacaulis* Ldb., δ . *maxima* Ldb., ϵ . *hypoleuca* Ldb.); Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 36 (excl. γ . *subacaulis* Ldb. and Turcz. δ . *angustifolia* Rgl., ϵ . *hypoleuca* Ldb. cum a. *maxima*, b. *major*, c. *minor*, d. *minima*, ξ . *foliosa*); Turcz. 490 Fl. baic.-dahur. II, 1 (1856) 114 p. p. (excl. α . *communis*, β . *subacaulis* Ldb.); Hegi, III. Fl. VI, 2 (1929) 839; Sergievskaja in Sist. Zam. Gerb. Tomsk. Un. 2 (1941) 1, excl. var. *schischkinii* Serg. and var. *lancifolia* Serg. p. p.; Kryl. Fl. Zap. Sib. XI, 2918; Juzepczuk in Sp. Rast. Gerb. Flory SSSR, XIII, 98.—*S. decurrens* Winkl. (non Hemsl.) Catal. sem. Horti. Bot. Petropol. (1882) 16 (nom. nud.); Ej. op. cit. (1883) 16 (nom. nud.).—*S. alpina* var. *decurrens* Rgl. ex Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 424.—*Serratula alpina* L. Sp. pl. (1753) 816; Willd. Spec. pl. III (1800) 1641 excl. var. β .—*Saussurea alpina sibirica* C.A.M. ex DC. op. cit. (1837) 535 and Turcz. op. cit. (1856) 115.—*S. alpina* β . *vulgaris* Ldb. Fl. Ross. II, 2 (1845–1846) 669.—*S. pohlei* Gandoger in Bull. Soc. bot. France, LVI (1909) 533.—*Ic.*: Hegi, op. cit. (1929) tab. 270, fig. 2 and fig. 536, 537.—*Exs.*: GRF nos. 1331, 2949.

Perennial. Rhizome prostrate, stem (5)8–10 cm to 20–50 cm high, erect, solitary, less often two or more, simple or sometimes branched in inflorescence, usually green, less often dark colored, more or less pubescent or glabrous. Leaves green and glabrous above in type specimen, grayish arachnoid-hairy beneath due to long, intertwined, fine hairs (var. *vulgaris* Ldb.) or glabrous (var. *viridis* Turcz.), sometimes with sparse sessile glandular hairs, with indistinct cartilaginous teeth or entire, leaf margin not revolute in type specimen; basal leaves persistent till anthesis; lower cauline leaves petiolate, ovate-lanceolate, lanceolate, oblong or elliptical lamina, (4)8–20 cm long and 1.5–4 cm wide, usually attenuate-acuminate, sometimes short-acuminate, less often obtuse, petiole less often almost as long as lamina, usually one-fifth to two-thirds as long, midrib prominent, leaf margin usually with minute horizontal or slightly divergent cartilaginous teeth; middle cauline leaves often remote, elliptical or lanceolate, acuminate, sessile, less often weakly decurrent (var. *decurrens* (Winkl.) Rgl.); uppermost leaves lanceolate or linear, acuminate, sessile, usually not decurrent, 2–5 cm long and 1–8 cm wide, entire. Capitula terminal on main stem or lateral branches, in dense or lax corymbs. Involucre distinctly imbricate, 5–7(10) mm wide, often becoming hard; involucral bracts dark-colored, sometimes greenish; outer bracts broadly ovate or ovate-lanceolate, subobtuse or subacute, middle bracts ovate, subobtuse, both weakly crisped-hairy or arachnoid-hairy along margin and on dorsal surface, sometimes almost glabrous (var.

viridis Turcz.); inner bracts oblong, subobtusate, densely pubescent with long, white, soft, semidivergent hairs, with one to three lanceolately acuminate appendages at base of capitulum, as long as or slightly longer than outer involucre bracts. Receptacle densely squamose; florets violet-pink, about 1.1 cm long; narrow part of tube about 5 mm long, almost as long as broad part with lobes of limb; anther appendages strongly hairy. Pappus about 9 mm long, inner pappus bristles long-plumose; achenes 3–4 mm long, brownish. Flowering VII–IX.

491 Stony slopes, screes, moss and lichen covered tundras in alpine belt; open deciduous forests; cedar-larch and spruce-larch-cedar forests, willows of forest belt; alder thickets; grassy, hummocky tundras, rocks, pebbles of the arctic region.—*Arctic*: Arctic Europe, Novaya Zemlya; *European Part*: Upper Dniester, Ladoga-Ilmen, Karelia-Lapland, Dvina-Pechora, Volga-Kama (Ural); *Western Siberia*: Ob', Upper Tobol, Irtysh (western part), Altai; *Eastern Siberia*: Yenisei, Angara-Sayans, Lena-Kolyma; *Soviet Central Asia*: Pamiro-Alai, Tien Shan. *General distribution*: Arctic, Scandinavia, Central Europe, Atlantic Europe (Great Britain), Mongolia, Dzhungaria-Kashgaria (Kuldzha). *S. alpina* (L.) DC. is described from Lapland; type, evidently, in London. *S. pohlei* Gandoger is described from collections of Pohle from the Kolguev Island; type in the Herbarium of Gandoger; isotypes(?) in Leningrad (they do not fully conform to the diagnosis). *S. decurrens* Winkl. reported on the basis of specimens raised in the Petersburg Botanical Garden from seeds by A. Regel from Chinese Turkestan; preserved in Leningrad.

Note. An extremely polymorphic, widely distributed boreal-alpine species requiring a monographic study based on extensive material collected from throughout its range. Undoubtedly, it includes numerous ecological forms correlated with the various ecological conditions, as well as races. Among the most distinct races are: *S. depressa* Gren. and Godr. (western Alps), *S. angustifolia* (Willd.) DC. (North America, islands of the Bering Strait), *S. densa* Rydb. (North America), *S. pricei* Simps. (Altai, Sayans), *S. sukaczewii* Lipsch. (eastern Siberia), *S. ambigua* Kryl. (Altai, Tuva, Mongolia), *S. stubendorffii* Herd. (eastern Siberia). Less distinct is Estonian *S. alpina*, described as *S. esthonica* Baer. ex Rupr., which is connected by a series of transitional forms to typical *S. alpina* and, therefore, is reduced by many authors to the level of a subspecies or variety of *S. alpina* (see note to this species). Some of these races growing within the limits of the USSR, are treated here under binomial names in accordance with the tradition of the *Flora of the USSR*. The following characters of *S. alpina* show significant variation: stem height; shape, size, pubescence and nature of the margin of the leaves and the degree of leaf decurrence along stem; type of inflorescence; shape of involucre bracts.

Like many other species of the genus, *S. alpina* also hybridizes. For instance, hybrids with *S. controversa* DC. (= *S. uralensis* Lipsch.) (Urals) and with *S. tilesii* Ldb. (Yakutia) are known.

An infraspecific classification of *S. alpina* has been worked out by De Candolle, Ledebour, Turczaninow and Herder, and recently by Sergievskaja. Let us mention the most clearly defined varieties: 1) var. *viridis* Turcz. (in DC. *Prodr.* VI, 535; *Fl. baic-dahur.* II, 114 = var. *glabra* Ldb. *Fl. Ross.* II, 2, 669)—Leaves almost glabrous on both sides, green, oblong-lanceolate or ovate; outer involucral bracts almost glabrous, inner pubescent; 2) var. *vulgaris* Ldb. (op. cit. 669) does not in any way differ from typical *S. alpina*; 3) var. *krylovii* Serg. (*Sistemat, Zam. Gerb. Tomsk. Univ.* No. (1941) 2)—Stem 24–35 cm high; leaves oblong-ovate or oblong, 1–3 cm broad, decurrent on stem, arachnoid-hairy beneath; 4) var. *lancifolia* Serg. (op. cit. (1941) 2)—Stem 35–60 cm high; leaves lanceolate, more or less long-acuminate, 6–15 cm long and 4–12 mm wide, decurrent, arachnoid-hairy beneath, identical with *S. stubendorffii* Herd. p. p.; and 5) var. *schischkinii* Serg. (op. cit. (1941) 2) undoubtedly is identical with *S. stubendorffii* Herd., under which it is placed as a synonym.

83. *S. sukaczewii* Lipsch. in *Byull. Mosk. Obshch. Isp. Prir. Otd. Biol.* LIX, 6 (1954) 71; Popov, *Fl. Sr. Sib.* II, 760.—*S. alpina* ϵ . *hypoleuca* Ldb. *Fl. Ross.* II, 2 (1845–1846) 669; Herd. in *Bull. Soc. Nat. Mosc.* XLI, 3 (1868) 38 and 39.—*S. alpina* δ . *hypoleuca* b. *major* seu *genuina* Herd. *Ibid.* (1868) 39.—*S. alpina* δ . *hypoleuca* c. *minor* Herd. *Ibid.* (1868) 40.—*S. denticulata* Turcz. *Fl. baic-dahur.* II, 1 (1856) 115 (non Wall. nec. Ldb.).—*S. alpina* var. *leucophylla* Turcz. ex Herd. op. cit. (1868) 38.—*S. foliosa* β . *dentosa* Turcz. in DC. *Prodr.* VI (1837) 536 p. p.; Turcz. op. cit. (1856) 116 p. p.; Herd. op. cit. 38 in syn. p. p.—*S. serrata* var. *pygmaea* Turcz. in herb. and ex Herd. op. cit. (1868) 40 in syn.—*S. alpina* α . *communis* Turcz. op. cit. (1856) 114 and herb.

Perennial. Rhizome oblique, with fibrous roots; root collar covered with brown-black, partially split remains of old leaves; stem erect, solitary, simple, not winged, green or often red-violet, weakly arachnoid hairy-pubescent or almost glabrous, sometimes, mainly below corymb, flattened, 12–30(35) cm high; high mountain specimens up to 7 cm high (var. *pumila* Lipsch.). Leaves green and glabrous above, densely white tomentose beneath with prominent midrib; all leaves shallow-toothed with teeth more or less sparse, callosely-pointed, horizontal or weakly deflexed, often slightly revolute; basal leaves persisting till anthesis, sometimes withering; lower cauline leaves in type specimen lanceolate, less often oblong-ovate, acuminate, up to 12 cm long with

petiole and (0.5)1–1.5(2) cm wide, petioles half to two-thirds as long as lamina, less often almost as long; middle and upper cauline leaves resembling lower leaves in shape, usually narrower, sessile or subsessile, not decurrent; uppermost leaves linear or linear-lanceolate, acuminate, sessile, 2–4 cm long and 1–5 mm wide, entire. Capitula cylindrical or narrow-campanulate, on 1–3 cm long peduncles in type specimen (sometimes peduncles poorly developed), usually adjoining somewhat lax terminal corymb. Involucre imbricate, 5–7 mm wide, involucre bracts dark-colored, sometimes green; outer bracts ovate, often becoming hard, attenuate toward apex, acuminate, middle bracts ovate, obtuse, both more or less arachnoid-hairy along margins and on dorsal surface; inner bracts oblong, subobtuse, usually glochidiolate with white hairs in upper part with (one) two or three lanceolate bracteal leaves present below capitula 493 which are as long as outer involucre bracts or longer. Receptacle densely squamose, scales linear-subulate, lustrous, unequal, up to 6 mm long; florets pink-violet, about 1.2 cm long, narrow part of tube about 5.5–6 mm long, almost as long as broad part together with lobes of limb; anther appendages ciliate. Pappus double, outer pappus bristles unequal (up to 3 mm long) serrate-scabrous; inner bristles about 1 cm long, long-plumose; achenes mottled. Flowering VII–VIII. (Plate XXXV, Fig. 1.)

Sphagnum moss-marshes; grass areas, gravelly and moss-lichen tundras, rocks, stony screes in alpine zone and in upper part of forest zone.—*Eastern Siberia*: Angara-Sayans, Yenisei (southern part), Dauria. Endemic. Described from Kultuk-on-Baikal. Type in Leningrad.

Note. The species, particularly its alpine variety (var. *pumila* Lipsch.), is close to *S. pricei* Simps., from which it differs by greater height, imbricate involucre bracts, with the outer ones distinctly shorter than the inner ones, and also by longer, attenuate-lanceolate leaves and receptacular scales up to 6 mm long. Hybrids between *S. sukaczewii* and *S. pricei* are possible in their areas of contact. Cf. the note to the latter species.

84. *S. esthonica* Baer ex Rupr. in Beitr. Pflanzenk. Russ. Reichs, IV (1845) 21; C.A.M. in Mém. Acad. Sc. Pétersb., VI sér., sc. natur. VII, Bot. 5 (diagn. emend.); Juz. in Sp. Rast. Gerb. Flory SSSR, XIII, 99, No. 3950.—*S. alpina* subsp. *esthonica* (Baer ex Rupr.) Kupff. in Korrespondenzbl. Naturforsch.-Ver. zu Riga, XLV (1902) 94.—*S. alpina* auct. fl. Pribalt. Ross.: Wiedemann and Weber, Besch. der. phanerogam. Gwächse Est-, Liv-u. Kurlands (1852) 483; Klinge, Fl. v. Est-, Liv-u. Curl. (1882) 317; Lehmann, Fl. v. Poln.-Livl. (1895) 268.—*lc.*: Kupff. op. cit. fig. B.—*Exs.*: Eesti taimed Tartu Ulik. Botaanikam. Nos. 27, 27a.

Perennial. Stem 30–40(60) cm high, less often shorter, solitary, green or violet, slender, glabrous or, with weak and easily rubbed off pubescence mainly in upper part. Leaves in type specimen narrow-lanceolate, young leaves flocculose-pubescent, glabrescent or subglabrous, narrowed at base and weakly cuneate, not decurrent, long acuminate, less often scarcely acuminate; lower cauline leaves long-petiolate, oblong-lanceolate, up to 20 cm long and 1–2 cm (less often up to 3.5 cm) wide, toothed with callosely pointed teeth; middle cauline leaves like lower but narrower and on shorter petioles, gradually reduced toward stem apex, usually less distinctly toothed, usually more than 10 on a stem; uppermost leaves sessile, reduced, narrow-linear, entire, slightly involute. Capitula (3)10–15 (less often up to 25) in paniculate inflorescence, comprising individual lax corymbs; peduncles of capitula usually longer than latter. Involucre imbricate, light green or dark-colored; involucre bracts villous due to numerous soft hairs; outer bracts reduced, ovate or rotund, subacute; middle and inner bracts ovate-oblong, scarcely acuminate. Receptacle densely squamose, scales linear-subulate, lustrous, about 6–7 mm long; florets (according to observations of A. Vag in nature) lilac-colored with strong blue tinge, about 1.3 cm long, narrow part of tube about 6 mm long, almost as long as broad part together with lobes of limb; anther appendages ciliate. Achenes cylindrical, glabrous; pappus dirty white, double, outer pappus bristles numerous, deciduous, serrate, up to 3–4 mm long, inner bristles plumose, about 11–12 mm long. Flowering VII–VIII.

Marshy meadows, marshes, scrubs.—*European Part*: Baltic Region (Estonian SSR); ?Ladoga-Ilmen. Described from Estonia. Type in Leningrad.

Note. Of the species aggregate *S. alpina*; it mainly differs from the typical (Lapland) specimens of *S. alpina* by a taller stem, narrower basal leaves, numerous (often exceeding 10), weakly pubescent (often glabrous) cauline leaves, a lax paniculate inflorescence with peduncles longer than the capitula. Kupffer and Juzepczuk considered *S. esthonica* an endemic race of the Estonian SSR. The first author assumed that the range of *S. esthonica* is sharply isolated from the northern localities of *S. alpina* (known to him from the former Olonetsk and Arkhangelsk provinces). Juzepczuk realized the mistake of Kupffer, as bridging localities of *S. alpina* were subsequently found in the Leningrad and Novgorod provinces. However, Juzepczuk did not refer the latter specimens to true *S. alpina*. At the same time, an examination of the accumulated, rather extensive herbarium collections from the northwest European Part of the USSR shows that a series of plants is found there, particularly growing on limestone and peat marshes, which are intermediate between *S. esthonica* and *S. alpina* s. str. Some of them are so close to the

former that they could quite rightly be referred to it. These questions can be finally resolved only after special studies in nature. It appears that *S. esthonica* is not a local Estonian race. On the other hand, *S. esthonica* is morphologically quite close to one of the east Siberian races of *S. alpina*—*S. stubendorffii* Herd., which is also found in Yakutia. Morphologically, *S. esthonica* differs from *S. stubendorffii* chiefly as follows: leaves beneath in type glabrous or very weakly pubescent; lower leaves narrowly lanceolate (1–2 cm wide); cauline leaves usually more than 10, not decurrent on stem; inflorescence consists of fewer capitula because the floriferous branches are fewer; florets lilac-colored with bluish tinge, and not purple. All these differences between the species are relative in nature. The chief reason preventing us from combining the two species is their distinct ranges. Following the practice of the *Flora of the USSR*, they are treated here under binominal names. Formally speaking, it would be more correct to call our plants *S. alpina* subsp. *esthonica* (Baer ex Rupr.) Kupff. and *S. alpina* subsp. *stubendorffii* (Herd.) Lipsch.

- 495 85. *S. stubendorffii* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 26; Freyn in Oest. bot. Zeitschr. LII, 7, 281; Popov, Fl. Sr. Sib. II, 760.—*S. denticulata* Ldb. γ . *viluensis* Herd. op. cit. (1868) 26.—*S. alpina* var. *schischkinii* Serg. in Sist. Zam. Gerb. Tomsk. Univ. 2 (1941) 2; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI, 377.—*S. alpina* var. *lancifolia* Serg. op. cit. (1941) 2.—*S. amurensis* auct. fl. Sib. (non Turcz.) p. p.—*S. serrata* auct. fl. Sib. p.p. non DC.—*S. alpina* auct. fl. Sib. p. p.

Perennial. Stem erect, 30–70(80) cm high, slightly floccose-arachnoid hairy-pubescent or glabrous, sulcate, less often simple, often branched above or even from middle; sometimes narrow-winged due to decurrent leaves, usually wingless. Leaves soft, lanceolate, oblong-lanceolate or even almost ovate, green and weakly scabrous above, more or less densely grayish or whitish flocculose-arachnoid-hairy (pubescence glabrescent); basal and lower cauline leaves 2.5–3 cm wide, persistent at anthesis, petiolate, distinctly toothed, teeth callose, remote; upper leaves narrow, linear or linear-lanceolate, almost entire, sessile or subsessile together with middle leaves, more or less decurrent on stem and sometimes forming narrow wing. Capitula pedunculate, in more or less numerous corymbs terminating on pubescent peduncles; individual corymbs usually unequal in height, forming more or less lax paniculate inflorescence. Capitula in type specimen up to 1.5(2) cm long. Involucre ovoid or cylindrical, four- or five-rowed; involucrel bracts imbricate, light-colored or dark, covered with long hairs; outer bracts ovate, subacute, inner linear-lanceolate, acuminate. Receptacle squamose, scales

linear-subulate, lustrous, up to 6 mm long; florets red, about 1.2 cm long, narrow part of tube about 6 mm long, as long or almost as long as broad part together with lobes of limb; anther appendages ciliate. Pappus double, outer pappus bristles less numerous, serrate, fragile, about 2–3 mm long, inner bristles long plumose, about 1 cm long; achenes cylindrical. Flowering VII–VIII.

Coniferous and deciduous forests, willow stands, meadows, peat bogs.—*Western Siberia*: Ob' (eastern part), Altai; *Eastern Siberia*: Angara-Sayans, Yenisei, Lena-Kolyma. Endemic. Described from the eastern part of Siberia, from the Khorma and Biryusa rivers. Type in Leningrad.

Note. Herder compared this species with *S. serrata* DC. (= *S. parviflora*), *S. denticulata* Ldb. and *S. amurensis* Turcz. distinguishing it from them by larger capitula and red florets. Among the type material is a sheet with the label (written in the hand of C.A. Meyer) that says: "Saussurea Stubendorffiana m. Semina misit Dr. Stubendorf. Cult. in h[orto] b.[ot.] Petropol. 1850." The plant on this sheet differs from the authentic wild plants of *S. stubendorffii* Herd. by more coriaceous leaves, with more dense, snow-white, almost tomentose indumentum beneath, relatively small capitula, weakly pubescent involucre bracts and one-headed peduncles of the individual corymbs, and it is close to *S. sukaczewii* Lipsch. It appears that *S. stubendorffii* Herd. is an east Siberian and Yakutian race of *S. alpina*, also entering Altai, in habit often convergent with *S. serrata* and *S. amurensis*; many of the floristic taxonomists of Siberia wrongly identified it sometimes as *S. serrata*, sometimes as *S. amurensis*. It differs sharply from *S. parviflora* (= *S. serrata*) by the pubescence on the lower leaf surface, larger capitula, and the absence of a distinct wing on the stem. It is more difficult to distinguish *S. stubendorffii* from *S. amurensis*, especially its Trans-Baikal forms, which have somewhat lost the "purity" of the species. *S. stubendorffii*, in comparison with *S. amurensis*, has softer leaves that are arachnoid hairy-flocculose on the lower side (and not white-tomentose), a stem with less distinct wings from decurrent leaves, larger capitula, and involucre bracts (especially inner) less villous-pubescent. Among the materials referred by me to *S. stubendorffii*, these differ from the typical specimens: 1) specimens from the Irkut River Valley (Torskaya and Tunkinskaya ravines, V.I. Smirnov, 1931), characterized by cupuliform capitula, in a more compact terminal corymb, densely villous from ferruginous involucre hairs, outer involucre bracts narrower and more strongly acuminate, and also a deeper violet. Evidently, it is a separate race (*S. turczaninovii* Lipsch. in herbario), but the material at my disposal is inadequate for a final conclusion about the specific status of this entity; and 2) specimens from the Upper Angara Basin (vicinity of village Verkhne-Angarsk, V.N. Sukaczev and G.I. Poplavskaya, 1912,

No. 1250, 4 sheets; N.V. Shipczinsky, 1912, No. 439) are distinguished in type by stiffer leaves, entire and not toothed leaves (basal and middle cauline leaves sessile or subsessile), and reddish stems (*S. angarensis* Lipsch. in herbario). Specimens intermediate between the two species, including a set of characters of both parents, have been collected in the Yenisei region, in places of contact between *S. stubendorffii* Herd. and typical *S. parviflora* (Poir.) DC.; these are undoubtedly natural hybrids.

86. *S. ambigua* Kryl. ex Serg. in Sistemat. Zam. Gerb. Tomsk. Univ. 2 (1941) 2; Kryl. Fl. Zap. Sib. XI, 2920.—*S. frigida* Fisch. in herb. and ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 37, pl. tschuiens.—*S. alpina* auct. fl. Sib. p. min. p.

Perennial. Rhizomes obliquely ascending or vertical; stem erect, solitary, sometimes 2.5–3 cm high (var. *pumila* Lipsch.), or much taller (4–20(25) cm high), almost glabrous or flocculose-pubescent in short-stemmed plants. Leaves pale green, almost glabrous on both sides (var. *subglabra* Serg. op. cit. (1941) 2), sometimes grayish arachnoid-hairy beneath due to more or less thin tomentum of intertwined hairs, usually with scattered (especially beneath) lustrous, sessile, yellowish glandular hairs; basal and lower cauline leaves oblong-ovate, short-petiolate, 497 petioles one-eighth to half as long as lamina and together with it 5–13 cm long and 1–2.5(3) cm wide, with more or less frequent callose teeth and short cilia in some, especially in short-stemmed forms; middle leaves ovate-oblong, oblong or lanceolate, acuminate or less often subobtusely acuminate, sessile, nondecurrent or slightly decurrent on stem in acaulescent specimens. Capitula 4–12, aggregated in compact-terminal corymbs; less often with one or two (three) lateral corymbs besides terminal corymb, arising from axils of upper leaves (var. *ramosa* Lipsch.); sometimes several (or one) linear-lanceolate bracteal leaves borne at base of corymb. narrower than outer involucre bracts. Involucre imbricate, 5–8 mm wide, pale in type specimen, less often violet; outer involucre bracts ovate or oblong-ovate, acuminate, pubescent; inner bracts oblong, subobtusely, usually strongly villous-pubescent with white deflexed hairs; peduncles, and sometimes also involucre bracts, bearing solitary, lustrous, sessile, glandular hairs. Receptacle densely squamose; scales linear-subulate, lustrous, about 4 mm long; florets dark pink, turning red when dry, about 1.1–1.2 cm long, narrow part of corolla tube about 5–6 mm long, as long as broad part with lobes of limb; anther appendages hairy. Achenes 3–4 mm long, brownish or light-colored, with dark brown spots and solitary glandular hairs; pappus dense, white, double, outer pappus bristles less numerous, fragile, small, serrate, inner hairs up to 10–11 mm long, plumose. Flowering VII–IX.

Stony and saline steppes, saline meadows.—*Western Siberia*: Altai (southeastern part), Angara-Sayans (Tuva Republic).—*General distribution*: Mongolia. Described from the upper reaches of the Chuya River. Type in Leningrad.

Note. It differs from the Siberian forms of *S. alpina* by a shorter stem, oblong-ovate, outer involucre bracts one-third to half as long as the inner, covered with more or less numerous, sessile, yellowish glandular hairs below, and by more dense pappus.

87. *S. saxosa* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 457.

Perennial. Plants woody; rhizome woody, blackish-brown, deeply penetrating stones, longitudinally fibrously divided, many-headed at apex, imbricately covered with remains of previous year's leaves; sometimes lateral caudices terminating in rosettes of leaves; stems 4–15(20) cm high, slightly ascending at base, sulcate, arachnoid-hairy, densely leafy up to apex. Leaves hard, oblong or ovate-oblong, grayish-green on both sides, densely arachnoid-hairy (more strongly beneath) and with sessile glandular hairs, with sparse cartilaginous small teeth, often weakly involute, sometimes almost entire, with prominent midrib beneath, continued into petiole in lower leaves, and with less prominent lateral veins; leaf base weakly cuneate; all leaves acuminate, less often obtusely acuminate; basal leaves distinctly petiolate, petioles weakly winged, 5–7(8) cm long (including petioles, about 2–4 cm long) and (1)1.5–2 cm wide; middle leaves sessile or subsessile, usually weakly decurrent on stem like basal leaves; uppermost leaves reduced, lanceolate or linear, usually approximate with inflorescence, about 2–2.5 cm long and 1.5 mm wide. Capitula on about 5 mm long peduncles, terminal on stem in dense corymb. Involucre imbricate, about 1–1.1 cm long, 0.7–1 cm wide; involucre bracts pale, sometimes dark-colored, pubescent; one or two lanceolate, acuminate, bracteal leaves below capitulum, as long as outer involucre bracts, sometimes almost as long as inner involucre bracts; outer bracts ovate, acuminate; inner bracts longer, linear-lanceolate or lanceolate, acuminate, villous in upper half due to long, white, semideflexed hairs, sometimes forming tuft at apex of bracts. Receptacle not densely squamose, scales linearly subulate, lustrous, unequal, small in center, about 1–2 mm long, larger along margin, 3–4 mm long; florets about 1.1–1.2 cm long, narrow part of tube about 5–6 mm long, as long or almost as long as broad part with lobes of limb; anther appendages hairy. Pappus double, outer pappus bristles small, about 2–3 mm long, serrate-scabrous, inner bristles long-plumose, about 8–10 mm long; achenes mature, about 5 mm long, dark brown, with white ribs, shining, covered with glandular hairs. Flowering VII–beginning of IX.



Stony slopes, rocks (in the crevices), screens.—*Central Asia*: Pamiro-Alai (Zeravshan and Turkestan ranges). Endemic. Described from the Zeravshan Valley. Type in Leningrad.

Note. A species distinctly demarcated from the polymorphic species *S. alpina*, closest to the Mongolian species *S. klementzii* Lipsch.

88. *S. angustifolia* (Willd.) DC. in Ann. Mus. Paris, XVI (1810) 200; DC. Prodr. VI, 535; Ldb. Fl. Ross. II, 2, 668; Hult. Fl. of Alaska and Yukon, X, 1625; Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 451; Polunin, Circumpolar Arctic Flora (1959) 453 excl. *S. viscida* Hult.—*Serratula angustifolia* Willd. Sp. pl. III, 3 (1800) 1642.—*Saussurea borealis* Fisch. ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 38 (nomen) and in Herb.—*lc.*: Polunin, op. cit. (1959) 453.

500 Perennial. Small woody shrubs; stems 3.5–10(12) cm high, simple, sulcate, somewhat pubescent or glabrous. Leaves entire, usually more or less revolute, glabrous on both sides, sometimes sparsely woolly beneath; basal and cauline leaves linear or oblong-linear, uppermost leaves linear, approximate with inflorescence; all leaves narrow, in type specimen 2–3 mm wide, subobtuse. Capitula small, about 1 cm long, on distinct peduncles in terminal, relatively compact corymbs. Involucre three-rowed, pubescent; outer involucre bracts ovate, subobtuse or obtuse; inner bracts lanceolate or oblong-lanceolate, longer than outer bracts, acuminate, both pubescent with long, often squarrose, with hairs on dorsal surface, along margins and at apex. Receptacle densely squamose, scales linearly-subulate, lustrous, up to 5 mm long; florets about 1–1.1 cm long, narrow part of tube about 5 mm long, as long as broad part with lobes of limb; anther appendages ciliate. Pappus double, outer pappus bristles small, fragile, serrate-scabrous, inner bristles plumose, about 9 mm long; achenes glabrous. Flowering VII–VIII.

Mossy tundras, grassy swales.—*Arctic*: Chukotka (islands of Bering Strait, for example, Arakamchechen); Gulf of St. Lawrence; near the Chukotsk hot springs). *General distribution*: North America (Alaska, Canada).

Note. The Arctic race of *S. alpina* is quite close to *S. viscida* Hult. (see below), included under *S. angustifolia* by some authors (N. Polunin). *S. angustifolia* DC. differs from *S. viscida* Hult. by having glabrous or flocculose and not glandular-hairy stem and leaves; basal leaves linear with revolute margins (elliptical, lanceolate or broadly lanceolate in *S. viscida*). The earlier reports of the occurrence of this North American species in eastern Siberia and in the vicinity of Ayan are mistaken. The plants from Ayan and eastern Siberia identified as *S. alpina* var. *angustifolia* Rgl., are not identical with the true *S. angustifolia*, distributed

only in the extreme Northeast of the USSR (cf. above), and I have described them as a separate race—*S. pseudoangustifolia* Lipsch.

89. *S. viscida* Hult. Fl. of Alaska and Yukon, X (1950) 1627; Polunin, Circumpolar Arctic Flora, 453 p. p. sub nom: *S. angustifolia* agg.—*S. alpina* var. *ledebouri* Gray, Synopt. Fl. N. Amer. I, 2 (1886) 397 quoad pl. ex Alask.—*S. alpina* f. *angustifolia* Kjellman in Vega Exp. Vet. Iaktt. 2 (1883) 14, excl. synonym.—**lc.**: Hult. op. cit. (1950) fig. 6 c.

Perennial. Dwarfish plants, 5–15 cm high; stem simple, weakly arachnoid-hairy and covered with viscid hairs. Lower leaves elliptical-lanceolate, obtuse or acute, entire or indistinctly toothed, sessile or with extremely short petiole, covered with scattered, viscid, many-celled hairs on both sides, margins ciliate and with dense viscid hairs; upper leaves like lower but narrower. Capitula on short peduncles, aggregated in compact terminal corymbs. Involucre two- or three-rowed; outer involucre bracts ovate, acuminate or subobtusate, more or less densely pubescent; inner bracts longer, lanceolate, acuminate, densely pubescent
501 with white semi-erect hairs. Receptacle squamose; scales linear-subulate, lustrous, unequal, up to 6 mm long; florets dark pink(?); narrow part of tube about 5 mm long, as long or almost as long as broad part with lobes of limb; anther appendages ciliate. Pappus double, outer pappus bristles scarcely noticeable, small, fragile, inner bristles about 9 mm long, plumose; achenes glabrous, ribbed. Flowering VII–VIII.

Tundra.—*Arctic*: Chukotka (village of Uelen, Naukan). *General distribution*: Alaska. Described from St. Lawrence Island. Type in Stockholm.

Note. Besides *S. angustifolia*, it is also close to *S. tilesii*; see the note to the latter about specimens from the Wrangel Island. Viscid hairs are not always present on the stem and leaves.

90. *S. pseudoangustifolia* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 452.—*S. alpina* [var.] *angustifolia* Rgl. in Mém. Soc. Nat. Mosc. XI (1859) 107.

Perennial. Root collar covered with remains of previous year's leaves. Stem erect, solitary, 10–15(20) cm high, sulcate, arachnoid-hairy, sometimes glabrescent, usually with floriferous branches in upper part. Leaves lanceolate or lanceolate-linear, weakly but more or less distinctly toothed, often weakly involute, arachnoid-hairy beneath and with scattered, small, lustrous glandular hairs; basal and lower cauline leaves 1–1.3 cm wide, long-petiolate, sometimes somewhat cuneate at base; upper leaves 3–5 mm wide, linear in type specimen, less often linear-lanceolate, sessile or subsessile, not decurrent on stem. Capitula solitary

or less numerous (2–5), in latter case lateral capitula on more or less long peduncles of various length; capitula usually up to 2–2.3 cm long and 1–1.5 cm wide, central capitulum of corymb usually larger than laterals. Involucre four- or five-rowed, imbricate, with one to three linear bracteal leaves at its base; outer involucral bracts ovate or ovate-triangular, acuminate, pubescent, inner bracts oblong-lanceolate, acuminate, more or less villous. Receptacle squamose, scales linear-subulate, equal, 1.1 cm long, narrow part of tube about 5 mm long, as long or almost as long as broad part together with lobes of limb. Pappus double, outer pappus bristles few, fragile, serrate-scabrous, unequal, up to 4–5 mm long, inner bristles plumose, about 1 cm long; achenes glabrous. Flowering VII–VIII.

Open forests, thickets of Japanese stone pine meadows, marshes on alpine summits.—*Far East*: Okhotsk; *Eastern Siberia*: Lena-Kolyma (eastern part). Endemic. Described from the vicinity of Ayan. Type in Leningrad.

Note. A separate eastern Siberian race of *S. angustifolia* DC., for which it was incorrectly taken to be by a number of authors. In habit it also approaches *S. tschuktschorum* Lipsch., from which it differs by having a squamose receptacle. The old reports (Willdenow, Pallas, etc.) that the range of *S. angustifolia* is in eastern Siberia are mistaken.

502 **Series 18. Kuschakevicziae** Lipsch.—Plants almost stemless, small, sometimes with distinctly developed but short stem. Basal leaves rotund, ovate or elliptical, usually in rosette, surrounding inflorescence in stemless forms and as long as inflorescence. Capitula aggregated in large or small number in dense terminal corymb. Receptacle squamose, with small, sometimes corymb. Receptacle squamose, with small, sometimes fragile scales. Alpine plants.

Note. *S. ovata* Benth. and *S. caprifolia* Iljin and Zapr. phylogenetically gravitate to this series. However, the latter species differs so much by its smooth receptacle and larger solitary or few capitula that it is considered later under section *Depressae* Clarke. The differences between the species included in the series are difficult to delineate, but are well expressed in overall appearance.

91. *S. kuschakeviczii* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1889) 170.—*S. alpina* var. *kuschakeviczi* Winkl. ex O. Fedtsch. Ibid., XXI, 3 (1903) 358.—*S. kuschakeviczii* Winkl. var. *caulescens* O. Fedtsch. op. cit., XXVIII, (1908) 170.

Perennial. Dwarfish, small, stemless plants or with short, 2–5(8) cm high, sometimes flattened, flocculose, less often almost glabrous stem (var. *caulescens* O. Fedtsch.). Leaves, especially beneath, arachnoid-

hairy pubescent, sometimes glabrescent, toothed, teeth cartilaginous at apex; basal leaves more or less rosulate, surrounding inflorescence in stemless forms, as long as inflorescence or larger, variable in shape and size from ovate to elliptical and even oblong-lanceolate; all leaves short-petiolate, petioles usually much shorter than lamina, together 1.5–5(7) cm long, 1–1.5(2) cm wide; cauline leaves distinctly developed only in forms with stem (var. *caulescens* O. Fedtsch.), like basal leaves sessile; upper cauline leaves reduced, 3–5 mm wide, lanceolate, approximate with inflorescence. Capitula 3–20, numerous in type specimen, aggregated in dense terminal corymb. Involucre narrow-campanulate, indistinctly imbricate, tomentose or glabrous, subsequently becoming hard (always ?); outer and middle involucral bracts ovate, acuminate; inner bracts lanceolate or oblong-lanceolate, acuminate, both usually light colored, less often pigmented. Receptacle squamose, scales few, linearly subulate, lustrous, unequal, fragile; florets 1.1–1.2 cm long, narrow part of tube about 5–(6) mm long, as long or almost as long as broad part with lobes of limb; anther appendages hairy. Pappus double, outer pappus bristles up to 3 mm long, unequal, serrate, rather numerous, easily shedding, inner bristles long-plumose, 11–12 mm long; achenes 3–4 mm long, dark brown, glabrous. Flowering VIII–IX.

Moraines, alpine grassy areas, pebbled areas, meadows above the upper boundary of forests, rocks.—*Soviet Central Asia*: Pamiro-Alai (Pamir, Alai and Trans-Alai ranges); Tien Shan; Dzhungaria-Tarbagatai (Dzhungarian Alatau). Endemic. Described from Kyzyl-Art. Type in Leningrad.

Note. A high-mountain, Soviet Central Asian race of *S. alpina*, differing from it by growing close to the ground, having basal leaves that are rosette-like, surrounding the inflorescence, and having a less distinctly developed, imbricate involucre. C. Winkler reports a smooth receptacle in the original description of *S. kuschakeviczii*. Study of the authentic material revealed the presence of a few scales on the receptacle. The plants collected subsequently from Kyzyl-Art also have squamose receptacles. *S. kuschakeviczii* Winkl. is closest to *S. caprifolia* Iljin and Zapr., from which it differs by having a squamose receptacle, larger number of smaller capitula, and less rotund toothed leaves. Earlier known only from Pamir and the Kyzyl-Art Pass, it subsequently was found in other regions of Alai, in the Central Tien Shan and Dzhungarian Alatau.

92. *S. ovata* Benth. in Henderson and Hume, Lahore to Yarkand (1873)325.—*lc.*: op. cit. (1873); 326, tab. colorata.

Perennial. Rhizome developing stems and sometimes rosettes of leaves; stems 2.5–10 cm long, sometimes 15–25 cm in individual specimens, glabrous in type specimens or less often more or less

pubescent, sulcate, usually with fewer leaves. Leaves fleshy, glabrous on both sides (arachnoid-hairy in dwarf specimens) and with scattered, small, lustrous glandular hairs (visible under lens), ovate, toothed or even shallow sinuate-toothed, teeth cartilaginous at apex; basal and lower cauline leaves distinctly petiolate, 4–10 cm long (including petiole) and 2–4.5 cm wide, truncate at base or indistinctly cuneate, usually with cusp, petiole narrow-winged; upper leaves significantly reduced, sessile, approximate with inflorescence. Capitula narrow-cupuliform, on short peduncles, three to many, aggregated in dense capitate corymbs at stem apex. Involucre imbricate, 8–10 mm long and 5–8 mm wide, pubescent with stiff hairs; outer involucral bracts broader, ovate, with short apical cusp or roundish; inner bracts narrower, subobtusate and often glochidiate at apex. Receptacle covered with smooth short scales, scales about 1–2 mm long; florets dark pink, narrow part of tube shorter than its broad part together with lobes of limb; anther appendages ciliate. Pappus double; outer pappus-bristles less numerous, serrate-scabrous, fragile, small, 2–3 mm long, inner bristles long-plumose, about 10 mm long; achenes 3 mm long, dark brown, glabrous. Flowering VII–VIII.

Stony and clayey slopes; alpine meadows.—*Soviet Central Asia: Pamiro-Alai* (near Irkeshtam). *General distribution: Kashgaria*. Described from the Yarkenda Region. Type in Kew(?).

Note. Because of the limited material, I am referring the specimens from the Talass Alatau (“stony screes in the upper reaches of the Dzhebogly-Su River, 3500 m above msl, 4, VIII, 1931, No. 934”. N.V. Pavlov) to *S. ovata* Benth. They are characterized by stems 3–5 cm high, arachnoid-hairy stem and leaves, smaller capitula (involucre 5–7 mm long) with slightly exerted florets (possibly, this is explained by the fact that the florets were damaged by frost). Evidently, this is a separate species (*S. talassica* Lipsch. ined. in *Herb. Inst. Bot. Acad. Sc. URSS*), but larger collections are required to resolve the question finally.

Bentham reported incorrectly in the original diagnosis of *S. ovata* that the receptacle of this species is smooth; all unquestioned specimens of *S. ovata* examined by me (from Kashgaria) show a squamose receptacle, but the scales are 1–2 mm long and not dense.

Series 19. Salsae Lipsch.—Plants of saline and salty habitats, somewhat bitter to taste. Stem covered with hardened remains of previous year’s leaves at base. Leaves fleshy, sometimes lower leaves lyrate-pinnatisect, with large terminal lobe almost sagittate at base and sinuate-large toothed along margin, upper leaves often entire, sometimes deeply pinnatisect; usually (but not always) decurrent. Capitula in corymbs, sometimes numerous, aggregated in branched, lax, paniculate-corymbose inflorescence, sometimes less numerous, terminal, dense. Outer involucral

bracts not herbaceous and not distinguished from inner bracts by consistency. Anther appendages hairy. Pappus snow-white, soft.

Note. Besides *S. salsa*, I also include under this series *S. turgaiensis* B. Fedtsch., *S. daurica* Adams, *S. kaschagarica* Rupr., and tentatively *S. pseudosalsa* Lipsch. from Kashgaria, as well as *S. faminziniana* Krassn., endemic to the USSR. The affinity of the latter species is not clear to me.

93. ***S. salsa*** (Pall.) Spreng. Syst. veg. III (1826) 381; Ldb. Fl. alt. IV, 22 excl. syn. *S. elongata* DC. and Poir.; Boiss. Fl. or. III, 566; O. and B. Fedtsch. Perech. Rast. Turk. IV, 232 excl. syn. plur.; Grossh. Fl. Kavk. IV, 168; Fl. Yugo-Vost. VI, 386; Kryl. Fl. Zap. Sib. XI, 2912 excl. var. *laciniosa* (Kryl.) Serg.; Popov, Fl. Sr. Sib. II, 757.—*S. salsa* var. *fastigiata* Winkl. in O. and B. Fedtsch. op. cit. (1911) 232, nomen.—*Serratula salsa* Pall. Reise, I, Anhang (1771) 502 sub nomine “*Planta salsa ambigui generis*”; nomen specificum conf. Pall. Reise, III (1776) 607, 635; MB. Fl. taur.-cauc. II, 266.—*S. salina* Pall. Reise, III (1776) 314.—*Heterotrichum salsum* MB. Fl. taur.-cauc. III (1819) 551.—*Saussurea crassifolia* DC. in Ann. Mus. Paris, X (1810) 201; Ej. Prodr. VI, 533; Spreng. op. cit. 380; Ldb. Fl. Ross. II, 2, 665, excl. β . *papposa* Turcz.; Bge. in Mém. Acad. Pétersb. sav. étrang. VII, 353 excl. var. β . *muricata* Bge.; Kryl. Fl. Alt. III, 703 excl. f. *laciniosa* Kryl.

Perennial. Root collar more or less densely covered with remains of previous year's leaves. Stems 15–50 cm high, solitary or several, sulcate, pubescent or almost glabrous, branched above or from middle, distinctly winged (wings of variable width, entire or toothed) due to decurrent leaves, sometimes weakly winged, often wingless. Leaves somewhat thick, fleshy, more or less scabrous due to short stiff hairs or almost smooth, glabrous, covered with numerous punctate glandular hairs beneath, more weakly noticeable above; all leaves fairly polymorphic; especially in respect of serration; basal and lower cauline leaves larger, petiolate, broadened at base in sheaths, together with petioles 5–35(!) cm long, 2–12 cm wide, lyrate-pinnatisect, with large, usually sagittate at base, and sometimes boldly sinuate-toothed, sometimes entire terminal lobe; lateral lobes numerous, triangular, usually entire, retrorse, gradually reduced toward base; cauline leaves oblong, oblong-linear or lanceolate, entire or with less numerous teeth along margin, sessile, usually decurrent; uppermost leaves narrow and weakly decurrent. Capitula with florets 1–1.2 cm long, numerous, forming lax corymbose-paniculate inflorescence. Involucre imbricate, 4–5 mm wide, glabrous or arachnoid-hairy, involucrel bracts obtuse; outer bracts ovate, inner oblong, pink or red colored. Receptacle densely squamous, scales uneven, sometimes 4–4.5 mm long, linearly subulate, lustrous; florets pink, 1–1.1 cm long

with narrow part of tube, almost as long as or somewhat shorter than broad part with lobes of limb; anther appendages hairy. Pappus double, outer pappus bristles unequal, serrate, up to 3 mm long, fragile, inner bristles plumose, about 9 mm long; achenes smooth, compressed. Flowering VI-IX. (Plate XXXVII, Fig. 1.)

Saline lands, alkaline steppes and meadows, reed thickets.—
European Part: Black Sea Region (Novomoskovsk and Melitopol regions), Crimea (Perekop), ?Lower Don, Lower Volga, Trans-Volga Region, Volga-Kama (southeastern); *Caucasus*: Cis-Caucasia, southern Transcaucasia? Dagestan (according to Grossheim); *Western Siberia*: Upper Tobol, Ob' (southern part), Irtysh, Altai; *Eastern Siberia*: Angara-Sayans; *Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region, Kara-Kum, Kyzyl-Kum, Amu-Darya, Syr-Darya, Tien Shan, Pamiro-Alai, Dzhungaria-Tarbagatai. *General distribution*: Iran, Dzhungaria-Kashgaria, Mongolia. The type specimen originated from saline lands near Samara and around the salt mines near Lake Iletscoe (Pallas). Type in Leningrad.

Note. An extremely polymorphic species which was first reported by Ledebour (*Fl. alt.* IV, 23). It varies in the form of leaves (their size, serration), presence or absence of wings on the stem formed by decurrent leaves, scabrous or smooth stem and leaves, pubescence of the involucre bracts, form of the inflorescence (few terminal corymbs or numerous lax corymbs, forming corymbose panicle), etc. I consider the following taxa, phylogenetically close to *S. salsa*, as independent species: *S. daurica* Adams, *S. turgaiensis* B. Fedtsch. and *S. kaschgarica* Rupr. Populations with white florets (albinos) are found in *S. salsa*; this is f. *albiflora* Lipsch. (vicinity of the Aul Health Resort in the Altai, V.I. Vereshchagin, 1921). The taxonomic status of *S. crassifolia* β . *muricata* Bge. l.c. is not clear to me. It was described from Zeravshan (its type specimen is not found in the Herbarium of the Botanical Institute). This variety is close, if not identical, to var. *aspera* Serg. (Kryl. Fl. Zap. Sib., XI, 2912). Specimens resembling *S. salsa*, but differing from it in several characters, have been collected from the Kurgan-Tyubensk Region ("Clayey Plain between Kurgantyube and Lyagman," 2.VIII.1913, No. 659, B.A. Fedchenko; same place, 15.VIII.1913, No. 1040, I. Bornmüller). Unfortunately, these specimens were collected at an immature stage, which does not allow us to come to a definitive opinion about their taxonomic rank. They are characterized by a less leafy, glabrous, wingless stem up to 70 cm high; elongated, strongly pinnatisect lower leaves, some lower lobes of which are bipinnatisect, curved, and upward-pointed, and the upper lobe, as in true *S. salsa*, is larger and sagittate at the base. Apparently, it is a separate race (or ecological variety?). Pamir specimens differ slightly from the typical ones and are split off by me into the separate var. *pamirica* Lipsch. var. *nova*: stems

15–20(25) cm high, few, simple, less often branched, usually distinctly winged from decurrent leaves; leaves elongate, runcinate or sinuate-toothed, with indistinctly developed upper lobe; corymbs of capitula compact; inner involucre bracts acuminate (type: toward north of Murgab, 1954, No. 590, P. Polyakov). In the Zaisan Region, very unusual forms of *S. salsa* are found, which are intermediate between it and *S. laciniata* Ldb., a species with appendages on the involucre bracts and, therefore, included under subgenus *Theodorea* (Cass.) Lipsch.

94. × *S. paradoxa* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 378.—*S. salsa* (Pall.) Spreng. × *S. laciniata* Ldb.

Perennial. Root collar covered with remains of sheaths of previous year's leaves; stems solitary or few, 25–35 cm high, sulcate, usually weakly winged due to decurrent leaves, slightly pubescent with short hairs, pubescence easily rubbed off, and then stems almost glabrous. Basal and lower cauline leaves very similar to leaves of *S. salsa*, long-petiolate, with petiole up to 18 cm long, up to 5 cm wide, broadened at base into short sheath; lamina somewhat thick, more or less scabrous due to short, hard, appressed hairs, ovate, elliptical or oblong, crenate-toothed, especially in lower part, teeth terminating in callose cusp; middle and upper leaves reduced, entire. Capitula in corymbs, terminal on stem and less numerous lateral branches, like capitula of *S. laciniata*. Involucre up to 10 cm long, middle and inner involucre bracts broadened into membranous pinkish apical appendage. Receptacle densely squamous, scales linearly subulate, white, lustrous, unequal; florets pink, about 1.2 cm long including narrow part of tube, almost as long as broad part together with lobes of limb. Pappus white, double, outer pappus bristles short, fragile, inner bristles plumose, about 8–9 mm long, slightly exserted from involucre. Flowering VII–IX.

Saline lands, alkaline meadows.—*Western Siberia*: Irtysh (Zaisan District). *General distribution*: Mongolia. Described from the Takyrka River. Type in Leningrad.

Note. As can be seen, the plant has inherited its vegetative morphological characters (stem, leaves) from *S. salsa* and its capitulum features (presence of membranous appendages on the involucre bracts) from *S. laciniata* and is, therefore, undoubtedly, a natural hybrid between them. This hybrid is also known from Mongolia (Ladygin, No. 410, Island on Lake Kobdo).

95. *S. daurica* Adams in Nouv. Mém. Soc. Nat. Mosc. III (1834) 251; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI, 378.—*Serratula davurica* Adams errore ex Ldb. Fl. Ross. II, 2 (1845–

1846) 666.—*Saussurea papposa* Turcz. in DC. Prodr. VI (1837) 534; Turcz. Fl. baic.-dahur. II, 1, 108; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 10; Kom. in Tr. Peterb. Bot. Sada, XXV, 2, 742; Serg. in Sistemat. Zam. Gerb. Tomsk. Univ. 2 (1941) 4–5 (descriptio emend.); Krylov, Fl. Zap. Sib. XI, 2913; Popov, Fl. Sr. Sib. II, 757.—*S. crassifolia* β . *papposa* Ldb. Fl. Ross. II, 2 (1845–1846) 666.—Exs.: GRF No. 1330.

Perennial. Root slender, one- or less often two- or three-headed. Stems solitary, sometimes two or three, slender in type specimen, (5)10–15(20) cm high, erect, usually simple, less often branched, almost glabrous or sparsely pubescent, not winged. Leaves somewhat thick, almost smooth or weakly scabrous due to short stiff hairs, lanceolate or oblong; basal and lower cauline leaves petiolate, with petiole 3–9 cm long, 1–3 cm wide, terminal lobe often indistinct, if fully developed, then oblong, entire or shallow crenate-toothed, lateral lobes two or three pairs, sometimes absent; cauline leaves two to five, sessile or short-petiolate, semiamplexicaul, nondecurrent on stem, oblong, runcinate, sometimes entire, 4–7 cm long and 0.6–1.5 cm wide; uppermost leaves smaller, entire. Capitula in semicapitate or capitate corymbs. Involucre 10–12 mm long, 5–6 mm wide; outer involucral bracts ovate, inner oblong, acuminate, almost glabrous or puberulent along margin, often reddish. Receptacle squamous, scales linear-subulate, lustrous; florets pink, up to 1.4 cm long, narrow part of tube about 8 mm, broad part with lobes of limbs about 6 mm long. Pappus snow-white, outer pappus bristles short, serrate, fragile, inner bristles plumose, about 11–12 mm long, strongly exerted from involucre at fruiting; achenes with narrow top edge (corona). Flowering VII–IX. (Plate XXXVII, Fig. 2.)

Saline lands, desert steppes, saline meadows.—*Western Siberia*: Altai (southeastern part, Chuya steppe), *Eastern Siberia*: Angara-Sayans (Khakassia, Tuva); Dauria. *General distribution*: Mongolia, China. Described from Dauria; Adams' type evidently is lost; the type of *S. papposa* Turcz. originates from the Selenginsk saline lands and is preserved in Leningrad.

Note. Adams' name has priority. He described this species in the genus *Saussurea* and not in the genus *Serratula*. Ledebour erroneously cites the name "*Serratula davurica* Adams."

Popov (op. cit. 1959) reported that forms of *S. salsa* transitional to *S. papposa* (= *S. daurica*) are found in the Selenginsk Dauria; I did not see them. *S. salsa* is the well defined Daurian-Mongolian race. It can be distinguished easily from the latter by the lower stature, aggregated corymbs of capitula, with a dense, snow-white pappus, strongly exerted from the involucre at fruiting, giving a globose or hemispherical appearance to the inflorescence, smaller, nondecurrent leaves, acuminate inner involucral bracts, and achenes with a narrow border-corona.

96. *S. turgaiensis* B. Fedtsch. in Fedde, Repert. VIII (1910) 497; Fedtsch. in Tr. Pochv.-Bot. Eksp. Pereselench. Upravl. Ch. II, Bot. Issl. 1908, 7, 242; O. and B. Fedtsch. in Perech. Rast. Turk. IV, 232; Fl. Yugo-Vost. VI, 386.—*S. salsa* var. *pinnatifida* Winkl. in O. and B. Fedtsch. op. cit. 232 nomen and in herb.—*S. salsa* var. *bipinnatifida* Rgl. and Schm. in O. and B. Fedtsch. op. cit. 232 nomen and in herb.—*S. crassifolia* f. *laciniosa* Kryl. Fl. Alt. III (1904) 703.—*S. salsa* var. *laciniosa* (Kryl.) Serg. in Kryl. Fl. Zap. Sib. XI (1949) 2912.—**lc.**: Fedtsch. Rast. Turk. (1915) 751.

Perennial. Roots strongly thickened, woody, with many caudices above, covered with remains of hardened sheaths of previous year's leaves. Stems more or less numerous, (15)20–30(40) cm high, branched from middle or above, sulcate, sometimes angular-sulcate, pubescent, wingless, sparsely leafy. Leaves more or less covered with stiff hairs, numerous, mainly crowded in lower part of plant, pinnatisect, short-petiolate, broadened at base in sheath; lamina of basal and lower cauline leaves oblong, pinnatisect or even bipinnatisect, lower lobes ovate, divided in linear lobules, upper lobes linear, almost undivided; cauline leaves reduced, pinnatisect, on very short petioles or sessile; uppermost leaves small, sometimes with small number of lateral teeth, less often almost entire. Capitula numerous, in corymbs, aggregated in lax paniculate inflorescence. Involucre imbricate, about 10 mm long, involucre bracts usually reddish; outer bracts smaller, ovate, inner oblong, both puberulent especially along margin (often glabrescent), subobtusate. Receptacle squamose, scales linear-subulate, lustrous; florets pink, about 1.2 cm long, narrow part of tube about 7 mm long, broad part with lobes of limb about 5 mm long. Pappus double, 509 outer pappus bristles short, serrate, fragile, inner bristles plumose, somewhat exerted from involucre; achenes glabrous. Flowering VII–VIII. (Plate XXXVIII, Fig. 1.)

Saline lands, saline meadows, thickets of chee grass (*Lasiagrostis splendens*), limestone outcrops.—*European Part*: Trans-Volga Region (southeastern part); *Western Siberia*: Upper Tobol, Irtysh, Altai; *Soviet Central Asia*: Aralo-Caspian, Balkhash Region, Kyzyl-Kum, Tien Shan (?), Pamiro-Alai (Alai Valley, form transitional to *S. salsa*). Described from former Turgai District (border of Naurzum-Karagai forest and the former Akmolinsk District). Type preserved in Leningrad.

Note. Albino populations (f. *albiflora* Lipsch.) are also found. It differs from *S. salsa* (Pall.) Spreng. by pinnatisect and more strongly scabrous leaves owing to short stiff hairs. A few specimens transitional to *S. salsa* are found in which the leaves are indistinctly pinnatisect.

97. *S. kaschgarica* Rupr. in Mém. Acad. Sc. Pétersb. VII sér. XIV, No. 4 (1869) 54; O. and B. Fedtsch. Perech. Rast. Turk. IV, 233.

Perennial. Root collar covered with more or less shining or smooth, hardened, dark brown sheaths of basal leaves. Stems several, 20–25 cm high, more or less ascending at base, sulcate, weakly pubescent, sparsely branched, wingless. Leaves pinnatifid or pinnatisect, scabrous due to numerous short and stiff hairs; basal leaves petiolate, up to 15 cm long with petioles, petioles broadened in sheaths, lobes of lamina acute, long or short-toothed; cauline leaves reduced, short-petiolate or almost sessile, not decurrent. Capitula in dense corymbs, terminal on stem and branches, if branched. Involucre deep purple, about 12 mm long and 8–10 mm wide, imbricate, four-rowed; outer involucre bracts ovate; subobtusate; inner bracts oblong or oblong-lanceolate, with somewhat subacute apex, sparsely pubescent with stiff hairs on dorsal surface, along margin, and apex, later glabrescent. Receptacle squamose, scales linearly-subulate, lustrous, unequal; florets pink, about 1.4 cm long, narrow part of tube almost as long as or slightly shorter than broad part with lobes of limb; anther appendages hairy. Pappus double; outer pappus bristles unequal, 3–5 mm long, stiff, serrate, persistent, inner bristles about 10–11 mm long, plumose; achenes about 5 mm long, glabrous. Flowering VIII.

Saline lands, outcrops of varicolored rocks.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the Suukta Valley. Type in Leningrad.

Note. A species of clear phylogenetic affinity to *S. salsa*, from which it was distinguished by Ruprecht on the basis of scabrous, weakly decurrent leaves, larger and wider capitula, compactly aggregated on the tips of unbranched or weakly branched stems, and a receptacle that is not squamose, but narrow-setose. It was incorrectly stated in the diagnosis of Ruprecht that the receptacular bristles are “sometimes plumose”; the receptacular bristles (scales) in *Saussurea* are never plumose. Evidently, Ruprecht considered the deciduous outer pappus bristles remaining on the receptacle as plumose receptacular bristles. The collections from central Tien Shan made since Osten-Sacken’s collections, on the basis of which *S. kaschgarica* was described, are not identical with the authentic specimens; they differ by having smaller capitula, pale (and not purple) involucre bracts, and more scabrous peduncles and branches of the inflorescence. But since these specimens (Issyk-Kul Basin, No. 281, 1953, P.P. Polyakov; Naryn-Tau mountains, 1926, No. 1191) are quite close to *S. kaschgarica* Rupr., I include them under the latter. The presence of a well-developed outer row of pappus hairs that persist on the achene is a very characteristic feature of both the authentic material of *S. kaschgarica* Rupr. and these similar specimens.

98. *S. faminziniana* Krassn. in Bot. Zap. II, 1 (1887) 71; in Zap. Russk. Geogr. Obshch. po Obshch. Geogr. XIX, 338; Lipschitz in Bot.

Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX, 387.—*S. colorata* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1889) 167.

Perennial. Rhizome many-headed, forming turf; caudices covered with remains of previous year's leaves, partially fibrously divided; stem (2)5–12 cm high, prostrate or ascending, pubescent or glabrescent, simple, sometimes branched above. Leaves lanceolate, 2 to 17 cm long (including petiole) and 0.3–1.2 wide, scabrous, arachnoid-hairy or less often almost glabrous on both sides, large toothed, or pinnatidentate, less often almost entire, teeth with small cartilaginous cusp; basal leaves gradually narrowed in petiole, petiole almost as long as lamina or nearly half as long and broadened at base in hard sheath; lower cauline leaves short-petiolate, upper sessile, weakly amplexicaul. Capitula on short peduncles, in compact corymbs, campanulate, about 1.2–1.5 cm long and up to 1.2 cm wide. Involucre imbricate, light colored or dark, arachnoid-hairy, later sometimes glabrescent; outer involucre bracts ovate, inner lanceolate, obtuse. Receptacle glabrous, not squamose sometimes with less numerous scales; florets pale purple, about 1.3–1.4 cm long, narrow part of tube about 6–7 mm long, broad part with lobes of limb almost as long as narrow part; anther appendages ciliate. Achenes about 4 mm long, glabrous, smooth, with short apical corona; pappus double, snow-white; outer pappus bristles short-plumose, persistent on achenes, up to 4–5 mm long, inner bristles long-plumose, about 11 mm long. Flowering VIII.

Sands (saline), stony slopes, moraines, alkaline patches in alpine steppe.—*Soviet Central Asia*: Pamiro-Alai (eastern Pamir), Tien Shan. *General distribution*: Dzhungaria-Kashgaria (eastern Tien Shan). *S. faminziniana* Krassn. was described from Sary-Dzhas (central Tien Shan). Type in Leningrad. *S. colorata* Winkl. was described from Eastern Pamir (Lake Kara-Kul). Type in Leningrad.

511 *Note*. As shown by my studies, *S. faminziniana* Krassn., for which the author of the species reports the presence of receptacular scales, and *S. colorata* Winkl., whose receptacle was described as smooth (without scales), are identical, representing a single species. The receptacle of this species is sometimes smooth (without scales) and sometimes squamose. In this case, I see reason for using the artificial section *Depressae* Clarke. The affinity of *S. faminziniana* Krassn. to series *Salsae* is doubtful.

Series 20. Karaartschae Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 379.—Stem covered with hardened leaf sheaths at base, wingless, somewhat leafy. Leaves succulent, extremely variable from almost undivided to lyrate-pinnatisect. Capitula in type specimen solitary or few, and then in lax corymbs. Outer involucre bracts herbaceous, strongly acuminate with more or less bent cusp. The series includes a single species.—*S. karaartscha* Saposhn.

99. *S. karaartscha* Saposhn. in Bot. Mat. Gerb. Glavn. Bot. Sada, VI, 2 (1926) 31.

Perennial. Entire plant glabrous. Roots woody, many-headed, with more or less numerous stems, densely covered at base with sheaths of previous year's leaves. Stems 12–25(35) cm high, ascending, slightly flexuous, glabrous, sulcate, usually branched, less often simple. Leaves fleshy, hard when dry, fairly variable on same plant; basal leaves long-petiolate, petiole narrow, somewhat winged, broadened at base in sheath, lamina 13–14 cm long (including petiole) and 2–4 cm wide, deeply lyrate, with ovate and triangular lateral lobes terminating in small callose cusp, and larger and broader, triangular or ovate terminal lobe, sometimes entire, sometimes toothed, cuneate at base, sometimes only one terminal lobe developed, and lateral lobes reduced to less numerous teeth; lower cauline leaves also petiolate, lyrate; upper leaves sessile or subsessile. Capitula solitary or two to seven on stem, terminal on main stem and lateral branches arising from axils of upper leaves. Involucre 1.3–1.5 cm long and 0.6–1 cm wide, five-rowed, glabrous; outer involucre bracts in type specimen like bracteal leaves, herbaceous, green; subsequent bracts green, ovate, long-acuminate; inner bracts lanceolate or oblong, reddish in upper part, long-acuminate, exerted from outer bracts; acuminate tips of involucre bracts sometimes slightly bent. Receptacle densely squamose, scales linear-subulate, lustrous, half or one-third as long as involucre bracts; florets purple, 1.3–1.4 cm long, narrow part of tube about 0.6 cm long, broad part with lobes of limb about 0.8 cm long; anther appendages ciliate. Pappus double; outer pappus bristles 512 serrate-scabrous, unequal, small, inner bristles long-plumose, much longer than outer. Immature achenes about 0.4 cm long. Flowering VII–VIII. (Plate XXXVIII, Fig. 2.)

Stony slopes, coastal pebbles.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the region of Kara-Archa (Tien Shan). Type in Leningrad.

Note. Undoubtedly, it is phylogenetically close to *S. salsa* (Pall.) Spreng., from which it differs by solitary or few capitula and the presence of herbaceous, strongly acuminate outer involucre bracts, as well as by the form of the leaves. Perhaps, it is also confused with *S. faminziniana* Krassn. but it differs from the latter mainly by lyrate-pinnatisect leaves, herbaceous, strongly acuminate outer involucre bracts and by form. From *S. blanda* Schrenk., to which also it may be close, it differs by the absence of pubescence on the leaves (leaves of *S. blanda* are strongly scabrous from numerous stiff hairs along the margin), herbaceous, strongly acuminate outer involucre bracts, and form of inflorescence.

Section 4. Jurineiformes (Lipsch.) Lipsch. in Bot. Zhurn. XLIII, 3 (1958) 452 pro serie.—Semishrubs with numerous strongly and repeatedly

branched, virgate, erect, more or less glandular pubescent stems. Leaves less numerous, small, lanceolate. Capitula numerous, solitary terminal on branches and branchlets, forming lax paniculate inflorescence. Involucre imbricate; involucre bracts with hard, callose cusps covered with hairs. Receptacle densely squamose, scales subulately-linear, unequal, lustrous. Achenes with small fringe (corona). Pappus white, one-rowed, easily shedding, pappus-bristles equal or almost equal, plumose, connate at base in ring.

100. *S. chondrilloides* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1889) 169; Lipschitz in Bot. Zhurn. XLIII, 3 (1958) 452.—*Jurinea chondrilloides* (Winkl.) O. Fedtsch. in Perech. Rast. Turk. IV (1911) 296.—*Saussurea aphylla* Rech. f. Symb. Afghan. II (1955) 167.—*Ic.*: Rech. f. Ibid. (1955) fig. 114.

Perennial. Semishrub, up to 75 cm high, with numerous, strongly and repeatedly branched, virgate, erect, more or less glandular-hairy stems; branches cylindrical, finely sulcate, pale green, terminating in solitary capitula. Leaves few, small, coriaceous, lanceolate, about 2 cm long and scarcely 2–3 mm wide, acuminate, sometimes weakly involute, entire or with two or three teeth; upper cauline leaves significantly reduced; uppermost leaves filiform-linear, weakly divergent; lamina with small sessile glandular hairs on both sides. Capitula medium-sized, turbinate, numerous, solitary terminal on branches and branchlets, forming lax paniculate inflorescence. Involucre about 10–11 mm long; involucre bracts imbricate, five- or six-rowed, appressed and short-pubescent, sometimes sparsely glandular-hairy, with indurated yellow or brownish cusp covered with spinulose hairs; outer bracts reduced, inner elongate, both lanceolate. Receptacle densely squamose, scales subulate-linear, lustrous, almost as long as middle involucre bracts; florets pale pink (?), numerous with small glandular hairs on outer surface; narrow part of tube about 5 mm long, broad part including five-fid limb about 8–9 mm long; anther appendages woolly-hairy. Achenes 5 mm long, with narrow corona at apex, comprising prominent, small, sometimes unequal spinules; pappus easily shedding, simple, about 10 mm long, pappus bristles white, soft, plumose, connate at base into ring. Flowering VIII–IX.

Stony deposits, pebbles, outcrops of conglomerates, outcrops of varicolored rocks.—*Soviet Central Asia*: Pamiro-Alai. *General distribution*: Iran (Afghanistan). *S. chondrilloides* Winkl. is described from Darvaz; type in Leningrad. *S. aphylla* Rech. f. is described from Afghanistan. Type in Vienna.

Note. Comparison of the type specimens of *S. aphylla* Rech. f. and *S. chondrilloides* Winkl. showed their complete identity. The transfer of

S. chondrilloides Winkl. to the genus *Jurinea* by O. Fedtschenko (incidentally, without justification) was mistaken. *S. chondrilloides* has a pappus of equal or subequal plumose, basally connate, one-rowed bristles, as well as a receptacle covered with linear-subulate scales, and undoubtedly should be placed in the genus in which C. Winkler described it. But based on the presence on the achenes of a narrow crown of small spinules, the presence at their tips of the involucre bracts of indurescent cusps, the growth habit of the plant (semishrubs with numerous virgate branches), and other characters, it should be placed in a separate section. *S. popovii* Lipsch., distributed in Dzhungaria, is close to *S. chondrilloides*, being distinguished by the form of its involucre bracts, nature of the achenes (black with 4 white, slightly winged, ribs) and other characters.

Section 5. *Jacea* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 441.—Stem densely leafy. Capitula solitary terminal on stem and lateral branches, in latter case numerous, usually surrounded by uppermost leaves. Involucre bracts coriaceous, straw-yellow, with chestnut or black border. Receptacle squamous, scales 1.5–2 cm long, as long as or slightly longer than inner involucre bracts. Outer pappus bristles short (when present), plumose like inner ones. Achenes linear.

101. *S. masarica* Lipsky in Tr. Peterb. Bot. Sada, XVIII, 1 (1900) 81; O. and B. Fedtsch. Perech. Rast. Turk., IV 234.

514 Perennial. Stems numerous, strongly virgately branched from base, erect, sulcate, canescent or almost glabrous, densely leafy, wingless, 30–50 cm high. Leaves lanceolate or oblong-ovate, bicolored, green above, snow-white beneath, appressed-hairy, up to 4–5 cm long and 1.5 cm wide, with short cusp, short-petiolate, petioles weakly winged; upper cauline leaves sessile or subsessile; all leaves weakly toothed, more often undivided; base of cauline leaves roundish or indistinctly cuneate. Capitula with florets up to 1.5(2) cm long and 1–1.2 cm wide, solitary, less often in twos, terminal on main stem and numerous lateral branches that may be simple or branched in turn, forming lax and leafy panicle. Involucre four-rowed, involucre bracts coriaceous, hard, imbricate, sparingly and flocculosely arachnoid-hairy, especially along margin, or almost glabrous, straw-yellow, with clear brown border, less often entirely brownish; outer bracts smaller, ovate, inner much longer, linear-lanceolate, both acuminate, with very short cusp. Florets reddish when dry, about 14 mm long, narrow part of tube about 8 mm long, broad part with short lobes of limb about 6 mm long; anther appendages setaceous, about 1 mm long. Receptacle squamose, scales linear-subulate, up to 1.5 cm long, as long as inner involucre bracts; pappus about 1.2

cm long, white, pappus bristles connate at base into ring; outer bristles shorter, but all of same shape, plumose; achenes immature, about 4–5 mm long, linear, glabrous. Flowering VII–VIII. (Plate XXX, Fig. 2.)

Borders of glaciers, stony slopes.—*Soviet Central Asia*: Pamiro-Alai (Darvaz, Karategin). Endemic. Described from Darvaz and Karategin. Type in Leningrad.

Note. A typical species of the Himalayan alliance, together with *S. jacea* (Klotzsch) Clarke and *S. tadshikorum* Iljin and Gontsch. forming a natural group of *Saussurea*.

102. *S. tadshikorum* Iljin and Gontsch. in *Izv. Tadjh. Bazy Akad. Nauk SSSR, Bot.*, I, 1 (1933) 67.

Perennial. Stem 40–50 cm high, wingless, sulcate, flocculose, almost glabrous above, strongly leafy up to tip, branched from base; branches numerous, slender, in turn branched. Leaves numerous, somewhat hard, ovate-oblong or ovate, 2–2.5 cm long and 1–1.4 cm wide, narrowed into very short, broadly cuneate petiole, almost entire or remotely and indistinctly toothed, weakly involute, short acute; lamina concolorous, green on both sides, more or less covered with small glandular hairs beneath; lower leaves somewhat arachnoid-hairy, uppermost reduced. Capitula 15–20 mm long and 8–12 mm wide, solitary terminal on numerous branches, forming lax, almost paniculate inflorescence. Involucre almost cylindrical, four-rowed, imbricate; involucre bracts coriaceous, hard, straw-yellow, with dark brown border, weakly ciliate-arachnoid hairy or almost glabrous; outer and middle involucre bracts ovate or oblong-ovate, with indistinct midrib, narrowed into a short cusp; inner bracts linear, acuminate, much longer than outer. Florets reddish (?) (according to M.M. Iljin, whitish, which is not distinct in the herbarium material), about 14 mm long, narrow part of tube about 8 mm long, broad part with lobes of limb about 6 mm long, lobes of limb 1.5–2 mm long; anther appendages setaceous, about 1 mm long. Receptacle squamose, scales linear-subulate, lustrous, up to 18–20 mm long; pappus about 12 mm long, pappus bristles long-plumose, connate at base into ring, outer hairs shorter, but also plumose; achenes linear, 5–6 mm long. Flowering VII.

Pebbles, stony slopes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Vakhsh Range. Type in Leningrad.

Note. Besides the three sheets of the type material, there are no other collections in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR. The species is very close to *S. masarica* Lipsky and *S. jacea* (Klotzsch) Clarke. It differs from *S. masarica* by its leaves, green on both sides with minute punctate glandular hairs

beneath, and from *S. jacea* by numerous, smaller capitula, and also by smaller leaves, which are smooth or weakly scabrous on both sides.

Section 6. Depressae Clarke. Comp. Ind. (1876) 221; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 148.—Sect. *Gymnoclyne* Franch. in Journ. de bot. II (1883) 311; Kitam. in Acta Phyt. et Geobot. IV (1935) 4.—Capitula solitary or aggregated at apices of stem and its branches into compact corymbs. Involucral bracts without appendages. Receptacle glabrous, without scales. Pappus two-rowed, outer pappus bristles reduced, fragile, inner bristles oblong, plumose; achenes without apical fringe (corona).

Note. The distinctive feature of the species grouped into this section is the absence of scales on their receptacles. In other respects, the species included in this section do not differ sharply from the species included in other sections of the genus. As a result, the section is an artificial one and, likely, will be reduced in future. Of the saussureas growing within the USSR, it includes *S. nuda* Ldb., *S. caprifolia* Iljin and Zaprjagaev, *S. tschuktschorum* Lipsch.

103. **S. nuda** Ldb. Ic. pl. Fl. Ross. I (1829) 15; Fl. alt. IV, 16 in nota; DC. Prodr. VI, 536; Ldb. Fl. Ross. II, 2, 662; Rgl. in Mém. Soc. Nat. Mosc. XI, 106 (saltem α . *genuina* and β . *subsinuata*, excl. γ . *tilesii*); Kom. Fl. Kamch., III, 182; Hult. Fl. of Alaska and Yukon, X, 1626.—*S. ledebouri* α . *nuda* Rgl. ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 42.—*S. subsinuata* Ldb. Ic. pl. Fl. Ross. I (1829) 15; Ej. Fl. alt. IV, 16; DC. Prodr. VI, 536; Ldb. Fl. Ross. II, 2, 662; Kom. Fl. Kamch. III, 181; Hult. Fl. Kamtch. IV, 210; Kitam. in Mem. Coll. Sc. Kyoto Univ. Ser. B, XIII, 148.—*S. ledebouri* β . *subsinuata* Rgl. ex Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 42.—*S. nuda* var. *subsinuata* B. Fedtsch. Fl. II. Comm. (1906) 77.—*S. alpina* auct.: Lessing in Linnaea, VI (1831) 87.—?*S. morozeviczii* B. Fedtsch. Fl. II. Comm. (1906) 77.—**Ic.:** Ldb. op. cit. (1829) tab. 61, 62.

Perennial. Stem 10–20 (up to 40) cm high, erect or ascending in lower part, wingless or with narrow wings, glandular pubescent or almost glabrous, sulcate, covered at base with remains of old leaves. Leaves thicker, fleshy, sometimes thinner, green on both sides, often light-colored and usually crisped-pubescent beneath, especially densely along leaf margin, less often almost glabrous, sinuate-toothed to entirely toothed or almost undivided, teeth with callose tip, or subacute, less often roundish-obtuse; basal and lower cauline leaves petiolate, petioles winged, lamina oval, oblong or lanceolate, together with petiole 3.5–12 cm long, (0.5)1.5–2 cm wide (individual basal leaves reaching 25 cm in length and 3 cm in width, petioles 12.5 cm long), cuneate at base or less often



roundish; middle cauline leaves short-petiolate or sessile, weakly amplexicaul or sometimes slightly decurrent on stem; upper leaves gradually reduced, linear or lanceolate, sessile. Capitula 10–16 on peduncles, aggregated into a terminal more or less dense corymb, less often capitula solitary or in small number; peduncles short, sometimes up to 4–5 cm long, ferruginous or white arachnoid-woolly, mixed with lustrous glandular hairs; bracteal leaves linear, cuspidate. Involucre campanulate, 11–13 mm long and wide; involucre bracts four-rowed, light or dark-colored; outer bracts as long or almost as long as inner ones, all lanceolate, cuspidate, ferruginous or whitish villous on dorsal surface, especially along margins, usually (but not always) ferruginous-glochidiate at apex. Receptacle smooth, without lustrous scales; florets pinkish-violet, about 10–12 mm long, narrow part of tube as long or almost as long as its broad part with lobes of limb; anther appendages ciliate. Pappus weakly ferruginous, double; outer pappus bristles serrate, small, fragile, inner bristles long-plumose, about 9–10 mm long; achenes linear, about 6 mm long, 1 mm wide, glabrous. Flowering VII–VIII.

Meadows and grassy patches in the forest and alpine zone, mossy marshes, stony outcrops, rocks, sea coast.—*Arctic*: Chukotka, Anadyr; *Far East*: Kamchatka and Commander Islands (northern part), Okhotsk, Uda, Sakhalin (western part opposite the 'liman' of the Amur River) (Kurils). *General distribution*: Alaska. *S. nuda* Ldb. was described from Kamchatka and Cape Espenberg, *S. subsinuata* from Kamchatka; types preserved in Leningrad. *S. morozeviczii* B. Fedtsch. was described from the Commander Islands; E. Hultén saw the type specimens of the latter and identified this species with *S. subsinuata*: at present, the type of *S. morozeviczii* is missing from the Herbarium of the Botanical Institute.

- 518 *Note*. A polymorphic species. Varies in shape and incision of leaves and their pubescence, as well as decurrence along stem; stem height; number of capitula (alpine forms are sometimes unicapitulate—f. *uniflora* Lipsch., or with few capitula; low altitude forms usually with larger number of capitula aggregated in terminal, and rarely also lateral, corymbs); color of involucre bracts (green or anthocyanin-colored). Evidently, this variation is related to the amplitude of fluctuations in ecological conditions where the species grows. A comparison of the type specimens of *S. nuda* and *S. subsinuata* leaves no doubt about their identity. *S. nuda* also figures incorrectly alongside *S. subsinuata* Ldb. in the manuals on the flora of Kamchatka of Komarov and Hultén. Later (in 1950), in the *Flora of Alaska and Yukon*, Hultén, independently of me, came to the conclusion that the two species are the same and need to be combined into a single species under the name *S. nuda* Ldb.

The specific epithet *nuda*, as rightly pointed out by Hultén, "symbolizes" its most typical and stable character, the smooth, nonsquamose receptacle. Evidently, *S. nuda* forms hybrids with *S. oxyodonta* Hult., where they come in contact; these specimens have small scales on the receptacle and more acute and frequent teeth along the leaf margin, but the nature of the involucre is the same as in *S. nuda*. Such, for example, are the few specimens from the Anadyr Territory, where both species are found. It appears to me that *S. nuda* is the closest phylogenetically to *S. oxyodonta*, but always has a smooth receptacle and almost equal involucre bracts. A few specimens with dense, snow-white, tomentose indumentum on the lower leaf surface and a smooth receptacle were found among the collections from the Bering islands. These are undoubtedly hybrids between *S. nuda* and *S. pseudo-tilesii*, as the range of the latter species extends to the Commander Islands, where these species grow together and may form natural hybrids.

104. *S. tschuktschorum* Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 452.—*S. angustifolia* auct., p. p.

Perennial. Stem 6–10(12) cm high, simple, weakly flattened, finely sulcate, very sparsely pubescent or almost glabrous, sparsely covered at base with remains of previous year's leaves. Leaves linear or lanceolate-linear, usually narrow, about 2 mm, less often up to 5 mm wide, entire, more or less convolute, arachnoid-hairy beneath. Capitula pedunculate, aggregated in terminal, relatively dense corymbs; bracteal leaves one to three, approximate, linear longer than capitate corymbs. Involucre up to 1 cm long, imbricate, with soft squarrose hairs; involucre bracts lanceolate, outer short, inner bracts longer than outer, both subobtusely acuminate, often terminating with a tuft of white hairs. Receptacle smooth, without scales; florets about 10–11 mm long, narrow part of tube as long as broad part with lobes of limb. Pappus brownish, double; outer pappus bristles 1.5–2 mm long, fragile, serrate-scabrous; inner hairs plumose, about 10 mm long; achenes dark brown, glabrous, immature, soft. Flowering VII.

Arctic: Chukotka, Anadyr. Endemic (?). Described from the Anadyr River. Type in Leningrad.

Note. In appearance it resembles *S. angustifolia* (Willd.) DC., but differs by a smooth receptacle, 1–3 linear subtending leaves exceeding the inflorescence, and narrower involucre bracts. Phylogenetically it undoubtedly is close to this species, but is included under section *Depressae* on the basis of the smooth receptacle.

105. *S. caprifolia* Iljin and Zapriagaev in Izv. Tadzh. Bazy Akad. Nauk SSSR, Bot. I, 1 (1933) 69–70.—*lc.*: Ibid. 68.

Perennial. Miniature plant, stemless or with 2.5 cm high stem, in latter case stem arachnoid-hairy, covered by rosulate basal leaves, basal leaves roundish or almost so, shortly spinescent, entire or less often with solitary, indistinct, spinescent small teeth, roundish or broadly cuneate at base, distinctly petiolate, petioles broadened at base into short sheaths covering root collar; all leaves weakly pubescent above, finely tomentose beneath, with distinct midrib, with more or less numerous lustrous, small glandular hairs on both sides; cauline leaves reduced, sessile, one to three. Capitula less often solitary, often aggregated in groups of two or three (five), terminal. Involucre cupuliform, somewhat imbricate, about 1.2 cm long and about 1 cm wide; outer involucre bracts dark-colored, ovate, acuminate, cusp short, sometimes weakly bent, arachnoid-hairy, inner bracts slightly longer than outer and middle, oblong or lanceolate, acuminate, pubescent, with tuft of soft hairs at apex. Receptacle smooth, without scales; florets pale pink, about 1.2 cm long, narrow part of tube almost as long as broad part with lobes of limb covered with lustrous glandular hairs; anther appendages ciliate. Pappus double; outer pappus bristles less numerous or isolated, serrate, small, fragile, inner bristles long-plumose, about 1–1.1 cm long; achenes 4–4.5 mm long, oblong-linear, glabrous. Flowering VIII–IX.

Stony screes in alpine zone.—*Soviet Central Asia*: Pamiro-Alai (Darvaz Range). Endemic. Described from the Kurgovady Pass, 3800–3900 m. Type in Leningrad.

Note. A striking, acaulescent species, particularly close to *S. kuschakeviczii* Winkl., differing from it by having more rounded, entire leaves, fewer capitula, which in the type are much larger, and, most importantly, an entirely smooth receptacle. Because of its smooth receptacle, it is formally put in section *Depressae* Clarke. Phylogenetically it undoubtedly is close to series *Kuschakevicziae* Lipsch.

- 520 *Subgenus 6. Theodorea* (Cass.) Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 379.—Gen. *Theodorea* Cass. Dict. sc. nat. LIII (1828) 463; Benth. and Hook Gen. Pl. II, 472.—Sect. *Theodorea* (Cass.) DC. Prodr. VI (1837) 536; Endlich. Gen. pl. 468; Turcz. Fl. baic.-dahur. II, 1, 118; Franch. in Bull. Herb. Boiss. V, 534; Nakai in Bot. Mag. Tokyo, XXIX, 194 (pro subgen. sub falso nom. *Theodorea* (Cass.) DC.), 207 (pro subgen. sub falso nom. *Theodorea* Cass.); Kitam. in Acta Phyt. et Geobot. IV, 3; Kitam. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII, 142; Popov, Fl. Sr. Sib. II, 755.—Sect. *Elatae* Hook. f. Fl. Brit. Ind. III (1882) 373 p. p.; Pflanzenfam. IV, 5, 320 p. p.—Rhizome biennial, fusiform, or plants perennial. Stem tall, branched, more or less densely leafy. Capitula numerous, in corymbs. Involucre

imbricate; involucre bracts, at least inner, with membranous, usually colored, sometimes more or less toothed apical appendages. Receptacle densely squamose; anther appendages as small number of hairs. Pappus double; outer pappus bristles reduced, fragile, inner ones plumose; achenes without corona.

Series 1. Amarae Lipsch.—Subsect. *Theodorea-vera* Kitam. in Acta Phyt. et Geobot. IV (1935) 3 p. p.; Ej. in Mem. Coll. Sc. Kyoto Univ. ser. B, XIII (1937) 143 p. p.—Stem wingless. Leaves simple, entire or sinuate-toothed, but not pinnatisect. Capitula cylindrical or narrow campanulate. Outer rows of involucre bracts with dark green teeth or three-fid apical appendages, others (middle and outer) terminating into colored membranous appendages.

106. *S. amara* (L.) DC. in Ann. Mus. Paris, XVI (1810) 200; Ldb. Ic. pl. Fl. Ross. I, 16; Ldb. Fl. alt. IV, 21; DC. Prodr. VI, 536; Ldb. Fl. Ross. II, 2, 664; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 47 p. max. p.; Kryl. Fl. Alt. III, 702; Kom. Fl. Manchzh. III, 2, 719; Fl. Yugo-Vost. VI, 387; Kryl. Fl. Zap. Sib. XI, 2910; Popov, Fl. Sr. Sib. II, 755.—*Serratula amara* L. Sp. pl. I (1753) 819; willd. Sp. pl. III, 3, 1644.—*Saussurea marginata* Borszcz. in Zap. Akad. Nauk, VII, Appendix 1 (1865) 31 nomen.; Trautv. in Tr. Peterb. Bot. Sada, VIII, 2, 482.—*S. glomerata* Poir. Encycl. Meth.; Suppl. V (1827) 71; Ldb. op. cit. (1829) 17; Ldb. op. cit. (1833) 21; DC. op. cit. (1837) 536; Ldb. op. cit. (1845–1846) 664; Turcz. Fl. baic.-dahur. II, 1, 118; Kom. op. cit. 724.—*S. amara* var. *glomerata* (Poir.) Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 1 (1866) 369; Kryl. Fl. Zap. Sib. XI, 2910.—*S. amara* β. *glomerata* Trautv. in Herd. op. cit. 48.—*S. glomerata* Poir. var. *angustifolia* Freyn and var. *intermedia* Freyn in Oest. bot. Zeitschr. XLV, 11 (1895) 432.—? *S. centauroides* Tausch in Flora, XI, B, 2, No. 31 (1828) 484 (secund. cl. Ledebour = *S. glomerata* Poir.)—? *S. macrocephala* Less. in Linnaea, VI (1831) 87 (apud cl. Ledebour Fl. Ross. 665 est synon. *S. glomeratae*; ego specimina non visa; secundum cl. Kitamura (1937) 146 = *S. japonica* DC.)—? *S. scabra* Less. in Linnaea, IX (1834) 180 (apud cl. Ledebour op. cit. est synon. *S. glomeratae*, secundum cl. Kitamura = *S. japonica* DC.)—*S. gmelini* Hort. Dorp. ex Herd. op. cit. 48.—*S. amara* var. *integrata* DC. in Ann. Mus. Paris, XVI (1810) 200.—Ic.: Ldb. Ic. pl. Fl. Ross. I (1829) tab. 67, 68.—Exs.: GRF Nos. 1228a, 3988.

Perennial. Entire plant glaucescent, usually scabrous, less often smooth. Stem erect, wingless, distinctly sulcate, branched above, sometimes simple, weakly pubescent, or often almost glabrous, 15–60 cm high. Leaves fairly variable in shape and incision; basal and lower

cauline leaves long-petiolate, elliptical or oblong-elliptical, acuminate, entire or sinuate-toothed, teeth unequal, sometimes attenuate, lamina 5–20(28) cm long and 1.5–8(12) cm wide; cauline leaves short-petiolate or sessile, sometimes auriculate or scarcely decurrent, lamina smaller, oblong or lanceolate, entire; all leaves green on both sides, or somewhat pale beneath with numerous glandular hairs, usually scabrous due to somewhat pointed tubercles. Capitula campanulate, 1–1.5 cm wide or smaller, or cylindrical (in var. *glomerata*), less often solitary terminal on stem, usually forming more or less dense corymbose-paniculate inflorescence. Involucre of unequal, imbricate bracts, sometimes weakly obtuse, sometimes (often) pubescent; outer involucre bracts smaller, more or less lanceolate, with dark green, somewhat thick, oval or oblong teeth or three-fid appendages; middle bracts oblong or oblong-linear, broadened at apex into roundish, membranous, toothed, pink appendages two or three times or somewhat (var. *glomerata*) broader than bract; innermost involucre bracts linear, with or without narrow appendage. Florets pink or less often white (f. *albiflora* Lipsch.), about 15 mm long, narrow part of tube almost one and one-half to two times as long as its broad part with lobes of limb; anther appendages weakly pubescent. Receptacle densely squamose scales linear-subulate, lustrous, unequal, up to 7 mm long. Pappus double; outer pappus bristles serrate, small, numerous, unequal, although fragile, but persistent on achenes, inner bristles plumose, about 10 mm long; achenes about 3 mm long, smooth, without corona. Flowering VII–IX.

Saline and alkaline soils, saline meadows.—*European Part*: Middle Dnieper. Lower Volga, Trans-Volga Region, Volga-Kama; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Angara-Sayans, Dauria, Lena-Kolyma; *Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region, ?Kara-Kum, ?Kyzyl-Kum, Tien Shan, Dzhungaria-Tarbagatai. *General distribution*: Mongolia, China (north).

Note. From time to time, populations with white corollas (albinos) are found, (f. *albiflora* Lipsch.), or one-headed plants occur (f. *monocephala* Lipsch.). The characters cited by Ledebour (*Fl. alt.* IV, 22) for distinguishing *S. amara* from *S. glomerata* prove unstable when extensive material from different parts of its natural range are examined. A unique race is found in Dauria, which is characterized by much smaller and narrower capitula with fewer florets (these capitula are 2/3 as wide as in typical *S. amara*), in lax and irregular corymbs, simulating a panicle, by the indistinct smaller appendages of the middle involucre bracts, the latter being narrower in the type specimen than in true *S. amara*, and also by narrow lanceolate leaves. However, this race produces a great many forms transitional to typical *S. amara*, and, therefore, I do not recognize it. Apparently, if *S. amara* and *S. glomerata* are recognized

as separate species, then the name *S. glomerata* sensu Poirét should be applied to this race and not to the numerous forms that cluster around *S. amara*, which have been treated by a series of Russian authors, including Trautvetter, sometimes as *S. glomerata* and sometimes as *S. amara* var. *glomerata*. Because of the lack of material from Japan, I am not clear about the relationship of *S. glomerata* with *S. japonica* (Thunb.) DC. (= *Serratula japonica* Thunb.) non auct. plur. It appears that *S. japonica* (Thunb.) DC. is identical with *S. glomerata* Poir. or is quite close to it. Since much confusion has been created in relation to *S. japonica* and many authors, including in this country, have incorrectly used this name for another species, i.e., *S. pulchella* Fisch. (cf. below), as was correctly pointed out by Handel-Mazzetti, it is better to discontinue the use of the name *S. japonica*. Kitamura (*Mem. Coll. Sc. Kyoto Univ.* ser. B, XIII (1937) 146), however, continued to use this name for the island form (or species?) of "*S. amara*," without comparing the Japanese material with *S. glomerata* and without including the latter among the synonyms of his own *S. japonica*. But he has included a number of species among the synonyms of *S. japonica* (Thunb.) DC. (for example, *S. macrocephala* Less., *S. scabra* Less.) that Ledebour, based on his acquaintance with it in the Berlin Herbarium, referred without question to *S. glomerata* Poir.

Series 2. Pulchellae Lipsch.—Subsect. *Theodorea-vara* Kitam. in *Acta Phyt. et Geobot.* IV (1935) 3 p. p.; Ej. in *Mem. Coll. Sc. Kyoto Univ.* ser. B, XIII (1937) 143 p. p.—Stem more or less winged or wingless. Leaves pinnatisect. Capitula almost globose or broadly-campanulate with large, colored, membranous appendages surrounding involucre bracts, usually beginning from outermost bracts.

107. **S. pulchella** Fisch. in DC. *Prodr.* VI (1837) 537; Lindl. in *Bot. Regist.* XXVIII, t. 18; Ldb. *Fl. Ross.* II, 2, 664; Turcz. *Fl. baic.-dahur.* II, 1, 119; Maxim. *Prim. fl. amur.* 171 p. p. excl. var. *latifolia* Maxim.; Rgl. in *Mém. Acad. Pétersb. sér.* VII, IV, 4, 93–94 (incl. α . *subinterga* Rgl. γ . *pinnatifida* Rgl. δ . *ovata* Rgl.); Herd. in *Bull. Soc. Nat. Mosc.* XLI, 3, 50–51 excl. syn. pl.; Nakai in *Bot. Mag. Tokyo*, XLVI, 615; Hand.-Mazz. *Symb. Sin.* VII, 4, 1145 in nota; Kitam. in
523 *Mem. Coll. Sc. Kyoto Univ.* ser. B, XIII, 143; Popov, *Fl. Sr. Sib.* II, 757.—*Heterotrichum pulchellum* Fisch. in *Mém. Soc. Nat. Mosc.* III (1812) 71.—*Serratula pulchella* Sims. in *Bot. Mag.* LII (1825) tab. 2589.—*Theodorea pulchella* Cass. in *Dict. sc. nat.* LIII (1828) 465.—*Saussurea dissecta* Ldb. *lc. pl. Fl. Ross.* I (1829) 16, tab. 66; Ej. *Fl. alt.* IV, 19.—*S. pulchella* var. *lineariloba* Nakai in *Bot. Mag. Tokyo*, XLVI (1932) 616; Kitam. *op. cit.* 146.—*S. japonica* auct. plur. non DC.;

Maxim. in Mél. Biol. IX, 3, 337 (p. p., conf. observatio cl. Maximovicz ad *S. pulchella*); Kom. Fl. Manchzh. III, 727, p. p.; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1063, 1174.—*S. pulchella* Fisch. var. *subintegra* Rgl. Tent. Fl. Ussur. (1861) 93; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 50; Nakai in Bot. Mag. Tokyo, XLVI, 615.—*S. japonica* var. *subintegra* (Rgl.); Kom. Fl. Manchzh. III (1907) 729; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1174.—*S. pulchella* var. *pinnatifida* Rgl. Tent. Fl. Ussur. (1861) 94; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 50.—*S. japonica* var. *pinnatifida* (Rgl.) Kom. op. cit. 729; Nakai in Bot. Mag. Tokyo, XXIX (1909) 209.—*S. pulchella* var. *ovata* Rgl. Tent. Fl. Ussur. (1861) 94; Herd. op. cit. (1868) 51.—*S. japonica* var. *ovata* (Rgl.) Kom. op. cit. 729.—? *S. pulchella* var. *alata* Rgl. Tent. Fl. Ussur. (1861) 93.—? *S. japonica* var. *alata* (Rgl.) Kom. Fl. Manchzh. III (1907) 729.—*S. japonica* var. *pteroaulis* Franch. in Bull. Herb. Boiss. V, 7 (1897) 536.—**Ic.:** Bot. Mag. LII (1825) tab. 2589; Ldb. Ic. pl. Fl. Ross. I, tab. 66; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, Plate 317.—**Exs.:** GRF Nos. 3993, 3994.

Perennial. Root vertical, fusiform, bearing one or two stems. Stem 25–100 cm high, erect, strong, sulcate-angular with reddish furrows, simple or branched above, pubescent or glabrous, often wingless, less often more or less winged due to decurrent leaf bases, somewhat densely leafy. Leaves numerous, appressed to stem or spreading, pinnatisect, pinnatipartite, more or less deeply pinnatifid or almost entire, with shallow sinuses along margin; hard or soft, scabrous above due to short tubercles and sessile glandular hairs, flocculose beneath with numerous punctate glandular hairs; basal and lower cauline leaves long-petiolate in typical form; upper leaves short-petiolate or almost sessile; lamina wide, oblong or elliptical, pinnatisect into more or less narrow linear or lanceolate-linear, elongate, acuminate lobes, usually secondarily divided, undivided or toothed, secondary lobules or teeth cuspidate; midrib prominent on leaf axis, lateral veins solitary on primary lobes; cauline leaves gradually reduced above, uppermost leaves lanceolate or linear, with pinnatilobate or pinnatifid margin, sometimes undivided. Capitula numerous in type specimen, on slender, 1–5 cm long pubescent peduncles, aggregated in more or less dense corymbs, sometimes forming dense panicle, compising up to 100 capitula, usually corymbs with 5–20 capitula; capitula almost globose or broadly campanulate, roundish at base. Involucre 10–15 mm wide; involucre bracts numerous, weakly pubescent; outermost bracts one-rowed, reduced, two-fifths as long as inner (including its appendages), linear, green, subsequent, middle and inner bracts gradually longer, oblong in lower part or ovate, yellowish, lustrous, narrowed above in distinctly developed, membranous, roundish, toothed, pink-violet appendage. Receptacle densely squamose, scales

linear-subulate, lustrous, up to 6–7 mm long; florets purple, 12–13 mm long, narrow part of tube 7–8 mm long; broad part with lobes of limb about 5 mm long, lobes of limb with lustrous glandular hairs; anther appendages hairy. Pappus double; outer pappus bristles numerous, reduced, scabrous, although fragile yet persistent on achenes, inner bristles plumose, 7–8 mm long; achenes 3.5–4 mm long, truncate at apex, weakly narrowed at base, glabrous, with reddish longitudinal speckles. Flowering VII–VIII.

Dry and meadow steppes, flooded meadows, shrub thickets, wastelands, forest edges.—*Eastern Siberia*: Dauria; *Far East*: Zeya-Bureya, Ussuri, Uda, Sakhalin. *General distribution*: Japan, Korea, China, Mongolia (northeastern). Described from Dauria. Type in Leningrad. *S. dissecta* was described from Dauria; type in Dauria.

Note. As was explained by Nakai (*Bot. Mag. Tokyo*, XLVI (1932) 614) and independently by Handel-Mazzetti (*Symb. Sin.* VII, 4 (1936) 1145) from a study of the authentic specimen of *Serratula japonica* Thunb. (= *Saussurea japonica* (Thunb.) DC.) preserved in Uppsala, the plant described by Thunberg is close to or identical with *Saussurea glomerata* Poir., i.e., it belongs to our series *Amarae*. *S. japonica* sensu Thunb. and sensu DC. does not have anything in common with the *Saussurea* examined, for which many authors have wrongly used this name. The use of the latter name for the species under consideration has caused considerable confusion; therefore, it should be discarded. *Saussurea pulchella* is the valid name for this species, which was understood and recognized by Maximovicz (1859) and Regel (1861). Notwithstanding the opinion of Nakai (*Bot. Mag. Tokyo*, XXV (1911) 58; XXIX (1915) 209), *S. dissecta* Ldb. is a direct synonym of *S. pulchella* Fisch. This is evident from the comparison of the authentic specimens of both species originating from Dauria. Ledebour himself later included his *S. dissecta* among the synonyms of *S. pulchella* Fisch. In the Trans-Baikal Region, from where *S. pulchella* was described, it is represented by uniform material; its lamina is bipinnate or simply incised into lanceolate-linear or linear-elongate lobes. *Saussurea pulchella* γ. *pinnatifida* Rgl., described from the Far East, judging from the original specimens is typical *S. pulchella* as understood by Fischer. As the Far East is approached, plant populations are found together with typical *S. pulchella*, that are distinguished by: 1) a winged or wingless stem and, particularly, 2) the form of the leaves (width, length but mainly their incision; the leaves vary greatly—they are sometimes pinnate, sometimes more or less entire or toothed and constitute the gamut of transitional forms), and 3) the number of capitula (one can distinguish two series of populations: few-headed—*paucicephalae* Lipsch., and many-headed—*pluricephalae* Lipsch.).

Infraspecific classification of *S. pulchella* has been attempted by C.J. Maximovicz (op. cit. 1859), E. Regel (1861), V.L. Komarov (1907, 1932) and others. The main varieties are the following:

Var. **Subintegra** Rgl.—Leaves weakly decurrent; basal and lower cauline leaves pinnatifid; upper leaves entire or weakly dentate, lanceolate, lanceolate-linear, sometimes ovate. Identical with it is var. *ovata* Rgl. having, according to the author, a winged stem, pinnatifid lower leaves, the middle and upper leaves ovate and almost entire, and the uppermost lanceolate. In my view, var. *ovata* Rgl. has no taxonomic significance, because Regel's varieties were established on the basis of two uncorrelated characters: the wingedness of the stem and the cutting of the lamina. These unrelated characters used by him as the basis for the infraspecific classification of *S. pulchella*, are not restricted to the varieties described by him. Thus, var. *alata* Rgl., described at the same time by Regel, which I include as well, with some doubt, among the synonyms of *subintegra* Rgl., likewise has a winged stem as is seen also in some specimens of other varieties described by other authors, for example, var. *latifolia* Maxim. (see below). Among new collections there are no specimens identical with the authentic specimens of var. *ovata* Rgl. and *alata* Rgl.

Var. **dentata** Kom. Fl. Manch. III (1907) 729 has pectinate to coarsely toothed lower and middle cauline leaves and lanceolate, acuminate upper cauline leaves. It forms transitions to var. *subintegra* Rgl.

The unique var. **latifolia** Maxim., first described by Maximovicz from the lower reaches of the Amur and subsequently found in Sakhalin, deserves the greatest attention. This apparently is a separate race of *S. neopulchella* Lipsch.

108. **S. neopulchella** Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 380.—*S. pulchella* β. *latifolia* Maxim. Prim. fl. amur. (1859) 171; Sugaw. Ill. Fl. Saghal. IV, 1869, tab. 858.—*S. pulchella* β. *alata* auct. (non Rgl. 1861).—*S. japonica* β. *alata* Rgl. p. p. and γ. *latifolia* Maxim. ex Kom. Fl. Manchzh. III (1907) 729.

526 Perennial. Stem winged due to decurrent leaves (wings sometimes entire or weakly toothed), branched, up to 150 cm high. Leaves large, isolated leaves up to 25 cm wide, strongly scabrous beneath due to numerous bristles; basal leaves (if present) and lower cauline leaves pinnatipartite; middle cauline leaves pinnatifid; uppermost leaves almost undivided; lobes of pinnate leaves varying from oblong, sinuate-toothed and subobtusate to lanceolate, almost entire, acute; venation prominent, midrib strongly prominent, lateral veins continued into leaf lobes, slightly

weaker. Capitula numerous; involucre densely arachnoid-pubescent. Flowering VII–VIII.

Tall herb meadows; chains of coastal rocks.—*Far East*: Ussuri (eastern part), Zeya-Bureya, Sakhalin. Described from Sakhalin. Type in Leningrad.

Note. The specimens identified by many authors as var. *alata* are not identical with Regel's variety, Var. *alata* Rgl. non auct., despite having a winged stem, seems to be closer to var. *subintegra* Rgl.; I consider them identical. Most specimens taken by the authors to be var. *alata* are typical representatives of *S. neopulchella*.

Series 3. Sclerodontae Maxim. in Mém. Biol. XI (1881) 254.—Plants with distinctly winged (due to decurrent leaves) or wingless stem, sometimes stemless. Leaves pinnati- or bipinnatisect. Teeth of leaves and sometimes involucre bracts with cartilaginous cusp.

109. *S. alata* DC. in Ann. Mus. Paris, XVI (1810) 202; Ldb. Ic. pl. Fl. Ross. I, 15; Ej. Fl. alt. IV, 16; DC. Prodr. VI, 537; Ldb. Fl. Ross. II, 663; Turcz. Fl. baic.-dahur. II, 1, 120; Herd. in Bull. Soc. Nat. Mosc. XLI, 3, 45 (excl. γ . *pygmaea* Fisch. δ . *runcinata*, ϵ . *albiflora*, ξ . *lanciniata*); Popov. Fl. Sr. Sib. II, 755.—*S. laciniata* var. *lasiocephala* Turcz. ex DC. Prodr. VI (1837) 537; Turcz. op. cit. (1856) 120.—*S. alata* β . *aspera* Ldb. Fl. Ross. II, 2 (1845–1846) 663; Herd. op. cit. 45.—*S. alata* DC. α . *genuina* Herd. op. cit. (1868) 45.—*Heterotrichum squalidum* MB. ex DC. Prodr. VI (1837) 537 nomen.—*Serratula squalida* Steph. ex Ldb. Fl. alt. IV (1833) 17 nomen.—*S. salsuginosa* Sievers ex Herd. op. cit. (1868) 45.—*S. decurrens* Ldb. Ind. sem. hort. Dorp. suppl. (p. a. 1811) 4 (opusc. non v.); Ldb. op. cit. (1845–1846) 663 pro syn.—**Ic.**: Ldb. Ic. Pl. Fl. Ross. I (1829) tab. 63.

Perennial. Entire plant strongly or weakly scabrous due to somewhat thick articulate hairs with stiff base. Root collar sparsely covered with remains of hard sheaths of basal leaves. Stem erect, 20–35(50) cm, sometimes about 100 cm high, simple or branched, sulcate-angular, distinctly winged due to decurrent leaves, wings broad or narrow, toothed. Leaves pinnatisect; basal and lower cauline leaves petiolate with sheathing base, lamina strongly scabrous, with numerous sessile glandular hairs, almost lyrate and deeply pinnatifid or pinnatisect, with unequal, triangular, lanceolate, or oblong, lateral lobes, sinuate-toothed, teeth unequal terminating in cartilaginous cusp; upper cauline leaves oblong, 527 pinnatifid, cristate or less often almost undivided, sessile, with decurrent base, acute, strongly scabrous along margin, bracteal leaves linear-lanceolate. Capitula 8–10 mm wide, in dense, frequent corymbs of less numerous heads terminating on stem and its branches forming paniculate inflorescence with strongly branched stem. Involucre imbricate, oblong

or ovoid; involucre bracts strongly arachnoid-hairy in type specimen often glochidiate with white hairs; outer bracts herbaceous, oblong, acute, slightly deflexed; inner bracts coriaceous, linear-lanceolate, subobtusate, with indistinct purple, membranous, toothed apical appendage or tuft of hairs, usually larger than outer. Florets reddish, about (11)13–14 mm long, narrow part of tube slightly longer or almost as long as broad part with lobes of limb; lobes of limb about 3 mm long; anther appendages comprising few hairs. Receptacle densely squamose, scales linear-subulate, lustrous, unequal, 4–5 mm long; pappus double, outer pappus bristles unequal, up to 5 mm long, serrate, persistent on achenes, inner bristles long-plumose, equal, about 10 mm long; achenes glabrous. Flowering VIII.

Saline lands, saline meadows and sands.—*Eastern Siberia*: Angara-Sayans (Tuva), Dauria. *General distribution*: Mongolia. Type specimen comes from Siberia (“Siberia salsuginosis”), is preserved in Geneva. Type of *S. decurrens* Ldb. in Leningrad.

Note. Ledebour (*Fl. Ross.* II, 2, 661) considers *S. alata* DC. in the group of saussureas characterized by almost equal involucre bracts, i.e., he split off this species from others which are closely related (e.g., *S. laciniata*, *S. runcinata*, etc.), which have, according to Ledebour, membranous appendages at the tip of the involucre bracts. *S. alata*, although lacking distinct appendages, nevertheless, has been and undoubtedly should be included under subgenus *Theodorea* on the basis of the sum total of characters. The species is variable in the roughness and cutting of the leaves, size of the capitula, shape and length of the involucre bracts in relation to each other. The strongly scabrous plants with deeply pinnatisect leaves and aggregated capitula were separated by Ledebour as var. β . *aspera* Ldb. The specimens from Tuva, on the basis of which B.K. Schischkin described a separate variety, in my view should be referred to *S. alata* DC. and not to *S. laciniata* Ldb. As a result, a new combination has to be made: *S. alata* var. *pinnatifida* (Schischk.) Lipsch. hoc. loco. *S. laciniata* var. *pinnatifida* Schischk. in *Izv. Tomsk. Univ.* (1914). Stems more slender, weakly leafy, narrow-winged or wingless; leaves pinnatifid (their lobes narrower than in the type specimen) or sinuate-toothed; outer involucre bracts with strongly recurved tips.

110. *S. crepidifolia* Turcz. in *Bull. Soc. Nat. Mosc.* XX, 2 (1847) 47; *Ej. Fl. baic.-dahur.* II, 1, 120; Popov, *Fl. Sr. Sib.* II, 756.—*S. runcinata* β . *dentata* Ldb. *Fl. Ross.* II, 2 (1845–1846) 663.—*S. alata* DC. γ . *pygmaea* Fisch. ex Herd. in *Bull. Soc. Nat. Mosc.* XLI, 3 (1868) 46.—*S. polyodiifolia* Turcz. (non DC.) nomen in herb. and ex Ldb. op. cit. (1845–1846) 663 and Herd. op. cit. (1868) 46.

Perennial. Very similar to *S. alata* DC. Root collar covered with remains of leaf sheaths of previous year's basal leaves partially fibrously divided. Stem 5–10(15) cm high, sulcate-angular, slightly narrow-winged, weakly pubescent or almost glabrous. Leaves almost glabrous, weakly pubescent only along margin and veins, with sessile, lustrous, glandular hairs on both sides; basal and lower cauline leaves petiolate with sheathing base, discontinuously pinnatisect, segments usually oblong, toothed, teeth terminating in cartilaginous cusp, sometimes lamina of basal leaves almost undivided, roundish or oblong, with teeth along margin or only in upper part; cauline leaves pinnatifid, with lanceolate, small-toothed lobes, decurrent, forming narrow wing. Capitula narrowly oblong, almost cylindrical, 7–10 mm wide, densely aggregated at the apex of stem and lateral branches; individual corymbs slightly distant from the main corymb, with two or three capitula. Involucre 10–12 mm long, almost glabrous, involucre bracts hard, gradually longer from outer to inner; outer bracts short, gradually narrowed from broad base into narrow, divergent green apex; inner bracts longer, lanceolate, broadened at apex into small, membranous toothed, colored appendage. Florets pink, about 12–13 mm long, narrow part of tube as long or almost as long as its broad part with lobes of limb; anther appendages sparsely hairy. Receptacle densely squamose; scales unequal, linear-subulate, lustrous, about 4–5 mm long; pappus double; outer pappus bristles serrate, unequal, 4–5 mm long, persistent on achenes, inner bristles long-plumose, 9–10 mm long; achenes about 4 mm long, glabrous, dark brown. Flowering VII–VIII. (Plate XXXIX, Fig. 1.)

Saline lands, alkaline areas of sea coast, thickets of chee grass (*Lasiagrostis splendens*).—*Eastern Siberia*: Dauria; Lena-Kolyma (mouth of Lena, Adams). *General distribution*: Mongolia. Type specimen of the species comes from Dauria, is preserved in Leningrad.

Note. Turczaninow considered his species intermediate between *S. alata* and *S. laciniata*; he distinguished it from the former by the shape of the outer involucre bracts and the absence of indumentum and from the latter by the less incised leaves. *S. crepidifolia* Turcz. undoubtedly is phylogenetically close to *S. runcinata* DC., from which it differs by having a narrow-winged stem, broader lobes of the pinnatisect leaves, outer involucre bracts distinctly shorter than the inner, and other characters. Popov (op. cit. 756) reported the occurrence of transitional forms between these two species; they are unknown to me.

111. *S. runcinata* DC. in Ann. Mus. Paris, XVI (1810) 202; Ej. Prodr. VI, 537; Ldb. Fl. Ross. II, 2, 663 excl. β . *dentata* Ldb.; Turcz. Fl. baic.-dahur. II, 1, 119; Popov. Fl. Sr. Sib. II, 756.—*S. alata* δ . 529 *runcinata* Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 46.—*S.*

polypodiifolia Turcz. (non DC.) pl. exs.; nomen in Ldb. op. cit. 663 p. p.—*S. polypodiifolia* Turcz. (non DC.) β . *angustifolia* Turcz. ex Herd. op. cit. (1868) 46 and in herb.—*Serratula dissecta* Steph. ex Herd. op. cit. (1868) 46 and in herb. nomen.—*Heterotrichum dissectum* MB. ex Herd. op. cit. (1868) 46 and in herb. nomen.

Perennial. Similar to *S. crepidifolia* Turcz. Stem (10)15–25(30) cm high, basally covered with remains of sheaths of previous year's leaves, slender, erect, wingless, almost glabrous, sulcate-angular, branched. Leaves glabrous; basal, lower and middle cauline leaves pinnatisect with distinct linear and lanceolate, unequal, acute lobes terminating in cartilaginous cusp, often recurved, usually entire, less often with few small teeth, terminal lobe fairly variable in shape, from linear and acute to broader, subobtusate or acute; basal and lower cauline leaves long-petiolate with sheathing base; upper leaves linear, narrow, undivided or small-toothed in lower part. Capitula on more or less long peduncles aggregated at stem and lateral branch apices in few-headed, dense, and frequent corymbs, if stem branched, then corymbs forming many-headed corymbose-paniculate inflorescence. Involucre up to 1 cm wide; outer involucre bracts herbaceous, linear or linear-lanceolate, narrowed from ovate base, shorter or as long, sometimes even larger than inner bracts, not recurved; inner bracts coriaceous, broadened into membranous, toothed, purple appendage. Florets purple and white (var. *albiflora* Herd. op. cit. (1868) 47), about 10 mm long, narrow part of tube almost as long as broad part including lobes of limb; limb with isolated lustrous glandular hairs; anther appendages sparsely hairy; florets in individual capitula up to 14 mm long, with narrow part of tube about 8 mm long, broad part including lobes of limb about 6 mm long. Receptacle densely squamose, scales linear-subulate, lustrous, unequal, up to 4–5 mm long; pappus double; outer pappus bristles serrate or finely plumose, unequal, up to 5 mm long, persistent on achenes, inner bristles long-plumose, about 9 mm long; achenes glabrous. Flowering VIII–IX. (Plate XXXIX, Fig. 2.)

Alkaline meadows, saline steppes, saline lands.—*Eastern Siberia*: Dauria. *General distribution*: Mongolia. Type of the species originates from Siberia, without precise indication of locality (evidently, the specimens were collected in Dauria). Type in Geneva(?).

Note. A characteristic species, the main distinctive feature of which is the presence of herbaceous outer involucre bracts. Hybridizes with *S. salsa* (Pall.) Spreng.

112. *S. laciniata* Ldb. Ic. pl. Fl. Ross. I (1829) 16; Ej. Fl. alt. IV, 18; DC. Prodr. VI, 537; Ldb. Fl. Ross. II, 2, 663; Kryl. Fl. Zap. Sib. XI, 2909; Grubov, Konsp. Fl. Mong. 276.—*S. alata* DC. ξ . *laciniata*

530 Herd. in Bull. Soc. Nat. Mosc. XLI, 3 (1868) 46.—*lc.*: Ldb. *lc.* pl. Fl. Ross. I (1829) tab. 64.

Perennial. Entire plant glaucous or yellowish green. Root collar with more or less numerous caudices, densely covered with brownish remains of sheaths of basal leaves; caudices producing floriferous shoots or less often rosettes of leaves. Stems (5)15–40 cm high, solitary, straight, sometimes weakly bent, woody, sulcate-angular, winged almost from base to tip, with toothed wings, terminating in few-headed corymb or branched almost from base, with branches bearing frequent, dense, corymbs forming paniculate inflorescence. Leaves with numerous sessile glandular hairs and scattered, somewhat thick, articulate hairs with stiff base; basal leaves petiolate with sheathing base, lamina oblong, bipinnatifid almost up to base of axis into oblong-ovate or oblong lobes, further divided up to half or deeper into lanceolate lobules (less often only toothed), terminating in long, white, cartilaginous cusp, leaf rachis sometimes toothed; cauline leaves sessile, few, lower leaves like basal, gradually reduced toward stem tip; uppermost leaves slightly incised and decurrent, forming toothed wing. Capitula terminal on stem and branches in dense corymbs. Involucre imbricate; outer involucre bracts ovate, undivided or toothed, slightly arachnoid-hairy and with lustrous glandular hairs, broadened at base, decurved and with one or (when involucre bracts toothed) several cartilaginous cusps; inner bracts erect, broadly-linear, terminating in small, almost roundish, toothed, membranous, purple appendage. Florets pale purple, about 12 mm long, narrow part of tube as long or almost as long as its broad part including lobes of limb, covered with isolated lustrous glandular hairs; anther appendages sparsely hairy. Receptacle densely-squamose, scales linear-subulate, lustrous, unequal, up to 3.5 mm long; pappus double; outer pappus bristles numerous, unequal, up to 4 mm long, short-plumose, fragile, but persistent on achenes, inner bristles long-plumose, about 9–10 mm long. Achenes glabrous. Flowering VII–VIII.

Alkaline soils, quartzites.—*Western Siberia*: Upper Tobol (sporadically in Tselinograd Region), Irtysh (southeast); *Central Asia*: Balkash Region. *General distribution*: Mongolia. Described from Chingistau Mountains (Semipalatinsk Region). Type in Leningrad.

Note. It produces hybrids with *S. salsa* (Pall.) Spreng.; see note to *S. paradoxa* Lipsch. Occurs sporadically. It varies in the branching of the stem, which is sometimes simple and unbranched (f. *simplex* Lipsch.) and sometimes strongly branched (f. *ramosa* Lipsch.); the cutting of the leaves which are pinnate or bipinnate, less often pinnatifid; shape and depth of incision of the lateral lobes of the leaves; and in the number of capitula in the inflorescence. Two varieties are recognized.

1. Var. **pygmaea** Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 380.—Plants with numerous caudices; stem slender, 3.5–7 cm high; leaves pinnatisect, lobes narrow. Capitula solitary or in threes; involucre bracts appressed, usually not recurved, outer and middle bracts woolly at apex.—Karaganda Region, Karakalinsk District, vicinity of the Zhosaly Mountains. “White alkali soil,” 13.VII.1953. L. Demchenko.

2. Var. **latifolia** Lipsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 380.—Stem winged, thick, 10–15 cm high; leaves pinnatifid, with large, broad, toothed lobes, teeth terminating in cartilaginous white cusps. Capitula large, in groups of threes in corymbs, crowded by leaves usually at base.—Northern slope of Tarbagatai. Southern slopes of the Dzhilytau Mountains. 25.VII.1906. V. Resnichenko.—This variety is transitional to *S. alata* DC. The relationship of the latter with *S. laciniata* Ldb. requires further study. It is quite possible that these two species will be combined in the future, because intermediate forms between them are observed.

113. *S. ceterahifolia* Lipsch. in Byull. Mosc. Obshch. Isp. Prior., Otd. Biol. LIX, 6 (1954) 73.—*S. runcinata* auct. (non DC.); Sobolevskaya, Konsp. Fl. Tuvy, (1953) 195.

Perennial. Almost stemless, many-headed, canescent; stems dwarf, 1.5–3(4) cm high. Leaves usually longer than capitula, crowded near root collar, densely covered with brown remains of sheaths of previous year's leaves, oblong, short-petiolate, arachnoid hairy-tomentose and with more or less numerous, lustrous, sessile glandular hairs, lamina pinnatifid with spreading, toothed lobes, teeth acute, terminating into white cartilaginous cusp; leaf rachis toothed. Capitula one to three, terminal on short stem. Involucre 8–10 mm wide, imbricate; outer involucre bracts more or less villous, almost cymbiform, broadened at base, three-toothed at apex, teeth with cartilaginous white cusp; inner bracts straight, broadly linear, terminating in small, almost roundish, membranous, dark colored (dark red) toothed appendage. Receptacle densely squamose, scales linear-subulate, lustrous, unequal, up to 3 mm long; florets pink (or pale purple?) about 10 mm long, narrow part of corolla-tube as long as broad part including lobes of limb, decorated with individual lustrous glandular hairs; anther appendages sparsely hairy; pappus double; outer pappus bristles unequal, up to 4 mm long, serrate, fragile, inner bristles
533 about 7–8 mm long, long-plumose; achenes about 3 mm long, glabrous, with indistinct corona at apex. Flowering VII.

Saline places.—*Eastern Siberia*: Angara-Sayans (Tuva). *General distribution*: Mongolia. Described from Tuva. Type in Leningrad.



Note. The phylogenetic closeness of *S. ceterachifolia* Lipsch. to *S. laciniata* Ldb. is beyond doubt. It differs from the latter by having a prostrate stem (plants almost stemless), less cutting of the leaves, fewer capitula, and nonrecurved outer involucre bracts.

Series 4. Robustae Lipsch.—Stem winged throughout length due to decurrent leaves. Leaves entire in type specimen, less often pinnatilobate or with few teeth along margin. Teeth of leaves and involucre bracts without cartilaginous cusp. Florets 16–20 mm long.

114. *S. robusta* Ldb. Ic. pl. Fl. Ross. I (1829) 16; Ej. Fl. alt. IV, 19; DC. Prodr. VI, 537; Ldb. Fl. Ross. II, 2, 664; Kryl. Fl. Zap. Sib. XI, 2909; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 446.—*S. excelsa* M. Pop. in Fl. Almat. Gos. Zapoved. (1940) 47 nomen (= *S. altissima* M. Pop. nomen in herb.).—Ic.: Ldb. (1829) tab. 65.

Biennial, perennial. Plants with vertical root; root collar thick, covered with remains of previous year's leaves, producing one or several stems. Stems strong, (25)40–80 cm high, erect, ribbed-angular, distinctly winged due to decurrent cauline leaves, wings more or less broad, entire or toothed, scabrous together with stem due to scattered, somewhat thick, crisped hairs and sessile glandular hairs, strongly branched from base or in upper half; lower axillary branches, sterile, usually more or less numerous. Leaves decurrent throughout stem length, scabrous on both sides and along margin due to numerous, somewhat thick, crisped hairs with stiff base, and also covered with glandular hairs; basal leaves withering before anthesis; lower cauline leaves oblong, middle and upper leaves lanceolate, acuminate, undivided, or with few teeth along margin, less often pinnatilobate, 6–10 cm long and 0.7–3.5 cm wide; upper leaves reduced. Capitula on long peduncles, large, with florets (2)2.5–3 cm long and 1.5–2 cm wide, aggregated in strong corymbose-paniculate inflorescence, less often capitula terminal on stem in corymbs if stem unbranched. Involucre campanulate, imbricate, many-rowed; outer involucre bracts greenish, linear-lanceolate, pubescent, acute, decurved, and aristate; middle and inner bracts linear or linear-lanceolate, with membranous, pink, more or less toothed, apical appendage, densely white-tomentose, verrucose-villous near transition to appendage; all involucre bracts with prominent midrib, sometimes covered with pubescence. Florets lilac purple, about 16–17 mm long, narrow part of tube about 10 mm long, broad part including lobes of limb about 6–7
534 mm long; anther appendages sparsely hairy. Receptacle densely squamose; scales linear-subulate, white, lustrous, unequal, up to 7 mm long; pappus dual; outer pappus bristles unequal, 3–4 mm long, serrate-

scabrous, persistent on achenes, inner bristles long-plumose, equal, about 10–11 mm long; achenes dark brown, thin ribbed, 3.5–4.5 mm long, glabrous. Flowering VIII–IX.

Saline meadows, sands, thickets of reed, chee grass with pea scrub, bottomlands, alkaline and saline soils.—*Western Siberia*: Irtysh; *Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region, Dzhungaria-Tarbagatai, Tien Shan. Endemic. Described from the meadows of the Chingistau Mountains (former Semipalati Region). Type in Leningrad.

115. *S. prostrata* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 518; Lipschitz in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI, 446.—*S. robusta* Ldb. var. *discolor* Rgl. and Schmalh. ex O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 235 (nomen) and in herb.

Biennial or perennial. Plants with vertical roots; root collar thick, producing one or two to nine stems. Found as two morphologically distinct forms, but according to personal observations, growing together; one stemless, procumbent, often creeping (var. *exscapa* Winkl. ex Fedtsch., l.c. (1911) 235, nomen and herb.; Lipsch in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XXI (1961) 380 (description), and other with stem (var. *erecta* Winkl. ex Fedtsch. op. cit. nomen and herb.; Lipsch. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XXI (1961) 381 (descriptio)). Stem in second form ascending or erect, 10–60 cm long, angular, sulcate, strongly winged due to decurrent cauline leaves, wings usually narrow, entire or toothed, like stem scabrous due to somewhat thick, oblong, crisped hairs with stiff base, and with numerous sessile lustrous glandular hairs; stem branched in upper half, less often simple; sterile shoots in axils of lower cauline leaves absent or few. Leaves decurrent throughout stem length; basal leaves rosulate, withering before anthesis; middle and upper leaves lanceolate or lanceolate-linear, acuminate; uppermost leaves reduced; all leaves pinnate-toothed, less often undivided or with fewer teeth, scabrous on both sides and along margin due to numerous setaceous hairs. Capitula with florets 1.5–2 cm long and 1–1.5 cm wide, pedunculate and aggregated in corymbose-paniculate inflorescence. Involucre campanulate, imbricate, outer involucre bracts greenish, lanceolate, woolly-pubescent, sometimes glabrescent, acuminate, not recurved or slightly recurved; middle bracts somewhat villous, with slightly broadened cuspidate dark-colored apical appendage; inner (together with middle) bracts more elongate, linear, with membranous, violet-pink roundish, toothed, apical appendage, broader than bracts, verrucose-villous inside near transition to appendage; all bracts with distinct, often dark-colored, prominent midrib. Florets purple, 17–18(20) mm long, narrow part of tube longer than broad part

including lobes of limb; lobes of limb narrow-linear, about 5 mm long; anther appendages hairy. Receptacle densely squamose, scales linear-subulate, white, lustrous, unequal, about 7–8 mm long; pappus white, double; outer pappus bristles serrate-scabrous, unequal, up to 5 mm long, fragile, but persistent on achenes; inner bristles long-plumose, about 12 mm long; achenes dark brown, finely ribbed, glabrous, about 3.5 mm long. Flowering VII–VIII.

Saline meadows, alkali and saline lands.—*Central Asia*: Tien Shan. *General distribution*: China (Sinkiang, Kuldzha). Described from the Kokkamyr Plain east of Lake Sairam. Type in Leningrad.

Note. Without much justification, Winkler compared it with *S. laciniata* Ldb. The species is quite close to *S. robusta* Ldb., which it replaces in Tien Shan.

GENUS 1583. *Polytaxis* Bge.^{1, 2}

Bge. in Bot. Zeitung. I, 15 (14 April 1843) 256, descr. abbrev. germ.; ejusd. Delect. sem. Hort. bot. Dorpat. (30 November 1843) 8; ejusd. in Linnaea, XVIII (1844) 156; ejusd. Beitr. zur. Kenntn. der. Flor. Rasslands (1851) 194; ejusd. in Mém. Acad. Pétersb. sav. étr. VII (1854) 370.

Capitula homogamous, cupuliform, on long peduncles, aggregated in lax corymbose-paniculate inflorescence. Involucral bracts appressed, herbaceous, membranous along margin, imbricate. Receptacle flat, squamose, scales lustrous, white, flat, linear-lanceolate, acute, slightly shorter than inner involucral bracts. Florets less numerous, pink or purple, tubular, cylindrical, narrowed below, two times broader in upper half and slightly bent, bisexual, deeply five-toothed, zygomorphic (with variable depth of indentation); teeth linear, acute, somewhat falcate, sparsely puberulent on outer side. Filaments short, glabrous. Anthers with appendages; basal appendages plumose like brush, apical oblong, acuminate, linear, weakly falcate. Style with two short, lanceolate, subobtuse, deflexed branches, densely pubescent below branches on outer side with longer, above with short, semiappressed hairs. Achenes with areole of basal attachment, cylindrical, throughout six-ribbed, dark brown, darker in furrows, ribs transversely rugose-cristate, pubescent with scattered, white, soft, long, below bent and above with verrucose hairs, each rib with cristate margin at apex, ribs continued into flexible incurved

¹Treatment by V.P. Botschantzev.

²From the Greek words *polys*—many, and *taxis*—series, line; named on the basis of the many-rowed pappus.

hooks at base of achene, covering areole, achene above ribs with entire, 536 unequal-toothed, short corona enclosing double, white, persistent pappus. Outer pappus comprising many rows of sparse scabrous bristles, outermost bristles very short, inner increasingly longer from periphery to center. Inner pappus one-rowed, two times as long as outer, connate at base into tube appressed-hairy on outer side, bristles free and long plumose above.

Annual succulent herbs, pubescent with capitate glandular hairs on rather long articulate stalks. Basal leaves numerous, broad- and short-petiolate, broadly obovate-lanceolate or oblanceolate, acute, undivided and entire or with small number of sharp and large teeth at apex; cauline leaves less numerous, smaller, sessile, semiamplexicaul, broadly-lanceolate, acute, entire. Stem branched, usually from base.

The genus has two species growing in Soviet Central Asia.

Type species: *P. lehmannii* Bge.

1. Stem short (8–36 cm). Basal leaves entire. Capitula with 3–10-florets. Florets pink. Involucral bracts densely glandular-hairy on dorsal surface 1. ***P. lehmannii*** Bge.
- + Stem taller (15–55 cm). Basal leaves usually with less numerous, large, sharp teeth. Capitula larger, with 5–20 florets. Florets purple. Involucral bracts glabrous 2. ***P. winkleri*** Iljin

1. ***P. lehmannii*** Bge. Delect. Sem. Hort. Dorpat. (1843) 8; ejusd. in Linnaea, XVIII (1844) 156; ejusd. Beitr. zur Kenntn. der. Flor. Russlands (1851) 194; ejusd. Mém. Acad. Pétersb. sav. étr. VII (1854) 370; Boiss. Fl. or. III, 584; Ind. Kew. fasc. II, 1261 (sub *jurinea* Cass. sine combin.); O. and B. Fedtsch. Perech. Rast. Turk. IV, 304; Nikitin in Fl. Turkm. VII, 214.

Annual. Stem 8–36 cm high, often branched from base, leafy, together with leaves pubescent with capitate glandular hairs on rather long articulate stalks. Basal leaves many, 2.5–8.5 cm long and 1.7–2.8 cm wide, on broad, soft, petioles, broadly obvate-lanceolate or broadly oblanceolate, acute, entire; cauline leaves less numerous, strongly reduced, 0.4–0.5 cm long and 0.2–2 cm wide, sessile, semiamplexicaul, broadly-lanceolate, or lanceolate, acute, entire. Capitula with 3–10-florets, at anthesis about 23 mm long and 7 mm wide, in lax paniculate-corymbose inflorescence. Involucral bracts herbaceous, green, pinkish at apex, with three to seven longitudinal, distinct, dark brown veins and wide membranous border, pubescent dorsally with numerous capitate glandular hairs on short articulate stalks; outer bracts throughout, inner 537 ones near apex ciliate-fimbriate, outer bracts broadly ovate, obtuse, lowermost among them about 3.5 mm long and 1.7 mm wide; inner

bracts broadly lanceolate, acute, uppermost among them about 16 mm long and 4 mm wide. Receptacular scales about 9 mm long and 0.3–0.6 mm wide. Florets pink, about 18 mm long, in lower part 0.6 mm, in upper 1.25 mm wide. Achenes (excluding pappus) about 7.5 mm long and 1.8 mm thick; outer pappus bristles 0.25 mm (outer) to 7.5 mm (inner) long; inner pappus about 14 mm long, connate at base into tube up to 3–5.5 mm high between individual hairs. Flowering IV–VI.

On the outcrops of Tertiary, varicolored, saline crusts in lower hills and in outliers.—*Soviet Central Asia*: Kyzyl-Kum, Amu-Darya; Pamiro-Alai (Kugitang Range). Endemic. Described from the vicinity of the Bakali Well in the Kyzyl-Kum desert. Type in Leningrad.

2. **P. winkleri** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 52, Fig. 1.—*P. lehmannii* Bge. var. *longipedunculata* Winkl. in O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 304, nom. nud.—*Jurinea polytaxis* Winkl. var. *longipedunculata* Winkl. in O. and B. Fedtsch. Ibid., in syn.

Annual. Stem 15–55 cm high, usually branched from base, leafy, together with leaves pubescent with capitate glandular hairs on rather long articulate stalks. Basal leaves many, 2.5–11 cm long and 1–4.5 cm wide, on broad and short petioles, broadly obovate-lanceolate or broadly oblanceolate, acute, with few sharp and large teeth in upper part, less often entire; cauline leaves less numerous, strongly reduced, 0.3–8 cm long and 0.1–2.5 cm wide, sessile, semiamplexicaul, broadly lanceolate or lanceolate, acute, entire. Capitula with 5–20 florets, at anthesis about 27 mm long and 10 mm wide, in very lax paniculate-corymbose inflorescence. Involucral bracts herbaceous, green on outer side, purple inside, with three to seven longitudinal indistinct veins and wide membranous border, dorsally glabrous, outer bracts throughout, inner ones near apex ciliate-fimbriate; outer bracts broadly ovate, obtuse, lowermost of them about 3 mm long and 1.75 mm wide; inner bracts lanceolate, acute, uppermost among them about 18 mm long and 3 mm wide. Receptacular scales about 12 mm long and 0.3–0.6 mm wide; florets purple, about 22 mm long, in lower part 0.75 mm, in upper part 2 mm wide. Achenes (excluding pappus) about 7.8 mm long and 1.8 mm thick; outer pappus bristles 0.25 mm (outer) to 9 mm (inner) long; inner pappus about 18 mm long, connate at base into tube over 3–5.5 mm high between individual hairs. Flowering IV–V.

On outcrops of Tertiary varicolored saline crusts in lower hills.—*Soviet Central Asia*: Pamiro-Alai (southern Kazakhstan). Endemic. Described from the Kyzyl-Tumshuk Mountains in southern Tadzhikistan (in original description, the mountains mistakenly named “Kzyltysh-Shup”). Type in Leningrad.

Cass. in Bull. Soc. Phill. Paris (1821) 140.

Capitula with many florets, occasionally with fewer florets. Involucre usually cupuliform, ovoid or obhemispherical, sometimes almost globose, less often oblong, imbricate, less often with almost equal, long appressed bracts, or outer, and often middle bracts, distinctly recurved, inner bracts always erect, herbaceous or almost coriaceous, more or less arachnoid-hairy or glabrous, with sessile glandular hairs (less often without them) and usually with hardly visible appressed bristles above (especially on inner bracts), along margin, involute (inner) and ciliate. Receptacle flat, usually with dense glabrous, smooth and acuminate scales. Florets homogamous, bisexual, all fertile; corolla regular or slightly obliquely five-fid, always narrowed toward base, pink, purple or dark purple, in exceptional cases cream-colored, almost always with sessile glandular hairs, glabrous; anthers glabrous, hastate, syngenesious; apical appendages of anthers narrow hastate, basal appendages setaceous, membranous, caudate, mostly divided or split along length, often flexuous, filaments free, glabrous and smooth, occasionally somewhat tuberculate, but not hairy, inserted at point of narrowing in species with abruptly narrowed tube, and in lower part in species with gradually narrowed tube; style glabrous, stigma bifid almost up to base and with tuft of short bristles at base, branches of stigma arcuate, covered with short papillae, mostly slightly grooved above. Pappus many-rowed, bristles unequal, two to five inner larger than others, bristles serrate, barbate, or plumose, innermost two to five bristles supporting pappogenus, broader and shorter-barbate, connate into ring (in species with deciduous pappus), enclosing pappogenus developing on membranous bottom, and with nectary at tip; pappogenus together with pappus detaching from achene, detaching from pappophorus, or pappus bristles firmly attached to achene, and then pappophores absent and nectary developing on pappogenus itself. Achenes obpyramidal, four-angled, less often somewhat compressed, more or less oblong, with straight or slightly oblique areole, structurally more simple than in *Serratula*, glabrous along ridges, smooth, longitudinally striate or smooth, or transversely tuberculate-alveolate with folds, rugose above with bands of teeth below corona, often with sessile glandular hairs. Perennial herbs or semishrubs: often stemless or scape-like; leaves simple and pinnatipartite.

539 Genus widely distributed in Eurasia from the Atlantic up to eastern Siberia, in Western and Central Asia, and partly in Soviet Central Asia.

¹Treatment by M.M. Iljin.

²Named after Louis Jurine, Professor of Medicine in Geneva at the end of 18th century.

It comprises about 300 species, of which more than 150 species are found in the USSR.

Note. The diagnosis of the genus and its sections includes some morphological structures that have been mentioned already in brief. In species with a deciduous pappus, a conical or dome-shaped projection, the so-called pappophorus, develops at the tip of the achene, from which the pappus easily detaches at the maturation of the fruit (Plate XL). The pappophorus does not develop in species with a persistent pappus, whose bristles are firmly appressed to the achene by the pappogenus and the nectary is shifted to the center of the pappogenus. The nectary usually sits on a more or less short pedicel, the so-called manubrium. The bristles supporting the pappogenus (2–5) and projecting above the others have a unique structure. These bristles are always sturdier, broader and flatter; they may differ sharply from all the other bristles, as for example, in *Jurinea xeranthemoides* Iljin, which recalls the genus *Xeranthemum*. The inner subtending bristles in this species are narrowly ensiform, hardly serrate and with numerous fine hairs along the border; the rest are short-barbate, with the barbules bilateral.

Type species: *J. alata* Cass.

KEY TO SECTIONS

1. Corolla gradually narrowed toward base, peripheral corollas abruptly pendulous 2.
- + All corollas never pendulous 3.
2. Involucre cylindrical or narrow-cupuliform; all leaves linear, entire, sessile Section 8. **Olgaeae** Iljin
- + Involucre cupuliform; leaves pinnatipartite or lyrate parted, often entire, but then oblong-lanceolate or oval; cauline leaves decurrent (cf., however, *J. cephalopoda* Iljin) Section 7. **Penduliflorae** Iljin
3. Plants thistle-like, exclusively Caucasian; pappus entirely deciduous, pappophorus developed, marginal ribs of achene white-cartilaginous Section 14. **Jurinea**.
- + Plants with different combination of characters, not thistle-like 4.
4. Achenes with longitudinal, discontinuously alveolate ribs 5.
- + Achenes glabrous, smooth, scabrous along length or cylindrical, sometimes with band of teeth or barbules below corona 6.
5. Ribs of achenes only transversely discontinuous, often modified into teeth above, less often into bristles, connate below; pappus persistent on achene or weakly connate with it, less often entirely

- deciduous. Kazakhstan-Soviet Central Asian sections
 Section 15. **Chaetocarpae** (Korsh.) Iljin
- 540 + Ribs of achene sharply scabrous, so that pits alternate with cochleate
 tubercles, teeth pointing upward, always densely glandular; pappus
 always deciduous, pappophorus persistent. European-Caucasian
 section Section 13. **Molles** (Korsh.) Iljin
6. Section from the European Part of the USSR, Caucasus and
 Kazakhstan 7.
 + Sections from Soviet Central Asia 11.
7. Plants with scapelike stem; pappus not deciduous; achenes small;
 Caucasus Section 2. **Bellae** Iljin
 + Stem always leafy 8.
8. Achenes regularly broadly four-angled, narrowed below; Pappus
 not deciduous; European Part of the USSR, Northern Caucasus,
 Western Siberia, Kazakhstan
 Section 1. **Cyanooides** (Korsh.) Iljin
 + Achenes subobtuse below, narrower 9.
9. Capitula cylindrical or narrow cupuliform, numerous in corymbose
 inflorescence; pappus persistent, with serrate or serrate-barbed
 bristles. European Part of the USSR, Caucasus, Western Siberia,
 Kazakhstan Section 3. **Stenocephalae** Benth. and Hook.
 + Capitula solitary, terminal on main stem and branches; pappus
 deciduous. Caucasus 10.
10. Plants with virgate branches; leaves pinnatisect or sinuate-toothed;
 pappus barbed Section 6. **Floccosae** (Sosn.) Iljin
 + Plants weakly branched, but not virgate, leaves undivided and
 entire; pappus plumose (only species *J. auscheriana* DC.)
 Section 10. **Derderia** (Jaub. and Spach) Boiss.
11. Corolla gradually narrowed below, usually 27–35 mm long,
 sometimes at least 25 mm; pappus plumose or barbate-plumose.
 12.
 + Corolla less than 25 mm long (cf., however, *J. maxima* Winkl.);
 pappus serrate or barbate (cf. however, *J. propinqua* Iljin, *J.*
macranthodia Iljin, *J. kokanica* Iljin and *J. serratuloides* Iljin) ..
 13.
12. Leaves auriculate; pappus always persistent on achene
 Section 10. **Derderia** (Jaub. and Spach) Boiss.
 + Leaves not auriculate; pappus always deciduous
 Section 11. **Stechmannia** Boiss.
13. Leaves linear and entire or with linear lateral lobes, in exceptional
 case finely lobed or oval 14.
 + Leaves variable, but always broader, not linear 15.
14. Pulvinate semishrubs, with sessile capitula, or plants with short

- stem, less often up to 25 cm high, pappus always deciduous.....
 Section 12. **Nanae** Iljin
- + Semishrubs of usual type, with linear always undivided and entire leaves; pappus always persistent on achenes.....
 Section 5. **Suffrutices** Iljin
- 541 15. Leaves undivided, in exceptional case forked (*J. trifurcata* Iljin), usually decurrent with undivided wing. Tien Shan.....
 Section 4. **Integrae** Iljin
- + Leaves variously incised, decurrent, row of serrate appendages (fimbria) or toothed wing (Pamiro-Alai Mountain System, less often Tien Shan) Section 9. **Insulptae** Iljin

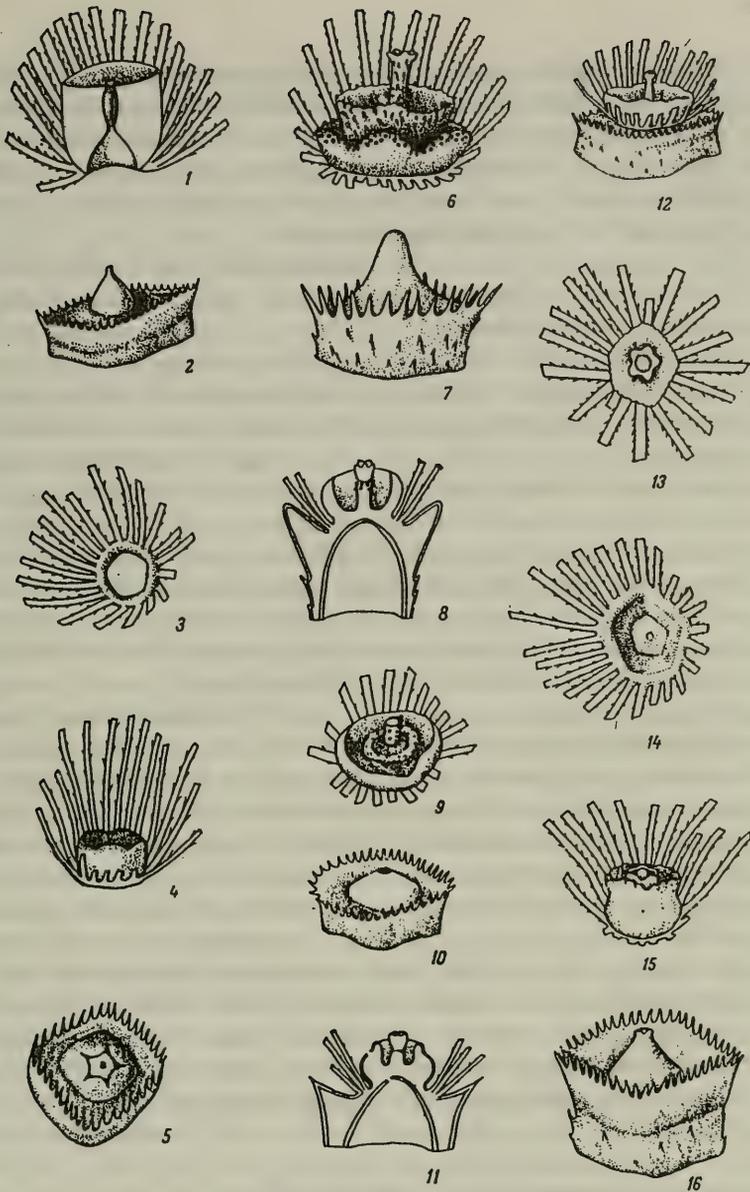
Section 1. Cyanoides (Korsh.) Iljin in Addenda XXVI, 715.—Stirps *Cyanoides* Korsh. in Izv. Akad. Nauk 1, 2 (1894) 8; Iljin in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 3–4, 348; Group *Cyanoides* Klok. in Bot. Zhurn. Akad. Nauk URSR, VIII, 1, 47.—Sect. §2. *Longifolia* DC. Prodr. VI (1837) 674 p. p.—§3. *Deccurrentes* DC. Ibid. 675 p. p.—§4. *Pinnatilobeae* DC. Ibid. 675 p. p.—*Platycephalae* Benth. and Hook. Gen. pl. II, 1 (1873) 473 p. p.—§ *Pinnatae* Boiss. Fl. or. III (1875) 572 p. p.; Pflanzenfam. IV, 5, 321 p. p.—Sect. *Platycephalae* Benth. and Hook. subs. *Cyanoides* Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2 (1926) 196.—Pappus bristles not always connate into ring, serrate or serrate-barbate. Achenes obpyramidal, four-angled, narrowed toward base, glabrous, almost smooth or with longitudinal parallel stripes, simply serrate above, not forming true corona, with pappogenus of different shape in center at apex, pappus bristles appressed below it; pappophorus undeveloped, pappogenus terminating in five-toothed nectary. Plants always perennial with leafy stem, often winged; leaves divided to various degree, less often entire, almost always gray or white-tomentose beneath. This section comprises about 25 species; 22 of them occur in the USSR.

Type of section: *J. cyanoides* (L.) DC.

1. Stem wingless; leaves nondecurrent 2.
- + Stem winged; leaves decurrent in wing or border 9.
2. Outer and middle involucre bracts sharply decurved..... 3.
- + Outer and middle involucre bracts squarrose, slightly entangled (ruffled) or all appressed 6.
3. Capitula medium; involucre always strongly arachnoid-hairy or white-tomentose, decurved part of involucre bracts purple or dark green, weakly arachnoid-hairy like base of inner bracts; leaves stiffly scabrous, usually bi- or almost tripinnatisect into narrow linear or almost filiform segments; cauline leaves sessile, semiamplexicaul with well-developed auricles at base (Donbass) 7. **J. granitica** Klok.

- + Involucre glabrous, arachnoid-hairy or white-tomentose; leaves pinnatisect or bipinnatisect, less often mixture of undivided, scabrous or glabrous, with or without auricles (European Part, Western Siberia, Kazakhstan) 4.
- 542 4. Capitula small, less often medium; involucre white-tomentose; outer and middle involucral bracts appressed, only slightly and short-uncately exerted from tomentum, dark green or violet-purple at apex (Dnieper Region)..... 8. **J. salicifolia** Grun.
- + Capitula large, outer and middle involucral bracts long and deflexed 5.
5. Leaves stiffly scabrous above due to fine cartilaginous papillae, semiamplexicaul, usually with distinct auricles; involucre usually glabrous, less often arachnoid-hairy (plants of semidesert and southern steppes) 5. **J. eversmanni** Bge.
- + Leaves smooth above, less often weakly scabrous, usually without, less often with poorly developed auricles; involucre usually arachnoid-hairy, less often almost glabrous (plants of forest-steppe and northern steppes) 6. **J. charcoviensis** Klok.
6. All involucral bracts appressed (eastern part of Western Siberia and Northeastern Kazakhstan) 3. **J. schischkiniana** Iljin.
- + Outer and often also middle involucral bracts separated to various degree 7.
7. Stem usually flexuous and strongly branched above base; leaves more or less coriaceous, green on both sides or slightly arachnoid-hairy beneath. Capitula medium or small; outer involucral bracts separate or almost appressed (central Kazakhstan) 4. **J. xerophytica** Iljin
- + Stem upright, simple or weakly branched, usually with fewer branches above middle or only in upper part, spreading upward; leaves thin, herbaceous, white-tomentose or gray arachnoid-hairy beneath. Capitula large or medium; outer and middle involucral bracts as if ruffled 8.
8. Basal leaves gradually narrowed toward base, pinnatisect, sessile or with poorly developed petiole, smooth or arachnoid-hairy above; cauline leaves except lowermost, sessile, semiamplexicaul and with well developed auricles; involucre always arachnoid-hairy (Belorussia, Lithuania, Western Ukraine) 2. **J. pseudocyanoides** Klok.
- 544 + Basal and lower cauline leaves with well-developed petiole and pinnatisect or bipinnatisect lamina, scabrous above; cauline leaves not amplexicaul and without auricles 1. **J. cyanoides** (L.) Rchb.
9. Plants robust, stem mostly thick, 3–7 mm; thick at base; basal

- leaves 20–30 cm long; cauline leaves long- and broadly decurrent (sands of Crimea, Dnieper and Bug rivers) 10.
- + Plants less robust, stem thinner; leaves smaller 11.
10. Leaves undivided, entire, lanceolate-oblong; lower and middle involucre bracts somewhat ruffled, like *J. cyanoides* (Aleshi sands) 12. **J. laxa** Fisch. ex Iljin
- + Leaves pinnatisect; lower and middle involucre bracts sharply deflexed (sands between lower reaches of the Dnieper and southern Bug) 19. **J. paczoskiana** Iljin
11. All involucre bracts appressed, from shorter outer to more elongate inner (imbricate) 12.
- + Outer, and often also middle involucre bracts ruffled to various degree 13.
12. Stem always branched, usually in upper one-third or even upper half. Capitula usually 15–25; involucre at anthesis almost cupuliform; inner involucre bracts long and white-membranous, acuminate, distinctly exserted (valley of the Don and its tributaries) 21. **J. tanaitica** Klok.
- + Stem simple or branched only at extreme tip. Capitula usually fewer; involucre cupuliform, inner bracts although membranous above, but attenuate into acuminate tip (Trans-Caspian deserts) 20. **J. tenuiloba** Bge.
13. Outer and middle involucre bracts squarrose and as if ruffled (like *J. cyanoides*); leaves quite narrowly decurrent (cf. however, *J. transuralensis* Iljin and *J. pineticola* Iljin) 14.
- + Outer and middle involucre bracts variously deflexed, but not like *J. cyanoides* 16.
14. Plants strongly white-tomentose; leaves undivided, linear, or pinnatisect, light green above. Capitula large or medium; involucre also white-tomentose (Baksan, Zaisan) 9. **J. albicaulis** Bge.
- + Plants not white-tomentose, finely arachnoid-hairy, only lower leaf surface whitish arachnoid-hairy; involucre weakly arachnoid-hairy 15.
15. Leaves usually always undivided, occasionally with mixture of weakly divided laminas (Kurgan and Yalutorov districts) 10. **J. gorodkovii** Iljin
- + Leaves except upper, always finely pinnatisect in linear-filiform segments (chalky deposits of Middle Volga Region) 11. **J. cretica** Iljin
16. Outer and middle involucre bracts in upper half sharply deflexed or arcuate 17.
- 545 + Outer and middle involucre bracts slightly deflexed from involucre or only at apex shortly uncatate 19.



Structural details of pappus in *Jurinea* species. 1, 2—*J. arachnoidea* Bge., pappogenus with "manubrium" and nectary in dorsal view; 3, 4, 5—*J. armeniaca* Sosn. pappus base, pappogenus and pappophorus; 6, 7—*J. poacea* Iljin, pappogenus with nectary, pappophorus; 8—*J. psammophila* Iljin, schematic section through upper part of achene with pappogenus and nectary; 9, 10—*J. olgae* Rgl. and Schm., pappogenus with nectary, pappophorus; 11—*J. cyanoides* (L.) DC., schematic section through upper part of achene; 12—*J. rhizomatoidea* Iljin, pappogenus with nectary; 13, 14, 15, 16—*J. tapetodes* Iljin, pappophorus, in lower, upper and lateral view, and upper part of achene with dentate border and pappophorus.

17. Outer and middle involucre bracts sharply deflexed 18.
 + Outer and middle involucre bracts arcuate in different directions (western Kazakhstan) 15. **J. transuralensis** Iljin
18. Deflexed part of involucre bracts glabrous or subglabrous, dark violet or dark green (semideserts and southern steppes of the European Part and bordering Kazakhstan)
 13. **J. amplexicaulis** (S.G. Gmel.) Bobr.
 + Deflexed part of involucre always gray arachnoid-hairy (Altai Territory, Loktev District) 14. **J. altaica** Iljin
19. Outer and middle involucre bracts finely arachnoid-hairy, not uncate but slightly deflexed at apex, especially at fruiting, sometimes with membranous somewhat more deflexed tip (Ukraine) 22. **J. thyrsoflora** Klok.
 + Plants with different characters (Ciscaucasia or Kazakhstan)
 20.
20. Involucre cupuliform or narrow-cupuliform, narrow or roundish at base, but in any case not depressed when attached to stem, always white-tomentose; outer and middle involucre bracts with short dark-purple or dark green uncate tip, exerted from tomentum (Aktyubinsk and northern Kyzyl-Orda regions)
 17. **J. kazachstanica** Iljin
 + Involucre broadly cupuliform or cupuliform, depressed at base when attached to stem, usually arachnoid-hairy, less often almost white-tomentose (plants of Ciscaucasia and eastern Kazakhstan) 21.
21. Involucre finely arachnoid-hairy, broadly cupuliform, always with distinct depression at base when attached to stem; outer and middle involucre bracts short-uncate at tip, arachnoid-hairy, not purple (Ciscaucasia) 16. **J. ciscaucasica** (Sosn.) Iljin
 + Involucre as high cup with weak depression at attachment to stem; outer and middle involucre bracts not shortly uncate at tip, but originating from involucre sometimes as arcuate tips, sometimes slightly drooping, sometimes almost appressed. Plants with decurrent or nondecurrent leaves (eastern Kazakhstan)
 18. **J. pineticola** Iljin

Series 1. Cyanoides Iljin—*Eucyanoides* Klok. in Bot. Zhurn. Akad. Nauk URSR, VIII, 1 (1951) 48 p. p.—Stem wingless.

Subseries 1. Intricatae Iljin. Ibid.—All involucre bracts appressed or loosely ruffled.

546 1. **J. cyanoides** (L.). Rchb. Fl. Exc. (1831) 290; DC. Prodr. VI, 676; Boiss. Fl. or. III, 573 p. p.; Grossh. Fl. Kavk. IV, 172; Schmalh.

Fl. II, 110 p. p.; Fl. Yugo-Vost. VI, 390; Kryl. Fl. Zap. Sib. XI, 2931 p. p.; Vzn. Rosl. URSR, 563, s. str.; O. and B. Fedtsch. Perech. Rast. Turk. IV, 300.—*Carduus cyanoides* α. *monoclonos* L. Sp. pl. (1753) 822; MB. Fl. taur.-cauc. II (1808) 272; Korsh. in Izv. Akad. Nauk, 1, 2, 117 p. p.; Tent. Fl. Ross. or., 251; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 196; Iljin, Tr. Turk. Nauchn. Obshch. 2, 20.—*Serratula cyanoides* DC. Diss. comp. III (1813) 30; MB. Fl. taur.-cauc. III, 550.—*Acarna cyanoides* Bess. Enum. pl. Volh. (1822) 32.

Perennial. Plants 25–60(70) cm high; stem erect, simple sulcate, whitish due to more or less dense arachnoid pubescence, especially in lower part and on petioles of lower leaves, less often greenish, with weak arachnoid-hairy coating, often branched, usually with few long or more or less short branches. Basal and lower cauline leaves distinctly petiolate, not decurrent, pinnatisect in 2–20 pairs of oblong or even linear segments, sometimes bipinnatisect (f. *bipinnata* Iljin) or almost lyrate-divided, less often all or only lower leaves undivided (f. *integrifolia* Iljin), latter often long (f. *longifolia* Iljin) with decurrent lobes, gradually acuminate upward or subobtusate; uppermost leaves entire, linear, sessile, not reaching capitulum; all leaves very finely arachnoid-hairy above, especially along veins, scabrous due to rather small papillae, slightly rugose, with sparse, sessile, glandular hairs, whitish beneath due to arachnoid pubescence. Capitula medium or large, solitary, with many florets. Involucre broadly cupuliform, with depression at base, 15–18(20) mm long, outer bracts linear-lanceolate, all bracts almost equal in length, acuminate, lax, somewhat ruffled and weakly deflexed, herbaceous, usually significantly arachnoid-hairy, usually three-rowed; inner bracts one- or two-rowed, straight, acuminate, only at extreme tip slightly recurved, reddish, less often yellowish, with short bristles, ciliate and with scattered sessile glandular hairs. Receptacle covered with glabrous and smooth scales, scales fused below, reaching one-third height of involucre or slightly more. Corolla pink-purple, 16–20 mm long, narrowed over 7–8 mm, with lobes of limb 4–6 mm long, with sessile glandular hairs; apical appendages of anthers acuminate, about 2.5 mm long, basal appendages 2–2.5 mm long; stigma 2 mm long; style glabrous; filaments glabrous. Pappus whitish, divaricate, two to two and one-half times as long as achene, comprising serrate-barbate bristles, not connate into ring; achenes obpyramidal, four-angled, distinctly acuminate below, glabrous, smooth, with longitudinal parallel stripes, somewhat serrate above, and with patellate pappogenus at apex. Flowering VI–VIII; fruiting VII–IX. (Plate XL, Fig. 11.).

In open and dry pine forests, pine-forest sands, sandy steppes, chee 547 grass-sheep's fescue and chee-grass-covered, gravelly stony steppes, on

limestone deposits and chalky slopes.—*European Part*: Upper Dnieper, Upper Volga; Middle Dnieper; Volga-Don; Volga-Kama; Bessarabia, Lower Don, Trans-Volga Region, Lower Volga; *Western Siberia*: Ob, Upper Tobol, Irtysh, Altai; *Caucasus*: Ciscaucasia. Endemic? Described from the Belgorod District and Crimea according to the report of Gerber. Type in London.

Note. The closely related species, *J. pollichii* Koch. (1837) = *J. cyanoides* β. *pollichiana* DC., grows in Central Europe, which is well distinguished from *J. cyanoides* (L.) DC. by having predominantly simple stems and almost sessile leaves with usually linear segments gradually decurrent to their base. Besides, both the lamina and the narrowly winged rachis of the basal leaves are usually circinate, not scabrous above.

2. ***J. pseudocyanoides*** Klok. in Vozn. Rosl. URSR (1950) 564 (nomen); Klok. in Bot. Zhurn. URSR, VIII, 1, 51.—*J. pollichii* Ldb. Fl. Ross. II (1844–1846) 764 specim. lithuan. and podolic. non DC.—*J. cyanoides* Schmalh. Fl. II (1897) 110, specim. bjelorus. non DC.; Fedtsch. and Flerow Fl. 1005 specim. occid. and polon.—*Exs.*: Fl. polon. exs.: No. 189.—*lc.*: Klok. op. cit. (Bot. Zhurn.) Fig. 8.

Perennial. Plants 27–75 cm high; stems solitary or few, straight, often somewhat thick, flocculose-arachnoid-hairy with longitudinally striate, simple or less often weakly branched in upper half. Basal leaves numerous, with poorly developed petiole or sessile, lamina often undivided (f. *integrifolia* Iljin) or oblong, gradually decurrent toward base, pinnatifid or pinnatisect, with two to eight lateral segments on each side, oblong or oblong-lanceolate, like undivided leaf acute or cuspidate, less often acuminate, also decurrent toward base; cauline leaves, except lowermost like basal, sessile, undivided or simple if divided, amplexicaul or auriculate, less often without one or another, all leaves weakly arachnoid-hairy above, smooth, with scattered sessile glandular hairs, white-tomentose beneath, with prominent midrib and lateral veins and numerous glands under tomentum. Capitula large, usually few, with many florets. Involucre always arachnoid-hairy, cupuliform, 10–18 mm long and 15–25(30) mm wide; outer involucre bracts narrow, linear, irregularly deflexed in upper half (divaricate as in *J. cyanoides*); inner bracts erect, narrowly lanceolate, acuminate, not arachnoid-hairy, with sessile glandular hairs and fine appressed bristles, ciliolate above, white-membranous and pubescent at tip. Corolla pink or pink-purple, with sessile glandular hairs, 15–19 mm long, narrowed over 6–8 mm length, with lobes of limb (4)5–6 mm long. Pappus snow-white, 10–16 mm long, pappus bristles not connate into ring, serrate-barbate, with barbs equaling thickness of hairs or shorter. Achenes 4–5

548 mm long, oblong, obpyramidal, four-angled, subacute, glabrous, smooth, whitish, weakly striate along length, serrate above, and with a pitcher-shaped pappogenus in center of tip. Flowering VI–VIII; fruiting VIII–IX.

On forest sands.—*European Part*: Bessarbia, Middle Dnieper, Upper Dnieper. *General distribution*: Possibly grows in Central Europe. Described from the region of the village of Zvonkovyi, Vasilkov District, Kiev Region. Type in Kiev.

3. *J. schischkiniana* Iljin sp. n. in Addenda XXVI, 716.—*J. cyanoides* Schischk. (p. p.; excl. specim. europ. USSR and Asia media, Kazah. occid) in Fl. Zap. Sib. XI (1949) 2931 non DC.; Iljin in Tr. Turk. Nauchn. Obshch. 2, 20 p. p.—*J. pollichii* Ldb. Fl. Ross. II (1844–1846) 764 p. p. non DC.—*Serratula cyanoides* Bge. in Ldb. Fl. alt. IV (1833) 42 p. p. non DC.—*J. albicaulis* × *J. cyanoides* Schischk. op. cit. 2933.—*Ic.*: Iljin, op. cit. tabl.

Perennial. Plants 30–75 cm high; stems solitary or few, straight, green or dirty purple, longitudinally striate, simple or sparsely branched above middle, less often below, flocculose- or finely arachnoid-hairy, often white-tomentose below. Basal and lower cauline leaves petiolate, with white-tomentose, usually semicylindrical petioles, pinnatisect in oblong-lanceolate or linear, acuminate or acute, entire, less often scarcely toothed segments, decurrent along rachis, less often all entire; other cauline leaves sessile, not decurrent, occasionally auriculate, uppermost leaves simple, linear or even filiform; all leaves green and finely-arachnoid-hairy above, finely rugose, covered with fine sessile glandular hairs, often narrowly revolute, white-tomentose beneath and with numerous sessile glandular hairs under tomentum. Capitula few (one to five), with many florets; florets 2–3.5 cm long. Involucre 15–25 mm long, broadly cupuliform, always distinctly arachnoid-hairy, with numerous bracts, almost equal, linear acute; outer bracts appressed, firmly enclosing involucre, slightly above yellowish, coriaceous short base terminating into herbaceous apex, not deflexed, inner row of bracts erect even with cusps, slightly curved only at apex, densely covered with sessile glandular hairs and short appressed bristles, somewhat ciliate and pubescent at apex. Corolla pink-purple, with scattered sessile glandular hairs, 14–21 mm long, narrowed over 8–10 mm length, with lobes of limb 5–7 mm long. Pappus snow-white, 12–15 mm long, pappus bristles not connate into ring, serrate-barbate; achenes oblong, 5–6 mm long, four-angled, obpyramidal, glabrous, smooth with prominent longitudinal stripes along angles, toothed above, teeth usually slightly bent, pappogenus in center of tip. Flowering V–VIII; fruiting VII–IX.

Dunes in river valleys, hummocky sands; pine forests on sands, in dryland meadows with loamy soil, in scrubs and chee-grass-covered steppes on loamy soil mostly in forest-steppe zones.—*Western Siberia*: Irtysh, Altai(?); *Soviet Central Asia*: Balkhash Region. *General distribution*: Possibly, in Dzhungaria-Kashgaria. Described from the Barnaul District, between Solonovka on Kasmal and the Malyshevyi Ravine. Type in Leningrad.

Note. The range of *J. schischkiniana* Iljin can be demarcated as follows: in the north the border is at 54°N, in the west at 70°E; in the east the range borders with the mountain-taiga region, and in the south with the semidesert zone of Kazakhstan. The phylogenetically close species *J. cyanoides* (L.) DC. occurs west of this range.

4. *J. xerophytica* Iljin sp. n. in Addenda XXVI, 716.

Perennial. Plants 20–60 cm high, with long or short, often branched, rhizome covered with dark brown scales, with woolly axillary buds. Stems solitary or numerous, like petioles of lower leaves, densely white-tomentose at base, flocculose-arachnoid-hairy above or almost glabrous (f. *glabrescens* Iljin), finely striate-sulcate, streaks of yellowish or purple, furrows greenish, usually more or less flexuous or straight, branched from base or somewhat above, sometimes only in upper part. Leaves somewhat stiff; basal and lower cauline leaves petiolate, pinnatipartite or pinnatisect; middle and upper leaves sessile, segments oblong or linear, acuminate, entire, sometimes lyrate, occasionally segments with lobes or teeth at base, often mixed with entire and undivided leaves; uppermost leaves reduced and undivided; all leaves greenish above, finely arachnoid-hairy or glabrous, somewhat rugose, scabrous, with sessile glandular hairs, narrowly involute, sometimes up to midrib, white-tomentose beneath, glandular under tomentum. Capitula with many florets, 15–25 cm wide. Involucre 10–15 mm long, more or less arachnoid-hairy, with outer bracts like *J. cyanoides*. Corolla pink-purple, sparsely glandular, (11–12)16–20 mm long, narrowed over (4)6–9 mm and with (4)5–6 mm long lobes of limb. Pappus snow-white, (10)12–15 mm long, with short-barbate bristles, more or less dense; achenes 4–5(6) mm long, rusty, dull, longitudinally striate, small-toothed above, and with apical pappogenus.

In semideserts.—*Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region. Endemic. Described from the Altai River, in the Sarysu River system. Type in Leningrad.

Subseries 2. Reclinatae Iljin.—Series *Eucyanoides* Klok. in Bot. Zhurn. Akad. Nauk URSR, VIII, 1 (1951) 48 nom. nud. p. p.—Involucral bracts deflexed.

550 5. *J. eversmannii* Bge. in Flora, XXIV, 1 (1841) 155; Ldb. Fl. Ross. II, 2, 765 (excl. specim. ural.); Schmalh. Fl. II, 110 p. p.; Iljin Fl. Yugo-Vost. VI, 391 p. p.; Grossh. Fl. Kavk. IV, 173; O. and B. Fedtsch. Perech. Rast. Turk. IV, 301; Korzh. in Izv. Akad. Nauk. I, 1, 118 p. p.; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 196; Iljin in Tr. Turk. Nauchn. Obshch. 2, 20 p. p.—**lc.**: Fl. Yugo-Vost. Fig. 699.

Perennial. Plants 20–75 cm high; stems solitary or few, erect, finely striate-lineate, usually not strongly arachnoid-hairy, green or dirty purple, simple or branched in upper half. Basal and lower cauline leaves petiolate, petioles white-tomentose, shorter than lamina, leaves reduced upward, pinnatisect (f. *pinnata* Iljin) or bipinnatisect (f. *bipinnata* Iljin), less often undivided (f. *integrifolia* Iljin), segments oblong-lanceolate, lanceolate-linear or even narrow-linear, decurrent along rachis, entire or with occasional teeth on lobes, acute, small up to filiform in upper half of stem, simple, undivided and entire; all leaves, except lowermost, sessile, auriculate, semiamplexicaul, green above, somewhat stiffly scabrous, glabrous or with fine tomentum, especially along midrib, narrowly involute, white-tomentose beneath, with scattered sessile glandular hairs under tomentum. Capitula solitary, medium or large, with many florets. Involucre cupuliform, 5–20 mm long, glabrous or arachnoid-hairy; bracts lanceolate-linear or linear, acuminate, equal, outer almost coriaceous, strongly recurved, dark green or purple; inner bracts glabrous, straight. Receptacle densely covered with smooth scales, more than half as long as involucre. Corolla pink-purple, with sessile glandular hairs, 16–20 mm, narrowed over 6–8 mm, with 4.5–6 mm long lobes of limb. Pappus yellowish, 10–15 mm long, pappus bristles not connate into ring, barbellate, with barbules shorter than thickness of hair or almost as long; achenes 5–6 mm long, four-angled, obpyramidal, glabrous, smooth or with parallel stripes, toothed above, and with cupuliform pappogenus at tip. Flowering V–VIII; fruiting VII–IX.

In the region of semideserts, on sands, sandy steppes, chalky areas.—*European Part*: Trans-Volga Region; Lower Volga, Lower Don; *Western Siberia*: Upper Tobol (extreme west); *Soviet Central Asia*: Aralo-Caspian Region (north). Endemic. Described from western Kazakhstan from the Bolshoye [Great] Bogdo Mountains. Type in Leningrad.

Note. It must be remembered that the auricles at the base of the leaves are not always well developed. Cf. the note to *J. charcoviensis* Klok.

6. *J. charcoviensis* Klok. in Vizn. Rosl. URSR (1950) 564; Bot. Zhurn. URSR, VIII, 1, 49.—*J. eversmanni* Korsh. in Izv. Akad. Nauk, 1, 2 (1894) 119 p. p. non Bge. (excl. specim. Saratow, Astrachan, Uralsk, Orenburg); Iljin in Fl. Yugo-Vost. VI, 391; Schmalh. Fl. II, 110 p. p.;

Korsh. Tent. Fl. Ross. or. 252.—*J. cyanoides* × *eversmannii* Korsh. Ibid. 252.—**lc.**: Klok. op. cit. Fig. 7.

551 Perennial. Plants 15–60 cm high; stems solitary or few, straight, finely-striated, finely flocculose-arachnoid-hairy, simple or with fewer branches usually above middle or slightly below. Basal and lower cauline leaves petiolate, with white-tomentose petioles, undivided (*J. integrifolia* Iljin), pinnatisect or less often bipinnatisect into oblong or oblong-lanceolate, less often linear, acuminate, acute or short-cuspidate, entire or somewhat toothed segments, decurrent along rachis, revolute, green or grayish-green above due to fine arachnoid-hairy, pubescence especially dense along midrib, usually soft, less often scabrous due to short and stiff papillae, white-tomentose beneath, with sessile glandular hairs under tomentum; middle cauline leaves short-petiolate or sessile, divided, like all other cauline leaves, uppermost short, simple, all without or with poorly developed auricles, less often auricles well developed. Capitula few, variable in size, terminal on stem and branches, usually medium, less often large or smaller, with many florets. Involucre cupuliform, arachnoid-hairy, less often glabrous; outer involucre bracts narrow-linear or linear-lanceolate, acuminate, deflexed, or less often regularly arranged so. Corolla 14–20 mm long, with scattered sessile glandular hairs, pink-purple, narrowed over 6–8 mm, with 4–6 mm long lobes of limb. Pappus 10–15 mm long, usually yellowish, pappus bristles not connate into ring, serrate-barbate, with barbules mostly shorter than thickness of hairs, less often as long, densely arranged; achenes oblong, four-angled, obpyramidal, 4–5 mm long, but glabrous, smooth or striate, brownish, narrowed toward base, toothed above, and with prominent pappogenus in center at tip. Flowering V–IX; fruiting VI–X.

Sandy river terraces, steppe sands, pine-forest sands.—*European Part*: Lower Don, Middle Dnieper, Volga-Kama. Endemic. Described from the vicinity of Merefa in Kharkov Region. Type in Kiev.

Note. This undoubtedly very young species is characterized by a large amplitude of morphological features fluctuating between *J. eversmannii* Bge. and *J. cyanoides* (L.) DC. According to M.V. Klovov, the main features distinguishing *J. charcoviensis* Klok. from *J. eversmannii* Bge. are: leaves not stiffly scabrous, pinnate, without auricles at the base, semiamplexicaul; involucre arachnoid, the bracts sharply deflexed as in *J. eversmannii* Bge. Even S. Korshinsky in 1894 and 1898 reported that to the north and west plants of the latter species develop the characters that were later reported by Klovov for *J. charcoviensis* Klok. These plants were tentatively assigned by Korshinsky to the hybrid *J. cyanoides* × *J. eversmannii* Bge. However, he suggested in his conclusion the possibility of climatic factors influencing the manifestation of this character combination, i.e., in essence he suggests

a racial character for these features. Following M.V. Klokov, we consider it appropriate to treat these plants as separate species, albeit in the formative stage.

552 7. **J. granitica** Klok. in *Vizn. Rosl. URSR* (1950) 564 (nomen); Klok. *Botan. Zhurn. Akad. Nauk URSR*, VIII, 1 (1951) 48.—**lc.**: Klok. *op. cit.* (1951) Fig. 6.

Perennial. Plants 20–75 cm high; stems solitary or few, straight, finely arachnoid-hairy, sulcate-striate, dirty purple, or striations dirty purple, and furrow green, rarely stems simple, usually branched above, less often from base. Basal and lowermost cauline leaves short-petiolate, bipinnatisect or even almost tripinnatisect, occasionally with mixture of pinnatisect or even entire leaves, with narrow-linear or almost filiform, acuminate, entire lobes, narrowly involute, erect-spreading or almost horizontal; cauline leaves sessile, especially middle leaves semiamplexicaul or with well developed auricles; all leaves green and stiffly scabrous due to well developed cartilaginous papillae on upper surface, with scattered sessile glandular hairs, finely rugose, lower surface gray arachnoid-hairy or white-tomentose. Capitula medium, with many florets, solitary. Involucre cupuliform, always distinctly arachnoid-hairy or even white-tomentose, especially its outer and middle bracts, near middle or slightly above deflexed, dark green or purple in deflexed part, gradually acuminate, inner row bracts straight, arachnoid-hairy only below, toward apex brownish, membranous, acuminate and strigose on outside with scattered sessile glandular hairs, finely ciliate. Corolla purple, with scattered sessile hairs, (14)15–16 mm long, narrowed over 6–7 mm, with (4.5)5–6 mm long lobes of limb. Pappus snow-white, pappus bristles not connate into ring, serrate-barbate; achenes 4.5–5 mm long, obpyramidal, four-angled, glabrous, smooth, longitudinally striate, whitish or whitish-brown, toothed above, with patellate or smooth dome-shaped pappogenus in center of tip. Flowering VI–VIII; fruiting VII–IX.

On gneiss-granites, stony steppes, sands.—*European Part*: Black Sea Region (Donetsk, Zaporozhe and Dnepropetrovsk regions). Endemic. Described from the village of Starodubovka in the Pervomaisk District of Donetsk Region. Type in Kiev, isotype in Leningrad.

Subseries 3. Hamulatae Iljin.—Series *Salicifolia* Klok. *nom. Bot. Zhurn. Akad. Nauk URSR*, VIII, 1 (1951) 47.—Involucral bracts slightly uncately bent upward.

8. **J. salicifolia** Gruner in *Bull. Soc. Nat. Mosc.* XLI, 2 (1868) 431 non Boiss.; *Schmalh. Fl.* II, III nom.; Iljin in *Izv. Bot. Sada Akad. Nauk SSSR*, XXX, 3–4, 347 (emend.); Klok. in *Vizn. Rosl. URSR*, 564.—**lc.**: Klok. *Ibid.* Fig. 5.

Perennial. Plants 20–70 cm high; stems solitary or few, straight, striate-sulcate, arachnoid-hairy, in upper half with few upward-spreading
 553 branches. Basal leaves numerous, imparipinnate, with two to six pairs of long, broad or narrow, acuminate or cuspidate lobes, often with mixture of entire leaves or with solitary lobes, sometimes leaves undivided predominate (f. *integrifolia* Iljin), narrowed into more or less long petiole with wings, gradually reducing toward base; cauline leaves sessile, except lowermost, always undivided and entire, narrow-lanceolate or linear, uppermost leaves filiform, never decurrent; all leaves narrowly involute and stiffly scabrous; above finely rugose due to short papillae, with sessile glandular hairs in pits, glabrous, green, sometimes weakly arachnoid-hairy, white-tomentose beneath with scattered sessile glandular hairs under tomentum. Capitula solitary, 20–30 mm wide, with many florets. Involucre cupuliform, 12–15 mm long; outer and middle bracts oblong-ovate, distinctly arachnoid-hairy, with short, uncate, glabrous, purple or dark green, recurved tip; innermost bracts oblong-lanceolate, straight, acuminate, purple, with sessile glandular hairs and slightly visible appressed bristles on outer side, ciliate at apex. Receptacle covered with smooth, acuminate scales almost up to half length. Corolla pink-purple, with scattered sessile glandular hairs, 14–17 mm long, narrowed over 5.5–8 mm length, with 4–5 mm long lobes of limb; apical appendages of anthers gradually narrowed upward, about 2 mm long, basal appendages caudate-setaceous, 2–2.5 mm long, filaments glabrous; stigma about 2 mm long; style glabrous. Pappus snow-white, two times, and with inner bristles three times, as long as achenes, pappus bristles serrate-barbate, with teeth slightly shorter than thickness of hairs; achenes oblong, obpyramidal, about 5 mm long, four-angled, narrowed below, light colored, slightly brownish, toothed above, with ovoid dome-shaped pappogenus at extreme tip and with stylar remains at end, with weak, oblong-parallel ridges. Flowering VI–VIII; fruiting VIII–IX.

Limestone deposits, steppe slopes, sands, especially along the banks of Dnieper.—*European Part*: Black Sea Region, Middle Dnieper, Volga-Don (southwest). Endemic. Described by Gruner from the banks of the Orel River above Dnepropetrovsk.

Note. Owing to the loss of the type specimens, I propose to select as the neotype the specimen collected by S. Postrigan, 16 VII 1923, in Cherkassy Region, near village Yablunivtsi. Type in Leningrad.

Series 2. Plerocladae Iljin.—*Series Albicaules* Klok. l.c. 52, nom. nud. (p. p.).—Stem winged; leaves decurrent or flanges decurrent.

Subseries 1. Albicaules Iljin.—Involucral bracts loosely and entangled, deflexed as in *J. cyanoides*.

554 9. *J. albicaulis* Bge. in Flora, XXIV, 1 (1841) 156; Ldb. Fl. Ross. II, 2, 765 (specim. sibir. alt.); Iljin in Tr. Turk. Nauchn. Obsch. II, 20; Kryl. Fl. Zap. Sib. XI, 293 (p. p.)—*J. polyclonos*, Kryl. Fl. Alt. III (1904) 713 non DC.—*J. cyanooides* × *polyclonos* Korsh. in Bull. Acad. Sc. Pétersb. V. ser. I (1894) 128.—*Serratula cyanooides* Ldb. Fl. alt. IV (1833) 42 non DC., specimina sibirica, synonym. excl.—*J. angustifolia* Bge. in Flora, XXIV, 1 (1841) 156.

Perennial. Plants 15–40 cm high; stem densely white-tomentose, straight, branched mainly in inflorescence. Leaves pinnatisect into linear or linear-lanceolate, entire, long and deflexed segments, less often all leaves undivided and entire (f. *integrifolia*) or with short solitary lobes, acuminate, with callose tip; basal and lower cauline leaves petiolate, with white-tomentose petiole, slightly broadened at base; cauline leaves sessile, weakly semiamplexicaul and narrowly decurrent; uppermost leaves linear, always undivided and entire, all leaves distinctly convolute, rugose-alveolate above and scabrous due to small papillae, with sessile glandular hairs in pits, grayish-green due to weakly arachnoid-hairy pubescence, strongly arachnoid-hairy along midrib, white-tomentose beneath. Capitula medium, with many florets. Involucre broadly cupuliform; outer involucre bracts densely arachnoid-hairy tomentose, linear, almost equal, irregularly divided, almost as in *J. cyanooides* L., innermost row of narrow-lanceolate erect bracts, acuminate, usually recurved, more or less densely covered on outer side with sessile glandular hairs, slightly toothed along margin. Corolla pink-purple, 15–22 mm long, narrowed over 7–10 mm length, with 5–6 mm long lobes of limb, with scattered sessile glandular hairs, apical appendages of anthers about 3 mm long, basal appendages caudate-setaceous, about 2.5–3 mm long. Pappus exceeding achene, pappus hairs serrate-barbate, with the dense barbs, as long as or shorter than thickness of hairs, not connate into ring; achenes 4–5.5 mm long, four-angled, obpyramidal, distinctly narrowed below, glabrous with visible parallel stripes at angles, toothed above, with broadly dome-shaped pappogenus at apex. Flowering V–VII; fruiting VII–VIII.

On sands, especially forest sands.—*Western Siberia*: Irtysh, Altai; *Soviet Central Asia*: Balkhash Region(?). Endemic. Described from the region of the Bekun River, a tributary of Irtysh. Type in Leningrad.

10. *J. gorodkovii* Iljin sp. n. in addenda XXVI, 717.—*J. cyanooides* Kryl. (non DC.) Fl. Alt. III (1904) 1904 (specim. Tobol).

Perennial. Plants 20–50 cm high; stems solitary or few, erect, ciliate, finely arachnoid-hairy; simple or with fewer branches; branches slightly deflexed. Basal leaves numerous, like cauline leaves, narrow, oblong-
555 linear, acuminate, simple or with isolated segments, entire, green and

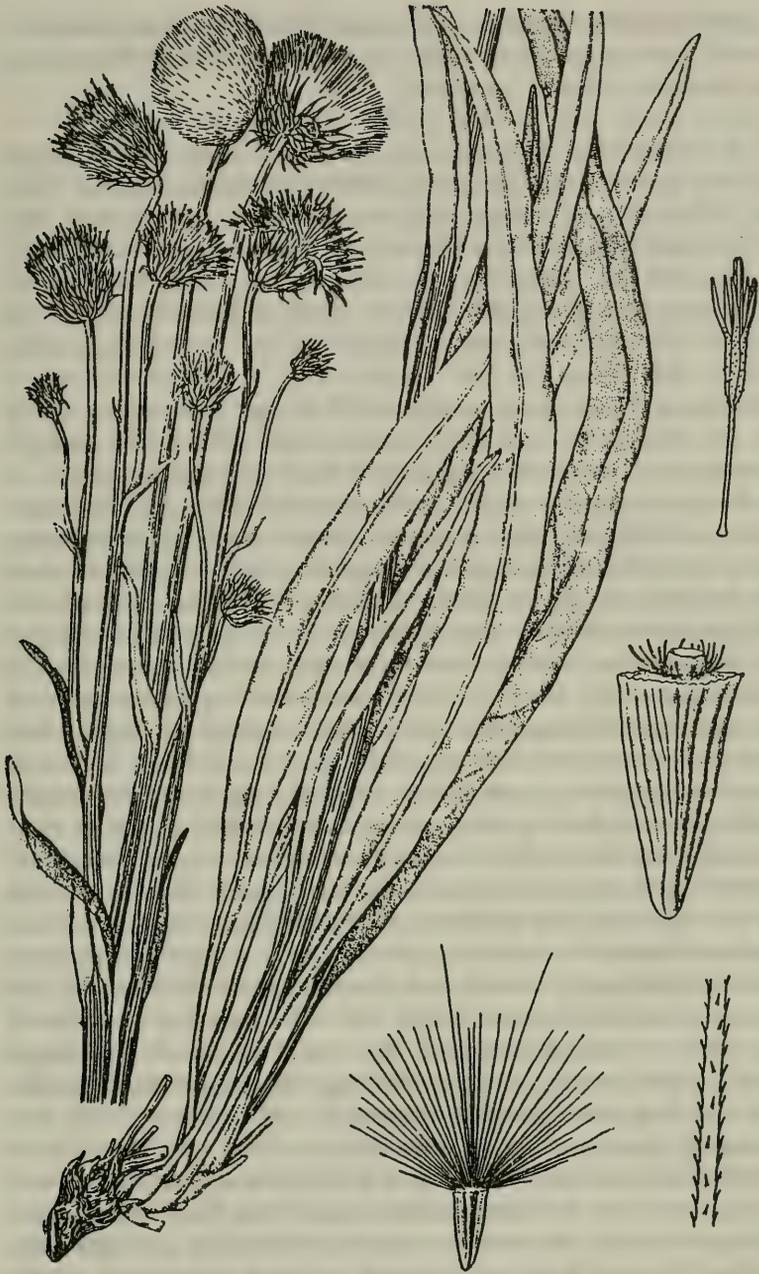
finely rugose above with scattered sessile glandular hairs, usually weakly arachnoid-hairy, especially along somewhat depressed midrib, white-tomentose beneath, with numerous sessile glandular hairs under tomentum, gradually narrowed toward base; cauline leaves few, simple, sessile, semiamplexicaul and decurrent with narrow wing; uppermost leaves almost filiform, also decurrent or only with auricles at base. Capitula 1–10, 10–15 mm wide, less often up to 20 mm. Involucre cupuliform, 10–15 mm long, finely arachnoid-hairy, all or outermost involucre bracts with herbaceous tip, thin-linear, not appressed or appressed only at base, with flexuous erect-spreading apices, inner row erect, of oblong, acuminate bracts with more or less sessile glandular hairs, short-setose at apex. Corolla pink or pink-purple, 13–15 mm long, narrowed over 5–6 mm length, with 4–4.5 mm long lobes of limb. Pappus snow-white, about 10 mm long, with bristles not connate into ring, with barbules as long as or usually shorter than hair thickness; achenes 4.5–5 mm long, oblong, obpyramidal, glabrous and smooth at the faces or striate throughout, brownish, with small teeth above, teeth slightly incurved, and with somewhat prominent cupuliform pappogenus at tip. Flowering VI–VIII; fruiting VIII–IX.

In sandy pine forests and on sands.—*Western Siberia*: Upper Tobol. Endemic. Described from the vicinity of Yalutorovsk. Type in Leningrad.

Note. So far known only from the vicinity of Kurgan and Yalutorovsk. This is the northermost species of the series *Plerocloidae*.

11. *J. cretica* Iljin sp. n. in Addenda XXVI, 717.

Perennial. Plants 15–30 cm high; stems erect, occasionally ascending, flocculose-arachnoid-hairy, striate, branched, less often simple. Basal as well as lower cauline leaves petiolate, white-tomentose, with pinnatisect lamina, less often bipinnatisect, with narrow-linear segments, acuminate or acute, deflexed, involute almost up to midrib, less numerous; middle and upper cauline leaves sessile, decurrent forming narrow ridges; all leaves somewhat rugose above, with sessile glandular hairs scattered between wrinkles, slightly scabrous, white-tomentose beneath with similar glandular hairs under tomentum; uppermost leaves undivided and entire, distinctly reduced, linear or filiform. Capitula solitary, 20–30 mm wide, with many florets, with involucre about 12–15 mm long, outer and middle involucre bracts arachnoid-hairy, acuminate, loosely entangled, deflexed, as in *J. cyanoides*; inner bracts straight, membranous in upper part, purple, acuminate, ciliate, somewhat strigillose dorsally. Corolla pink-purple, 16–18 mm long, narrowed over 7–8 mm length, with 5–6 mm long lobes of limb. Pappus snow-white, with short-barbate bristles and dense barbules; achenes immature, striate throughout the length.



Sands of chalky exposures.—*European Part*: Lower Don (northeast). Endemic. Described from the vicinity of Khvalinsk from the Peschanaya Gora Mountain. Type in Leningrad.

12. *J. laxa* Fisch. ex Iljin in Izv. Glavn. Bot. Sada, XVII, 1 (1928) 84; Korsh. in Izv. Akad. Nauk 1, 2 (1894) 122, nomen; Klok. in Vozn. Rosl. URSR, 565.—*J. ambigua* auct. non DC.: Lavr. and Pryan. in Mat. do Dosl. Grunt. Ukr. 1 (1926) 199.—*J. polyclonos* Schmalh. Fl. II (1897) 110 p. p.; Pachaskii in Zap. Novoross. Obshch. Est. XXVI, 101, XXXIV, 178.—*J. albicaulis* β . *longifolia* Ldb. Fl. Ross. II (1844–1846) 765.—*J. longifolia* Ldb. Ibid. 765, non DC. Iljin, op. cit. 85.—*Carduus laxus* Fisch. ex Iljin, op. cit. 84.

Perennial. Plants strong, usually 40–75 cm high, with strong woody root; stem straight, 4–7 mm thick, ribbed-sulcate in lower part, strongly arachnoid-hairy, branched in upper half, less often simple, solitary or few. Basal or lowermost cauline leaves also 20–30 cm long, lanceolate-oblong, undivided and entire, acuminate, repand, narrowed into relatively short petiole slightly broadened at base, other cauline leaves of same shape but reduced upward, sessile, semiamplexicaul and decurrent, not reaching capitula; all leaves grayish-greenish above due to fine arachnoid-hairy pubescence, with prominent whitish midrib, more densely arachnoid-tomentose beneath, with scattered sessile glandular hairs on both sides. Capitula large, with many florets, solitary on long leafless peduncles. Involucre broadly cupuliform, four-rowed; outer involucre bracts linear-lanceolate, quite loosely arranged, long acuminate, densely arachnoid-hairy at fruiting rather sharply deflexed, dark purple on inner side, glabrous, rugose, inner row of bracts erect, long acuminate, sometimes with slightly deflexed apex, dark purple, densely covered with short bristles and scattered sessile glandular hairs, ciliolate. Receptacle covered with smooth, glabrous scales, divided in upper half. Corolla pinkish-purple, covered with sessile glandular hairs, 17–22 mm long, narrowed over 7–10 mm length, with 4.5–6 mm long lobes; apical appendages of anthers acuminate, 2–3 mm long, basal appendages densely caudate, usually about 2 mm long; filaments glabrous; stigma 1.5–2 mm long; style glabrous. Pappus of numerous hairs, with two particularly prominent hairs, two times as long as achene, hairs serrate-barbate, with barbels shorter than thickness of hair, not connate into ring, divaricate at fruiting; achenes about 6 mm long, obpyramidal, four-angled, acutely narrowed towards base, toothed at apex, glabrous, smooth, with parallel stripes on edges, and with pappogenus at tip. Flowering VI–VIII; fruiting VI–IX. (Plate XLI.)

Sands, sandy “hummocks.”—*European Part*: Black Sea Region. Endemic. Described from the Aleshi Sands. Type in Leningrad.

Subseries 2. Amplexicaules Iljin.—Involucral bracts abruptly recurved from middle or above.

13. **J. amplexicaulis** (S.G. Gmel.) Bobr. in Bot. Zhurn. XLIII, 11 (1958) 1544.—*Carduus inermis* ... J.G. Gmel. Fl. Sib. (1749) 44, tab. XVI.—*C. cyanoides* β. *polyclonos* L. Sp. pl. (1763) 1152.—*C. cyanoides* Pall. Reise, III (1776) 594.—*C. polyclonos* MB. Fl. taur.-cauc. II (1808) 271.—*Centaurea amplexicaulis* S.G. Gmel. Reise I (1770) 136, tab. XXIV.—*Serratula polyclonos* MB. Fl. taur.-cauc. III (1819) 550.—*Jurinea polyclonos* DC. Prodr. VI (1837) 675; Bge. in Flora, XXIV, 155; Ldb. Fl. Ross. II, 2, 762; Korzh. in Izv. Akad. Nauk V, 1, 119 p. p.; Fedtsch. and Fler. Fl. Evrop. Ross. 1004; Iljin in Fl. Yugo-Vost. VI, 362; in Majevs. Fl. Izd. 8, 598.—*Jurinea polyclonos* Claus in Goebel, Reise, II (1838) 280.

Perennial. Plants 25–60(75) cm high; stems solitary or few, straight, branched, especially in upper half, green or dirty-purple, usually arachnoid-hairy, finely sulcate at base, winged. Basal and lowermost cauline leaves petiolate, petiole densely white arachnoid-hairy, usually pinnatisect (f. *pinnatisecta*), less often bipinnatisect (f. *bipinnatisecta*) or linear-filiform, less often oblong-lanceolate segments entire, less often all leaves entire (f. *integrifolia*); other cauline leaves amplexicaul, decurrent; uppermost leaves usually undivided, all leaves bright green, lustrous, and finely rugose above, with scattered sessile glandular hairs or covered with fine arachnoid-hairy pubescence, with one vein, whitish-tomentose below involute. Capitula comparatively small, numerous, with many florets, aggregated in corymbose panicles. Involucre cupuliform, 10–15 mm long and 7–10 mm wide, grayish arachnoid-hairy; outer and middle involucral bracts linear, acuminate, sharply recurved in middle or slightly above, with glabrous or subglabrous dark violet or dark green recurved part; innermost bracts linear-lanceolate, acuminate, straight, whitish in upper half, with purple tinge in lower half. Receptacle densely covered with yellowish acuminate scales reaching almost to half of involucre length. Corolla pale-pink or pink purple, with scattered sessile, glandular hairs, usually 12–15 mm long, narrowed over 4–5 mm length, with 4–5 mm long lobes of limb; apical appendages of anthers mostly about 2 mm long, somewhat pale, gradually acuminate; basal appendages caudate, 2–2.5 mm long; filaments glabrous. Pappus snow-white, 12–15 mm long; pappus bristles not connate into ring, serrate-barbate, with barbels always shorter than thickness of hair; achene oblong, obpyramidal, gradually narrowed toward base, pale, with parallel stripes on edges, glabrous, toothed above, and with broad cupuliform, pappogenus at tip. Flowering V–IX; fruiting VII–IX.

In the southern steppe and semidesert zones, on sandy steppes and hummocky sands, on chalky debris.—*European Part*: Volga-Don, Lower Don, Lower Volga, Trans-Volga Region; *Western Siberia*: Upper Tobol (western part); *Soviet Central Asia*: Aralo-Caspian Region (north). Endemic. Described from the Don Region in Voronezh District.

14. *J. altaica* Iljin sp. n. in Addenda XXVI, 717.

Perennial. Plants 25–40 cm high; stems solitary or few, branched almost from base, branches spreading upward, more or less arachnoid-hairy, finely striate. Basal leaves gradually narrowed into petiole, like lower cauline leaves, pinnatisect into oblong-linear segments as broad as leaf rachis, three to five pairs, obliquely opposite and directed upward at an angle, acuminate, cuspidate, or subobtusate, relatively sparse; all cauline leaves rather broadly long-decurrent, upper leaves grayish-green due to finely arachnoid-hairy pubescence, more dense along depressed midrib, finely rugose, with sessile glandular hairs, involute, white-tomentose beneath with prominent midrib. Capitula solitary, medium, aggregated in corymbose or corymbose-racemose inflorescence, with many florets. Involucre cupuliform, arachnoid-hairy; outer involucre bracts gray arachnoid-hairy, uncatate, recurved; inner bracts erect, membranous at apex, with somewhat ferruginous cusps, on outer side with sessile glandular hairs or short appressed bristles, less often some involucre bracts with all appressed bracts. Pappus persistent, pappus bristles not connate into ring, serrate-barbate. Corolla purple, with sessile glandular hairs, 14–15 mm long, narrowed over 4–5 mm length, with about 4 mm long lobes of limb. Achene four-angled, obpyramidal, with fine longitudinal ribs, somewhat toothed above, pappogenus flat, dome-shaped. Flowering VII–VIII; fruiting VII–IX(?).

Forest sands.—*Western Siberia*: Irtysh. Endemic. Described from northeastern Kazakhstan in the vicinity of Krasnyi Aul. Type in Leningrad.

Note. Close to *J. polyclonos* (L.) DC. Easily distinguished from the latter species by arachnoid limbs of the outer involucre bracts.

15. *J. transuralensis* Iljin sp. n. in Addenda XXVI, 718.—*J. polyclonos* Ldb. Fl. Ross. II (1844–1846) 763 (specim. alt. soong.-kirgh.) non DC.

560 Perennial. Plants 15–70 cm high; stem erect, striate throughout, flocculose-arachnoid or even densely white-tomentose, solitary or few, less often simple, usually branched in upper half or upper one-fourth to one-third, branches upward spreading, winged. Basal leaves numerous, petiolate like sometimes lowermost cauline leaves, less often undivided (f. *integrifolia* Iljin), usually pinnatisect in long, linear, remote lobes,

acuminate, entire, narrowly involute, other cauline leaves sessile, auriculate, semiamplexicaul and decurrent along stem forming broad or narrow, long or short wing, their laminas like basal leaves, becoming progressively simple upward; uppermost leaves undivided, linear and decurrent; all leaves green and glabrous above or usually with finely-arachnoid-hairy pubescence, especially along midrib, smooth or scabrous due to small cartilaginous papillae, finely rugose, with scattered sessile glandular hairs, white-tomentose beneath with prominent midrib, and with numerous sessile glandular hairs under tomentum. Capitula relatively small to medium, aggregated in pyramidal panicle. Involucre cupuliform, 10–15 mm long, with many bracts, almost glabrous to strongly arachnoid-hairy; outer involucre bracts acuminate, green in upper half with very smoothly arcuate cusp and directed sideward, inner row erect, acuminate, purple, with whitish membranous apices, ciliolate, with slightly visible short, appressed bristles and sessile glandular hairs on outer side. Corolla pink or pink-purple, with scattered sessile glandular hairs, 12–15 mm long, narrowed over 5–6 mm length, with 4–5 mm long lobes of limb. Pappus snow-white, (10)12–15 mm long, pappus bristles not connate into ring, serrate-barbate, barbules usually shorter than thickness of hair, achenes brown, glabrous, oblong, obpyramidal, four-angled, weakly ribbed at edges, toothed on upper margin, with pappogenus of various forms at tip. Flowering V–IX; fruiting VI–X.

Feather-grass meadow steppes on sandy-loam, hummocky sands, forested dunes, in pine forests, birch aspen forests on sandy soil, chalk and chalky rubble.—*European Part*: Lower Volga (extreme east), Trans-Volga Region (extreme southeast); *Western Siberia*: Upper Tobol (west); *Soviet Central Asia*: Aralo-Caspian Region (northwest). Endemic. Described from the Uila River Basin in Aktyubinsk Region. Type in Leningrad.

Note. The western boundary of this species is approximately the right bank of the Ural River (known from Urda and Orenburg and stretching up to the Mugodzharsk Mountains and up to the large sandy massifs of Taisugany, Kok-Dzhida, Kuguzyuk-Kum, Bolshie Barsuki); in the latter, this species is replaced by *J. kazachstanica* Iljin. It may be noted that *J. polyclonos* (L.) DC. s. str. is also found in this area, with which *J. transuralensis* possibly hybridizes, as with *J. cyanoides* (L.) DC. and *J. eversmannii* Bge.

561 *Subseries 3. Hamatae* Iljin—Outer and middle involucre bracts uncate only at extreme apex.

16. *J. ciscaucasica* (Sosn.) Iljin comb. n. hoc loco.—*J. polyclonos* ssp. *ciscaucasica* Sosn. in Vestn. Tifl. Bot. Sada, 49 (1920); in Zhurn.

Russk. Bot. Obshch. 11, 1, 2, 196; Grossh. Fl. Kavk. IV, 171.—*J. polyclonos* auct. p. p.: DC. Prodr. VI, 675; Ldb. Fl. Ross. II, 763; Boiss. Fl. or. III, 576.—*Carduus polyclonos* MB. Fl. taur.-cauc. II (1808) 271 p. p.—*Serratula polyclonos* MB. Ibid. Supplementum (1819) 550, syn. excl.

Perennial. Plants 25–60 cm high, distinctly white-tomentose; stems few or even solitary, erect, sulcate-striate, white-tomentose, less often simple, usually branched above middle or in upper one-third. Basal and lower cauline leaves gradually narrowed into petiole, white-tomentose, as if bordering decurrent lamina, pinnatisect (f. *pinnatisecta* Iljin f. n.) into narrow-linear or lanceolate-oblong, entire or dentate-sinuate, acuminate segments, narrowly involute; all leaves undivided (f. *integrifolia* Iljin) or almost entire, with isolated lateral segments; other cauline leaves also pinnatisect or undivided, always decurrent, then stem appearing angular; uppermost leaves linear-filiform, sessile; all leaves usually finely arachnoid-hairy above, more densely along midrib, with small sessile glandular hairs, densely white-tomentose beneath, with prominent midrib. Capitula aggregated in corymbose, less often corymbose-paniculate inflorescence, comprising 5–10, less often up to 20 capitula, occasionally solitary. Involucre broadly cupuliform, 10–12 mm long, up to 20 mm wide, with many bracts at fruiting imbricate, outer rows of bracts powdery-arachnoid-hairy, with scattered sessile glandular hairs, obtusely carinate, dark green or purple at tip; outer bracts shortly-arcuate, subsequent bracts slightly recurved, other bracts straight; innermost bracts prominent, acuminate, with purple tinge, tip ciliolate, whitish-membranous, setulose. Receptacle densely covered with smooth, pointed scales, half as long as involucre or slightly more. Corolla pink-purple, with scattered sessile glandular hairs, 12.5–14.5 mm long, abruptly narrowed over 5–6 mm, with 4–5 mm long lobes of limb, apical appendages of anthers acuminate, 2.5–3 mm long; basal appendages caudate, about 2–2.5 mm long; filaments glabrous. Pappus snow-white, 8–12 mm long, pappus bristles not connate into ring, with barbules shorter than thickness of hair axes, or almost as long; achene whitish, obpyramidal, four-angled, narrowed toward base, with faint parallel stripes on edges, toothed on upper margin, with cupuliform or obtuse dome-shaped pappogenus in center of tip, 3.5–5 mm long. Flowering V–VIII; fruiting VII–X.

562 Hummocky sands and dunes at sea coast, sandy-stony and gravelly places of river valleys in foothills.—*Caucasus*: Ciscaucasia, Dagestan. Endemic. Described from Nalchik. Type in Leningrad.

Note. D.I. Sosnowsky described this plant as a subspecies (1920); actually it is a good species, endemic to the foothills of the main Caucasian Range. I consider the specimens collected by V.I. Lipsky

from the vicinity of Nalchik on July 25, 1893, as the types of the species.

The range of *J. ciscaucasica* (Sosn.) Iljin and *J. polyclonos* (L.) DC. adjoin at the boundary of the lowland and the Ciscaucasian foothills.

17. ***J. kazachstanica*** Iljin sp. n. in Addenda XXVI, 718.—*J. polyclonos* B. Fedtsch. (non DC.). Perech. Rast. Turk. IV (1911) 30 (specim. turg. non DC.); Iljin in Tr. Turk. Nauchn. Obsch. 2, 21 p. p.

Perennial. Plants 20–60 cm high, with long rhizomes covered with brown scales; stems solitary or several, erect, white-tomentose or less often flocculose-arachnoid-hairy, discontinuously winged, less often simple, usually branched above middle; branches upward spreading, weakly deflexed. Basal leaves numerous, petiolate like lower cauline leaves, petiole white-tomentose, shorter than lamina, pinnatisect into linear, oblong, remote, acuminate, entire segments in three to five pairs, obliquely directed upward, less often undivided, oblong, or oblong-linear (f. *integrifolia* Iljin); other cauline leaves sessile, long-decurrent, becoming simple upward to undivided linear or filiform, also decurrent; all leaves green or gray-green above, weakly arachnoid-hairy, especially along midrib or even flocculose-arachnoid-hairy, smooth or rough due to small papillae, finely rugose, revolute, white-tomentose beneath, with numerous sessile glandular hairs under tomentum. Capitula about 10–12 mm wide, aggregated in pyramidal-paniculate or almost corymbose inflorescence, with many florets. Involucre narrow cupuliform or cyathiform-cupuliform, 10–15 mm long, usually white-tomentose, less often arachnoid hairy-flocculose; outer as well as middle involucre bracts with slightly floccose, recurved, dark green or purple tips, exerted from tomentum; bracts of innermost row erect, acuminate, purple, covered on outer side with sessile glandular hairs or rather short, almost punctate bristles, with membranous border, ciliolate, narrowed into pale membranous apex. Receptacle covered with smooth acuminate scales, reaching more than half of involucre height. Corolla pink or pink-purple, with sessile glandular hairs, (10)12–16 mm long, narrowed over 4–5 mm length, with 3–6 mm long lobes of limb. Pappus snow-white, 10–12 mm long, pappus bristles not connate into ring, serrate-barbate, with dense barbels almost as long as thickness of bristle; achenes 5–6 mm long, four-angled, obpyramidal, dark brown, finely longitudinally ribbed, with small teeth above, with somewhat flat pappogenus at tip, slightly dentate along margins and with nectary above. Flowering V–VIII; fruiting VI–IX.

Sandy steppes, hummocky sands of large sandy massifs of semidesert.—*Soviet Central Asia*: Aralo-Caspian Region. Endemic.

Described from the Taisuchan Sands (western Kazakhstan). Type in Leningrad.

18. ***J. pineticola*** Iljin sp. n. in Addenda XXVI, 719.—*J. pollichii* Ldb. Fl. Ross. II (1844–1846) 764 p. p. non DC.—*Serratula cyanoides* Bge. in Ldb. Fl. alt. IV (1833) 41 p. p. non DC.—*J. polyclonos* Korsh. in Izv. Akad. Nauk, 1, 2 (1894) 119.—*J. cyanoides* × *J. polyclonos* Korsh. Ibid. 121 (specim. e Loktjewsk. Irtysh, Semipalatinsk); O. and B. Fedtsch. Perech. Rast. Turk. IV, 301, specim. semipal.—*J. albicaulis* Iljin in Tr. Turk. Nauchn. Obshch. II (1925) 20 p. p. non Bge.—*J. albicaulis* × *J. cyanoides* Schischk. in Kryl. Fl. Zap. Sib. XI (1949) 2933.

Perennial. Plants 15–35 cm high; roots strong, tap roots, vertical, passing over to vertical or horizontal rhizomes, covered with brown scales and shaggy remains of old leaves. Stems usually several, erect or ascending, white-tomentose, less often flocculose-arachnoid, branched above middle or near apex. Basal leaves numerous, usually undivided and entire, narrow-oblong, acuminate, gradually narrowed toward base, almost sessile, less often with some mixture of pinnatifid or pinnatisect into lanceolate or linear-oblong lobes, two or three on each side on short white-tomentose petioles; cauline leaves usually undivided, gradually narrowed toward base, but sessile, not decurrent, auriculate or slightly decurrent, reduced above, to small, filiform, white-tomentose, sessile, nondecurrent leaves, all leaves green on grayish-green above due to the fine arachnoid-hairy pubescence, finely rugose, with large sessile glandular hairs in pits, smooth, less often weakly scabrous, with white-tomentose midrib, more or less narrowly involute, white-tomentose beneath, with prominent midrib and sessile glandular hairs under tomentum. Capitula usually numerous, small, solitary or in groups of two or three in corymb or panicle, with many florets, 10–12 mm long. Involucre cupuliform, 10–12 mm wide; outer involucral bracts arachnoid-hairy, appressed, sometimes slightly recurved, with flat tip, sometimes purple or gray-arachnoid-hairy; inner bracts erect, purple, white-membranous and acuminate, with sessile glandular hairs. Receptacle covered with smooth acuminate scales, reaching almost to half of involucral length. Corolla pink, pink-purple, or sometimes cream-colored, with scattered sessile (10)13–15 mm long glandular hairs, narrowed over 3–5 mm, with 3–5 mm long lobes. Pappus snow-white, up to 10–12 mm long, bristles not connate into ring, barbate, with dense barbules, as long as or slightly exceeding thickness of bristle; achenes (4.5)5–6 mm long, four-angled, obpyramidal, whitish or brownish, glabrous, smooth, 564 striate along edges, finely toothed above, with flat, scarcely serrate pappogenus and nectary at tip. Flowering VI–VIII; fruiting VII–IX.

Forest bands, fringes of pine forests, sand dunes.—*Western Siberia*: Irtysk (southeast). Endemic. Described from Shulbinsk Forest in Semipalatina Region. Type in Leningrad.

Note. An extremely polymorphic species, variable in the cutting of the leaf blade, degree of decurrency of the leaves, and nature of the involucre bracts. An increase of speciation is observed at the eastern edge of the range of the species of section *Cyanoides*.

19. **J. paczoskiana** Iljin in *Izv. Bot. Sada Akad. Nauk SSSR*, XXX, 3–4 (1932) 345; *Klok. in Vozn. Rosl. URSR*, 564; *Bot. Zhurn. URSR*, VIII, 1, 53.—*J. polyclonos* Schm. *Fl. II* (1897) 110 p. p.

Perennial. Plants 30–60 cm high; stems sulcate-ribbed, straight, always arachnoid hairy-tomentose, especially at base, with scattered sessile glandular hairs, less often simple, usually branched, especially in upper half. Lower leaves often up to 25–30 cm long; basal and lowermost leaves on petioles winged almost up to base, wing gradually narrowed toward base, lamina imparipinnate, with few (two to six pairs), rather long, remote, broadly lanceolate or oblong, less often lobes narrower, acuminate or subobtuse, obliquely spreading, entire, sometimes in combination with undivided leaves; middle cauline leaves distinctly decurrent, also divided, but with fewer lobes or abruptly terminating from amplexicaul part into entire, linear or oblong lamina with entire margin; uppermost leaves strongly reduced, filiform, amplexicaul; all leaves green or greenish above, weakly arachnoid-hairy, more distinct along midrib, slightly rugose-punctate, with sessile glandular hairs in pits, canescent beneath due to more dense arachnoid-hairy pubescence with scattered sessile glandular hairs. Capitula medium or large, with many florets. Involucre 15–20 mm long; outer involucre bracts arachnoid-hairy, sharply recurved, with long, glabrous, recurved part, usually exceeding appressed part, and gradually narrowed at tip; outermost row of erect, lanceolate, acuminate, distinctly purple bracts, with barely noticeable appressed bristles and scattered sessile glandular hairs on outer side, ciliolate. Receptacle with smooth acuminate scales, almost half as long as involucre. Corolla pink-purple, with scattered sessile glandular hairs, 16–20 mm long, abruptly narrowed over 7–10 mm length, with 4–6 mm long lobes of limb; pappus 10–15 mm long (with longer bristles), snow-white, with serrate barbules, not connate into ring, serration or barbules shorter or almost as long as thickness of bristle, achenes oblong-obpyramidal, four-angled, cuspidate and usually
565 with oblique hilum, not strongly toothed above, with slightly prominent longitudinal ridges, glabrous, at apex with dome-shaped pappogenus inside corona. Flowering and fruiting: VII–IX.

Compacted sands.—*European Part*: Black Sea Region (vicinity of

Nikolaev). Endemic. Described from the vicinity of Nikolaev. Type in Leningrad.

Subseries 4. Apressae Iljin l.c.—Series *Tenuilobae* Klok. in Bot. Zhurn. Akad. Nauk URSR, VIII (1951) 53 n.n.—All involucre bracts appressed and slightly lax, but not recurved or uncate.

20. **J. tenuiloba** Bge. in Flora, XXIV, 1 (1841) 155; Ldb. Fl. Ross. II, 765 p. p.; Iljin in Fl. Yugo-Vost. IV, 393; Iljin in Tr. Turk. Nauchn. Obshch. 2, 21 (specim. turcom).—**lc.**: Fl. Yugo-Vost., Fig. 700.

Perennial. Plants 25–40 cm high; stems solitary or few, erect, slender, with few branches only at extreme tip or even simple, finely striate-sulcate, finely arachnoid-hairy, white-tomentose only at extreme base, winged. Basal leaves pinnatisect into narrow-linear, acuminate, far recurved lobes, usually three to five on each side and, of course, particularly narrowed gradually into petiole, shorter than lamina; all cauline leaves, except uppermost, sessile, divided in same manner, but with fewer lobes above; all leaves abruptly broadened at base, semiamplexicaul and decurrent; uppermost leaves short, simple, filiform; all leaves green, finely arachnoid-hairy above, more densely arachnoid-hairy along depressed midrib, lustrous, finely rugose, entire or weakly repand, sometimes involute up to midrib, white-tomentose beneath. Capitula one to five, with many florets. Involucre somewhat broadly cupuliform, about 10–12 mm long; all involucre bracts appressed; outermost bracts weakly arachnoid-hairy, oblong, cuspidate, with dark green and purple tips; inner bracts purple, acuminate, membranous above, with sessile glandular hairs and colorless cusps, setulose, indistinctly ciliate. Corolla pink, with sparse sessile glandular hairs, 12–13 mm long, abruptly narrowed over 4 mm length, with about 4 mm long lobes of limb. Pappus snow-white, about 10 mm long, pappus bristles not connate into ring, serrate-barbate, with squarrose barbules, as long as or slightly shorter than thickness of bristle; achenes oblong, obpyramidal, four-angled, pale, glabrous, smooth, with scarcely visible longitudinal, parallel stripes, serrate above, about 5–5.5 mm long, with high pappogenus at apex, terminating in nectary.

Soviet Central Asia: Aralo-Caspian Region (western). Endemic. Described from the vicinity of the former Shevchenko Fort (Novo-Aleksandrovsk). Type in Leningrad.

Note. This species was described by Bunge on the basis of a specimen from the Herbarium of Escholtz with the label "*Carduus cyanoides* e Tataria." Since the original type specimen is lost, I consider the specimen
566 from the vicinity of Shevchenko Fort, collected by Karelin, as the type of the species. In the description of *J. tenuiloba* Bge., Ledebour reported

the following localities: 1) Penza, based on collections of Jacquet; this specimen does not conform to the original description of Bunge; 2) *Sibirica altaica* (apparently, these are collections of Gebler from the Altai); this plant conforms to the description, but it is doubtful if it was collected from the Altai; 3) des. *caspio*—cited from Pallas; I did not see Pallas' specimens; however, Karelin's specimens from Mangyshalk fully agree with Bunge's description; Karelin's label from Novo-Aleksandrovsk (Shevchenko Fort) bears the inscription: "*Jurineo polyclonos* aff. *forsan* sp. nov."

21. *J. tanaitica* Klok. sp. n. in Addenda XXVI, 719.—*J. polyclonos* auct. specim. *tanaitica* non DC.—*J. tenuiloba* auct. sp. *tanaitica* non Bge.

Plants 25–60 cm high. Stem solitary or few, erect, arachnoid-hairy, finely striate, branched, usually discontinuously winged in upper one-third part. Basal and lowermost cauline leaves petiolate, pinnatisect into linear or oblong-lanceolate, entire, acuminate segments, petioles whitish arachnoid-hairy; other cauline leaves, except uppermost, undivided, small and short-filiform, pinnatisect or even undivided, sessile with semiamplexicaul auricles, decurrent; all leaves green, lustrous, and glabrous above, with depressed midrib, arachnoid-hairy, or lamina entirely finely arachnoid-hairy, densely white-tomentose beneath. Capitula numerous, in corymbose-paniculate inflorescence, small. Involucre cupuliform, 10–12(15) mm long, usually, except innermost row, arachnoid-hairy, less often almost glabrous, all bracts imbricate and compactly appressed; outer bracts short, oblong, acuminate, with dark green tips; inner bracts prominent, linear-lanceolate, acuminate, with scattered sessile glandular hairs on outer surface or with appressed, scarcely visible short bristles, or with both, light purple, terminating in white membranous cusp, slightly ciliate along margin. Receptacle densely squamose with smooth acuminate scales, up to half as long as involucre or slightly longer. Corolla pink-purple, with scattered sessile glandular hairs, 12–14 mm long, narrowed over 4–5 mm length and with 3.5–5 mm long lobes of limb; apical appendages of anthers about 2–2.5 mm long; basal appendages caudate, about 2 mm long. Pappus up to 10 mm long, snow-white, with serrate-barbate bristles, not connate into ring, with barbules as long as diameter of bristle or slightly shorter; achenes pale, glabrous, four-angled, obpyramidal, 3.5–5 mm long, with parallel striations on edges, somewhat serrate, with patellate or smooth dome-shaped pappogenus at tip. Flowering VI–VII; fruiting VII–IX.

Sands of the Don River Valley in the lower and middle reaches and along its tributaries.—*European Part*: Lower Don. Endemic. Described from the Chir River Valley near the village of Oblivskaya. Type in Leningrad.

- 567 22. **J. thysiflora** Klok. in Bot. Zhurn. URSR, VIII, 1 (1951) 53; Vozn. Rosl. URSR, 555.—*J. polyclonos* auct. mult. ucr.—**lc.**: Klok. op. cit. Fig. 9.

Perennial. Plants 25–80 cm high, with solitary or few stems. Stems grayish-arachnoid, finely striate, strongly branched from middle or even below. Basal and lower cauline leaves numerous, petiolate, usually pinnatisect into linear or oblong-linear, entire, acuminate, often somewhat arcuate segments; other cauline leaves also pinnatisect, long-decurrent on stem; uppermost leaves, especially in inflorescence, linear, undivided, reduced; all leaves green, glabrous, lustrous above, often with arachnoid-hairy depressed midrib or entirely arachnoid hairy-pubescent and with scattered sessile glandular hairs, white-tomentose beneath. Capitula very small, usually numerous, with many florets, in corymbose-paniculate inflorescence. Involucre cupuliform, about 10 mm long; involucre bracts imbricate, grayish arachnoid-hairy; outer bracts shorter, oblong-lanceolate, with dark purple or dark green apices, slightly deflexed (not appressed); innermost bracts linear-lanceolate, acuminate with membranous apex, and sessile glandular hairs on outer side. Receptacle squamose with numerous, smooth, acuminate scales, up to half as long as involucre or longer. Corolla pink-purple, with scattered sessile 11–13 mm long glandular hairs, abruptly narrowed over 4–5 mm length, with 3–4 mm long lobes of limb, apical appendages of anthers about 2 mm long, basal appendages caudate, about 2 mm long, filaments glabrous; style smooth. Pappus snow-white, about 10 mm long, pappus bristles serrate-barbate, barbules dense, shorter than thickness of bristle, connate or not into ring; achenes 3–4.5 mm long, pale, glabrous, smooth, elongate, obpyramidal, gradually narrowed toward base, toothed above, with flat, slightly dome-shaped pappogenus at extreme tip. Flowering VI–VIII; fruiting VIII–X.

Sands in the valleys of the Dnieper, Oskol, northern Donets and Don, mainly restricted to the left bank of Ukraine.—*European Part*: Lower Don (northwestern part); Black Sea Region; Volga-Don (western), middle Dnieper. Described from the vicinity of Dnepropetrovsk from the Chepelskii Island.

Section 2. Bellae Iljin sect. n. in Addenda XXVI, 720.—*Section Subacaules* Boiss. Fl. or. III (1875) 582 p. p. non Benth.: Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 198.—Perennial plants. Stem scapose, or capitula sessile. Leaves rosulate; pappus persistent, serrate or serrate-barbate, and bristles not connate into ring. Achenes 2.5–3(4–5) mm long, glabrous, smooth or usually with parallel longitudinal striations, toothed above, not forming a true corona. Pappogenus developed, pappophorus absent. A plant of alpine and subalpine mountain zone of Caucasia. Type of section: *J. cadmea* Boiss.

- 568 1. Leaves undivided and entire, narrowly lanceolate, acuminate, gradually narrowed toward base into petiole, sometimes almost graminous 2.
 + Leaves usually pinnatisect, pinnate, lobate, or lyrate, if undivided and entire, then of different shape and not acuminate 3.
2. Leaves glabrous above, white-tomentose beneath 23. **J. pumila** Alb.
 + Leaves glabrous on both sides, green, scabrous above due to papillae 24. **J. woronowii** Iljin
3. Leaves undivided and entire, oval, oblong or oblong-obovate; roundish at apex, obtuse or with short cusp. Pappus almost as long as achene. Achenes about 2.5–3 mm long
 25. **J. bellidioides** Boiss.
 + Leaves variously divided 4.
4. Leaves green on both sides 5.
 + Leaves grayish arachnoid-hairy beneath or usually white-tomentose 7.
5. Leaves pinnatilobate, with wide, ovate, obtuse lobes almost as broad as winged leaf rachis, and almost as long as sinuses between lobes. Pappus with fine bristles equaling human hair in thickness, sparsely serrate. Achenes about 3 mm long 28. **J. sosnovskiyi** Grossh.
 + Leaves pinnatipartite into oblong-linear, remote segments. Pappus bristles two times as thick. Achenes about 5 mm long 6.
6. Rosettes reaching to half of scape or more, sometimes exceeding capitula. Leaves 5–15 mm wide; segments of lamina 3–10 mm long, all entire, usually acute or acuminate, especially terminal segments, distinctly obliquely spreading. Involucral bracts appressed, sometimes slightly decurved 26. **J. iljinii** Grossh.
 + Rosettes not reaching to half of scape. Leaves usually 20–40 mm wide, segments 10–20 mm long, mostly with solitary teeth or short lobes at base, obtuse or subobtuse, sometimes with short cusp, obliquely spreading or almost horizontal. Involucral bracts contorted 27. **J. venusta** Iljin
7. Leaves pinnatipartite, with obtuse lobes, usually broader than sinuses between them. Capitula sessile, occasionally on short peduncle, large 32a. **J. filicifolia** Boiss.
 + Leaves of different type. Scape longer than leaves 8.
8. Leaves pinnatisect in thin, linear or oblong-linear segments as broad as narrowly bordered scape and narrower than sinuses between them, acuminate, acute, cuspidate, or less often obtuse. Pappus four times as long as achene
 31. **J. coronopifolia** Somm. and Lev.
 + Leaves lyrate or pinnatipartite, with oblong-obovate, always obtuse
- 569

- lobes, usually as broad as sinuses or broader, or sinuate-cristate, with less divided apex, less often almost undivided 9.
9. Leaves sparsely arachnoid-hairy above, weakly scabrous. Pappus two to two and one-half times as long as achene, with sparse serration..... 32. **J. cartaliniana** Boiss.
- + Leaves always glabrous and smooth above 10.
10. Leaves with deeply depressed veins above, midrib as well as lateral veins, distinctly punctate under high magnification, with more or less approximate lobes. Involucral bracts straight, erect, not recurved, somewhat lax. Corolla 18–20 mm long. Pappus several times as long as achene with sparse barbules 29. **J. annae** Sosn.
- + Leaves with somewhat depressed midrib, not punctate, lobes never approximate. Involucral bracts arcuate and somewhat differently curved. Corolla about 15 mm long. Pappus almost as long as achene or slightly longer, densely barbate 30. **J. levieri** Alb.

Series 1. Integrae Iljin.—All leaves undivided and entire.

23. **J. pumila** Alb. in Bull. Herb. Boiss. I (1893) 243; Tr. Bot. Sada, XVI, 268; Grossh. Fl. Kavk. IV, 169; Sosn. Zhurn. Russk. Bot. Obshch. 11, 1–2, 198.—*J. pumila* Alb. var. *major* Alb. Prodr. Fl. Colh. (1895) 745.—**lc.**: Fl. Gruzii, VIII, Plate 408; Alb. op. cit. (1893) t. IX, 3, 4 and 5.—**Exs.**: GRF No. 3249.

Perennial. Plants 10–40 cm high; caespitose, usually with short vertical rhizome, covered with dark brown scales, producing roots. Stems scape-like, solitary, few, erect, cylindrical, sulcate, arachnoid-hairy, with fairly scattered sessile glandular hairs, usually exceeding leaves. All leaves in basal rosette, numerous, erect, narrow-lanceolate or linear, acuminate, undivided and entire, less often, usually in large forms, largely and sparsely retrorsely serrate in upper part, glabrous, lustrous and weakly rugose above with depressed midrib, very narrowly involute, white-tomentose beneath with numerous sessile glandular hairs and prominent brownish midrib. Capitula solitary, with many florets. Involucre cupuliform, 2–3.5 cm wide; involucral bracts four- or five-rowed; outer row weakly arachnoid-hairy, linear, herbaceous, acuminate, arcuate in upper part, usually slightly contorted and lax; innermost bracts more or less erect, broader, three- to seven-veined, narrowed apically into long, often aristate cusp; all bracts with scattered sessile glandular hairs. Corolla pink-purple, usually glabrous, 14–18 mm long, narrowed over 5–7 mm length from base, with lobes of limb 4–6 mm long, apical appendages of anthers 2–3 mm long, basal appendages 2.25–3 mm long, flexuous-caudate; stigma about 2 mm long, with short papillae on outer

side, style glabrous. Pappus of numerous unequal bristles, 12–15 mm long, not connate into ring, very short-barbate, almost serrate-barbate; achenes 4–5 mm long, four-angled, glabrous, dark brown, light colored at base, with corona of long simple teeth above, modified along edges in long parallel ridges. Flowering and fruiting VII–VIII.

On rocks, especially limestone rocks in alpine belt.—*Caucasus*: Ciscaucasia, western Transcaucasia. Endemic. Described from Abkhazia, from the Akhalibokh Mountains. Type in Florencè.

24. **J. voronowii** Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1 (1933) 185; Grossh. Fl. Kavk. IV, 169.

Perennial. Entire plant green, 12–20 cm high, with branched dark caudex, densely covered with narrow blackish remains of dead leaves, and rosette of basal leaves above. Stems leafless, erect, simple, distinctly finely sulcate, terminating in solitary capitula, almost two times as long as leaves, with arachnoid-hairy pubescence throughout. Leaves rosulate, numerous, 5–10 cm long, narrowly-lanceolate, sometimes almost linear, undivided and entire, or occasionally with isolated teeth, acuminate, convolute, gradually narrowed toward base into petiole, green on both sides, with single vein, finely rugose above due to distinct papillae, densely glandular-hairy beneath. Capitula 20–25 mm across. Involucre cupuliform, in upper part 1.5–2.0 mm long, glabrous or with only scarcely visible, weakly arachnoid-hairy pubescence, purple, yellowish-green at base; bracts linear, almost equal with long, thin, contorted, smooth apical appendage. Corolla pink-purple, 16–17 mm long, narrowed over 7–8 mm length, with 5–6 mm long limb; basal appendages of anthers 3 mm long, setose, divided at apex; filaments smooth, inserted at junction of broad and narrowed parts of corolla. Pappus with relatively long-serrate, snow-white bristles with teeth shorter than thickness of bristles, dense; achenes (immature) four-angled, glabrous and smooth. Flowering VII–VIII; fruiting VIII–IX(?).

Alpine zone of mountains.—*Caucasus*: Ciscaucasia. Endemic. Described from Abshier-Akhub. Type in Leningrad.

Series 2. Micrachaneniae Iljin.—Achenes small; pappus equal or shorter than achene.

25. **J. bellidioides** Boiss. Fl. or. III (1875) 583; Grossh. Fl. Kavk. IV, 169; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 198.

571 Perennial. Plants about 10 cm high, caespitose. Rhizomes densely covered with hardened remains of old leaves; stems scape-like, cylindrical, erect, sulcate, arachnoid-hairy, terminating in single capitulum. Leaves rosulate, petiolate, broadened at attachment, lamina

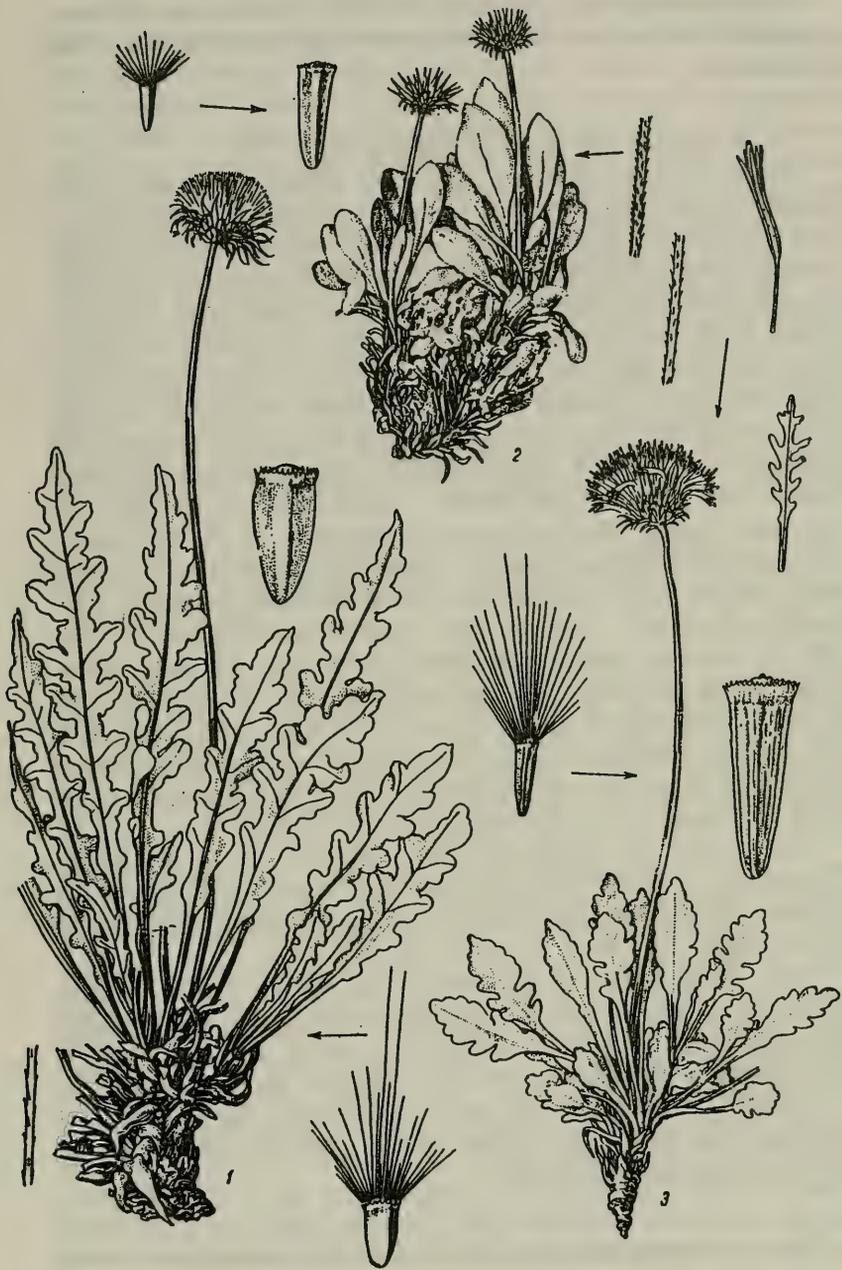
oblong-ovate, undivided and entire, less often very first leaves lyrate or incised-pinnatifid, obtuse or with very short cusp, less often subacute, green with fine arachnoid-hairy coating and whitish midrib above, finely rugose with sessile glandular hairs in pits, white-tomentose beneath, with numerous sessile glandular hairs and brownish midrib, scarcely shorter than scape. Capitula relatively small. Involucre cupuliform, 10–15 mm wide; outer involucre bracts arachnoid-hairy, narrowly lanceolate or almost linear, squarrose in upper half, smoothly recurved, acuminate, innermost bracts erect, broader, three- to five-veined, narrowed apically in membranous cusp. Pappus as long as achenes or slightly shorter, pappus bristles serrate-barbate, with dense serrations, not connate into ring; achenes usually 2.5 mm long, pale, glabrous, toothed above. Fruiting VIII–IX. (Plate XLII, Fig. 2.)

On slopes in alpine belt.—*Caucasus*: Central Caucasia. Endemic. Described from Alagir near the Ardon River. Type in Leningrad.

Series 3. Tenuisectae Iljin.—Leaves with linearly divided segments.

26. **J. iljinii** Grossh. in Dokl. Akad. Nauk AzerbSSR, III, 9 (1947) 166.

Perennial. Plants 8–25 cm high, with branched rhizome; stems simple, scape-like, leafless, erect, cylindrical, sulcate and finely ribbed, finely and sparsely arachnoid-hairy, with scattered whitish papillae, especially below. Leaves rosulate, numerous, narrowly oblong, first leaves often undivided or almost undivided, others pinnatifid, with entire lobes remote and obliquely spreading, with broad stripe, bordering leaf rachis, narrowly convolute, gradually narrowed toward base into usually dirty-purple petiole, light green on both sides, with pale midrib, scabrous due to short scattered papillae, with fine, sparse, sessile glandular hairs, glabrous, with tufts of fine hairs at isolated places along midrib. Capitula solitary, with many florets. Involucre cupuliform, usually 25–30 mm wide, glabrous or weakly arachnoid-hairy below; outer involucre bracts somewhat decurved above, herbaceous, slightly purple in remaining part, more or less appressed; bracts of innermost row erect, weakly purple. Corolla pink-purple, glabrous 14–18 mm long, narrowed over 6–9 mm length, with 5–7 mm long lobes of limb; apical appendages of anthers 572 about 2.5 mm long, basal appendages flexuous-caudate, of same length; style glabrous, stigma 1.5–2 mm long, with tuft of basal bristles, and more or less large papillae outside. Pappus smooth, 12–15 mm long, with few thicker and longer bristles, pappus bristles barbate, barbules dense, shorter than thickness of bristles, not connate firmly into ring; achenes immature, about 5 mm long, smooth, glabrous, with long-toothed apical corona. Flowering VII–VIII; fruiting VIII.



Subalpine meadows.—*Caucasus*: Western Transcaucasia. Endemic. Described from the Urup River Basin, and from Atsgara Mountain. Type in Leningrad.

27. *J. venusta* Iljin sp. n. in Addenda XXVI, 720.

Perennial. Plants 25–30 cm high. Stem solitary, finely striate, with scattered sessile glandular hairs, finely and sparsely arachnoid-hairy at some places, with small filiform leaflet in middle. Leaves rosulate, gradually narrowed into petiole, pinnatisect into oblong-linear, subobtuse, entire, 2–3 mm wide segments, occasionally with small cusp, often with solitary teeth near base or short obtuse lobes, convolute, as wide as rachis and separated from each other by three to three and one-half times their width, obliquely spreading or almost horizontal; all leaves pale green on both sides, glabrous, scabrous due to short papillae, with depressed veins and few sessile glandular hairs above, often glandular beneath with prominent pale midrib. Capitula about 30–35 mm wide, with many florets. Involucre broadly cupuliform, 18–22 mm long, at base somewhat arachnoid-hairy or completely glabrous, with narrow-linear, almost equal, contorted lax bracts; inner bracts usually erect. Corolla pink-purple, 12–13 mm long, abruptly narrowed over 5–6 mm, with 4–5 mm long lobes of limb. Pappus about 10–12 mm long, smoky, pappus bristles not connate into ring, serrate-barbate, with sparse barbules as long as thickness of bristle or shorter; achenes about 5 mm long, pale, glabrous, oblong, compressed, four-angled, with longitudinal parallel striations on edge, nonuniformly toothed above, with pappogen in center of tip, and nectary on it. Flowering VII–VIII; fruiting VIII.

Stony places in meadows in the subalpine zone.—*Caucasus*: Ciscaucasia, western Transcaucasia (northwest). Endemic to the mountains of Krasnopolyansk Region. Described from the upper reaches of the Malaya Laba River. Type in Leningrad.

Note. Three species of the section, *J. sosnovskyi* Grossh., *J. iljinii* Grossh. and *J. venusta* Iljin, with glabrous incised leaves, are distributed in the adjoining mountainous regions; the species described from the upper reaches of the Malaya Laba River and from the Aigbi Mountains, *J. sosnovskyi*, is found in the region of the Rocky Range, along the 574 Bolshaya Laba River, and *J. iljinii* Grossh. along the Urup River; all the species are narrow endemics.

Series 4. Pinnatilobae Iljin.—Leaves with broad, usually ovate lobes.

28. *J. sosnovskyi* Grossh. in Dokl. Akad. Nauk AzerbSSR, III, 4 (1947) 165.—*lc.*: Grossh. Ibid. 166 (only leaf).

Perennial. Plants up to 20–25 cm high, with branched rhizomes. Stem solitary, scape-like, almost two times as long as leaves, erect, brownish, cylindrical, sulcate-ribbed, densely covered with numerous hairs, eglandular. Leaves 5–14 cm long, oblong-lanceolate, pinnatipartite, with ovate or oblong-ovate, obtuse lobes, usually with scarcely visible one or two lobules at base, with broadly winged axis, usually somewhat obliquely spreading, green, with pale midrib, and similar hairs on both sides, as on stem, at isolated places with sparse groups of sessile glandular hairs beneath. Capitula solitary. Involucre cupuliform, 15–20 mm wide; involucre bracts four- or five-rowed, linear-lanceolate, acuminate, lax, squarrose; inner row of bracts erect, with long cusps and scattered sessile glandular hairs. Corolla about 15 mm long, narrowed over 6 mm, with lobes of limb about 5 mm long. Pappus smoky, with few bristles, bristles serrate, not connate into ring; achenes 3–4 mm long, smooth, glabrous, brownish in upper half, whitish-yellowish in lower, with distinct longitudinal ribs and corona of long teeth above. Fruiting IX. (Plate XLII, Fig. 1.)

Rocks of high mountain belt.—*Caucasus*: Ciscaucasia. Endemic. Described from the Bolshaya Laba River Basin from the Rocky Range. Type in Leningrad.

29. **J. annae** Sosn. in Zam. Sist. Geogr. Rast. Tbil. 13 (1947) 61; Shkhiyan in Fl. Gruzii, VIII, 455.—**Ic.**: Sosn. op. cit. Fig. on page 64.

Perennial. Plants 12–15 cm high. Rhizome vertical, covered with broad remains of old leaves; stem scapose, densely white-tomentose, usually with single filiform, small, white-tomentose leaf slightly below capitulum. Leaves only basal, distinctly shorter than stem, lyrate or almost pinnatipartite, oblong-obovate or oblong-elliptical, former with large obtuse terminal and usually short-cuspidate and semicircular lateral lobes, narrowed toward petiole; latter with similar but usually oblong and also obtuse or boldly-sinuate lateral lobes, approximate in upper one-third, reduced toward base and separated from each other, green, glabrous, and punctate above, sometimes arachnoid-hairy basally along midrib, with depressed veins, densely white-tomentose beneath, with sessile glandular hairs hidden under tomentum, short petiolate, petiole white-tomentose, almost one-third as long as lamina. Capitula solitary terminal, with many florets, 20–25 mm wide. Involucre broadly cupuliform, 17–20 mm long, floccose-arachnoid-hairy at base, involucre bracts erect, but slightly divaricate, linear-subulate; outer bracts slightly shorter, all acuminate, innermost bracts long and almost aristate. Corolla pale pink, 18–20 mm wide, abruptly narrowed over 8–9 mm, with lobes of limb about 6 mm long; apical appendages of anthers about 3 mm long, acuminate. Pappus snow-white, 13–15 mm long, 8–10 times as

long as immature achenes, pappus bristles not connate into ring, serrate-barbate, with barbules as long as or shorter than thickness of bristle; achenes immature, pale, glabrous, four-angled.

On limestone rocks.—*Caucasus*: Eastern Transcaucasia. Endemic. Described from Georgia, from the vicinity of the village of Chmi, from the Didneua Kom Ravine. Type in Tbilisi.

30. *J. levieri* Alb. in Bull. Herb. Boiss. II (1894) 257; Prodr. Fl. Colch. (1895) 145; Shkhiyan in Fl. Gruzii, VIII, 455; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 199; Grossh. Fl. Kavk. IV, 171.—*lc.*: Fl. Gruzii, VIII, 410; Iljin, Kauchuk i Kauchukonosy, II (1953) 501, Fig. 1; Alb. op. cit. (1894) tab. IX.

Perennial. Plants usually 12–25 cm high, with rather long rhizome, covered with hardened dark brown remains of old leaves. Stem solitary, scape-like, erect, cylindrical, sulcate-cylindrical, weakly arachnoid-hairy, brownish. Leaves rosulate, gradually narrowed into petiole, shorter than stem, lyrate, with large, oblong or oblong-ovate, short-cuspidate terminal lobe, narrowed towards base in ever decreasing, obtuse, ovate lobes or lobes equally long in middle part of lamina and oblong-obovate and reduced only at base, or lamina at extreme tip undivided, obtuse, not incised below into large teeth or oblong lobes, sometimes, in turn, somewhat toothed; all leaves green, glabrous, lustrous, and finely rugose above, white-tomentose beneath, with numerous sessile glandular hairs under tomentum, and prominent ferruginous midrib. Capitula solitary, with many florets. Involucre cupuliform; outer bracts herbaceous, usually arachnoid-hairy, acuminate, arcuate and somewhat irregularly curved; innermost bracts erect, gradually narrowed into long membranous cusp, almost glabrous. Receptacle covered with smooth acuminate scales up to one-third as long. Corolla pink-purple, with sessile glandular hairs about 15 mm long, narrowed over 6 mm, with 4–4.5 mm long lobes of limb. Pappus distinctly exceeding achene, smoky, with serrate-barbate hairs and dense barbules, not connate into ring; achenes about 4 mm long, light-colored, toothed above, with teeth modified into weakly developed parallel ridges along borders. Flowering VII; fruiting VIII.

576 Limestone rocks in alpine belt.—*Caucasus*: Ciscaucasia. Endemic. Described from Akhzhkhcha in Karachaevo-Cherkesskaya Autonomous Region. Type in Leningrad.

Series 5. Humilae Iljin.—Plants short, sometimes stemless; leaves divided into more or less approximate segments; outer involucre bracts arcuately recurved.

31. *J. coronopifolia* Somm. and Lev. in Tr. Peterb. Bot. Sada, XIII (1893) 48; XV (1900) 270; Sosn. in Zhurn. Russk. Bot. Obshch. XI,

1–2, 199; Grossh. Fl. Kavk. IV, 171; Fl. Gruzii, VIII, 456.—*J. filicifolia* var. *akinfiewii* Winkl. in sched. ex Sosn. l.c.—Ic.: Tr. Peterb. Bot. Sada, XVI, Plate XXVIII.

Perennial. Plants 5–20 cm, less often up to 25–30 cm high, with long, creeping, reddish-brown rhizomes, covered with large dark brown scales. Stems scape-like, erect, sulcate-ribbed, sparsely and finely arachnoid-hairy, glabrescent, with scattered sessile glandular hairs. Leaves rosulate, gradually narrowed into petiole, usually sparsely pinnatisect, fairly narrowly winged, with narrow linear or oblong segments, entire or in lower part toothed or with short lobes, somewhat antrorse, less often horizontal, narrowly convolute, green, usually glabrous above, less often weakly arachnoid-hairy, lustrous, usually weakly rugose, with depressed veins and scattered sessile glandular hairs in pits, white-tomentose beneath or canescent, with prominent veins, densely covered with sessile glandular hairs. Capitula solitary, with many florets. Involucre cupuliform, 20–30 mm wide, weakly arachnoid-hairy or almost glabrous, with or without sessile scattered glandular hairs, involucre bracts imbricate, four- or five-rowed; outer bracts with long herbaceous apices, arcuately recurved; bracts of inner row narrowed from broader membranous-frill and purple lower half into thin, usually aristate and often flexuous, membranous apex. Receptacle densely covered with smooth, long, acuminate, scales. Corolla pink, glabrous, 14–17 mm long, narrowed over 5–7 mm, with 4–7 mm long lobes of limb. Pappus smoky or smoky-pink, 12–13 mm long, with unequal bristles, serrate-barbate, with dense barbules, not connate into ring and not divided; achenes up to 3 mm long, obpyramidal, four-angled, pale, glabrous and smooth, with corona of elongate teeth above, modified at border as indistinct ridges, pappogen at apex cupuliform. Flowering VI–VIII; fruiting VII–IX.

Alpine and subalpine belts, on rocks, limestone deposits.—*Caucasus*: Ciscaucasia, western Transcaucasia. Endemic. Described from Kuban. Type in Florence; cotype in Leningrad.

577 *Note.* This species occurs in two forms: pappus and achenes with few pale bristles (f. *paucisetacea* Iljin), or with smoky-pink, dense bristles on the pappus (f. *multisetacea* Iljin). The latter plants have thicker achenes.

32. *J. cartaliniana* Boiss. Fl. or. Suppl. (1889) 311; Grossh. Fl. Kavk. IV, 170; Fl. Gruzii, VIII, 452; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 199.

Perennial. Plants 5–25 cm high, caespitose, with strong rhizomes, covered with rather hardened remains of old leaves. Stem scape-like, cylindrical, usually erect, sulcate-cylindrical, slightly arachnoid-hairy,

with scattered sessile glandular hairs, always longer than leaves, sometimes several times as long. All leaves rosulate, gradually narrowed into petiole, with oblong-lanceolate, oblong-obspatulate, or oval lamina, pinnatipartite or pinnatilobate, to almost undivided, with oblong or roundish lobes, coalescing near leaf rachis forming winged axes, green or greenish, finely arachnoid-hairy, with white arachnoid-hairy midrib above, finely rugose, with sessile glandular hairs in pits, white-tomentose beneath, with numerous sessile glandular hairs and ferruginous midrib. Capitula relatively small, with many florets. Involucre cupuliform, 20–25 mm wide, weakly arachnoid-hairy in lower half, with scattered glandular hairs; outer bracts lax, herbaceous-green, arcuately deflexed, middle bracts acute, inner erect, acuminate, purple. Receptacle covered with smooth acuminate scales, almost up to half as long as involucre. Corolla pink-purple, with sessile glandular hairs, about 14 mm long, narrowed over 6 mm length, with about 4 mm long lobes of limb; apical appendages of anthers 2.5–3 mm long, acuminate, basal appendages caudate, 2.5–3 mm long. Pappus two times as long as achenes (including longest bristles up to apex), yellowish-whitish, bristles sparsely serrate, not connate into ring; achenes 4.5–5 mm long, glabrous, light brownish, lighter below with toothed border, teeth of corona continued along border as parallel striations. Flowering V–VI; fruiting VI–VIII. (Plate XLII, Fig. 3.)

Rocks in high mountains.—*Caucasus*: Ciscaucasia. Main range, eastern and southern Transcaucasia. Endemic. Described from Kartalinia, between Akhaltsikh and Borzhomi. Type in Finland; cotype in Leningrad.

32a. *J. filicifolia* Boiss. Fl. or III (1875) 582; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 198; Grossh. Fl. Kavk. IV, 170; Fl. Gruzii, VIII, 451.—*lc.*: Fl. Gruzii, VIII, Plate 409.

578 Perennial. Plants 3–5 cm, less often up to 10 mm high, with branched rhizomes, caespitose, stemless or with slightly developed, scape-like, arachnoid-hairy stems. Leaves rosulate, exceeding stem, or less often as long, oblong, more or less short-petiolate, pinnatisect or pinnatipartite, with oblong-ovate or ovate, less often entire lobes, usually obtusely toothed or sinuate, reduced both upward and downward on lamina, approximate on rachis with sinuses between them smaller than width of lobes, coalesced at base forming winged rachis, green, weakly arachnoid-hairy, glabrescent, somewhat rugose with depressed veins and scattered, very small, sessile glandular hairs above, white-tomentose beneath, also with fine sessile glandular hairs under tomentum. Capitula medium, with many florets. Involucre cupuliform; involucre bracts five-rowed, linear, outer bracts arachnoid-hairy, herbaceous-green in upper half, acute and

arcuately recurved; inner bracts erect, narrowed into membranous finely arcuate apex. Pappus 12–15 mm long, smoky with numerous serrate-barbate bristles, not connate into ring, and not shedding off at fruiting; achenes 3 mm long, grayish, obpyramidal, four-angled, glabrous, toothed, each tooth with two or three denticles, modified as ridge. Flowering VI–VIII; fruiting VIII–IX.

Rocks in alpine belt.—*Caucasus*: Ciscaucasia (main range). Endemic. Described from Alagir near Ardon River. Type in Leningrad.

Section 3. Stenocephalae Benth. and Hook. Gen. pl. III (1873) 473; Pflanzenfam. IV, 3, 321.—§1. *Linearifoliae* Boiss. Fl. or. III (1875).—§3. *Pinnatae* l.c. 568 (quoad *J. pulchellam* DC.) p. p.—Plants branched at anthesis; leaves undivided and entire (excluding *J. pulchella* DC.); involucre narrow, with nonprickly bracts; pappus comprising serrate or serrate-barbate bristles, not connate into ring (see, however, *J. kapelkini* O.-Fedtsch.), teeth approximate. About six species, of which four species in the USSR.

1. Lower leaves pinnatisect.....
 35. **J. pulchella** (Fisch. and Mey.) DC.
 + All leaves undivided and entire 2.
 2. Capitula solitary; pappus deciduous; pappophorus present.....
 36. **J. kapelkinii** O. Fedtsch.
 + Capitula in corymbose inflorescence; pappus persistent; pappophorus
 absent 3.
 3. Capitula in simple corymb; leaves filiform or linearly filiform,
 sessile, nondecurrent; involucre white arachnoid hairy-flocculose;
 corolla usually 16–18 mm long; pappus 15–20 mm long; achenes
 7–7.5 mm long, glabrous, smooth
 34. **J. stoechadifolia** (MB.) DC
 + Capitula in compound corymbs; leaves linear or lanceolate,
 sometimes even oblong-ovate, sessile, usually semiamplexicaul and
 slightly decurrent; involucre glabrous or only slightly farinose-
 arachnoid-hairy, 10–15 mm long; corolla 13–17 mm long; pappus
 far exceeding achene; achenes 3.5–5 mm long, dark brown, often
 with white-cartilaginous ribs, transversely rugose
 33. **J. multiflora** (L.) B. Fedtsch.

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Note. Besides the species treated above, the Iranian species *J. heterophylla* (Jaub. and Spach.) Boiss. is also included in this section. Boissier assigns *J. pulchella* DC. to section *Pinnatae* Boiss., which, furthermore, includes extremely unlike species.

Series 1. Linearifoliae Iljin.—Leaves undivided with entire margin.

33. **J. multiflora** (L.) B. Fedtsch. in O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 295; Iljin in Fl. Yugo-Vost. VI, 389; Vozn. Rosl. URSS 564; Krylov, Fl. Zap. Sib. XI, 2930.—*J. linearifolia* DC. Prodr. VI (1837) 675; Ldb. Fl. Ross. II, 761; Boiss. Fl. or. III, 571; Schmalh. Fl. II, 109; Grossh. Fl. Kavk. IV, 169; Iljin in Tr. Turk. Nauchn. Obshch. II, 16; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 194.—*J. ambigua* DC. Prodr. VI (1837) 675 non al.—*Serratula multiflora* L. Sp. pl. (1753) 1145; MB. Fl. taur.-cauc. II, 265; III, 547; Ldb. Fl. alt. IV, 41.—*S. salicina* Pall. It. III (1776) 682.—*S. salicifolia* Lepech. It. I (1795) 262.—*Serratula ambigua* DC. in Ann. Mus. Hist. Nat. XVI (1810) 186.—*S. tincta* Cass. in Dict. sc. nat. XLVI (1826) 476.

Perennial. Plants 10–50 cm high. Rhizomes slender, long, usually branched; stems several or solitary, erect or bent, ribbed-sulcate, green or dirty purple, whitish-gray throughout or only below due to arachnoid hairy-flocculose pubescence, with scattered sessile glandular hairs, branched in inflorescence. Leaves lanceolate, oblong, or linear, acuminate, green, less often finely arachnoid-hairy, and scabrous above due to numerous short papillae, less often without papillae, slightly rugose, with scattered, very small sunken glandular hairs, ash-gray or whitish beneath due to fine arachnoid-hairy tomentum, less often green on both sides (f. *subglabra* Serg.), with prominent midrib, undivided and entire, occasionally lower and middle leaves sparsely serrate (f. *serrata* Iljin); cauline leaves sessile, often amplexicaul, sometimes auriculate (f. *auriculata* Iljin), shortly or even strongly decurrent, sometimes lateral (f. *ambigua* Iljin); basal and lowermost cauline leaves gradually narrowed in petiole, all involute often up to midrib. Capitula most numerous, in corymbose inflorescence, small. Involucre cylindrical, slightly narrowed at base, usually 10–15 mm long and 3–5 mm wide, glabrous or slightly farinose-arachnoid hairy, pale or purple; involucre bracts with dark green or purple prominent midrib, membranous along margin; outer bracts oblong-ovate, subobtuse, middle bracts oblong, inner lanceolate-linear, acuminate; all bracts appressed, with scattered sessile glandular hairs. Receptacle covered with long, smooth, acuminate scales, reaching to one-third of involucre or even to its tip.

580 Corolla pale pink or purple, less often creamish, 13–17 mm long, more or less abruptly narrowed into 5–7.5 mm long tube, with 4–5 mm long lobes of limb, having scattered sessile glandular hairs; apical appendages of anthers abruptly narrowed, about 2 mm long; basal appendages caudate, about 1.25–1.5 mm long; stigma 1.25–1.5 mm long; style glabrous; filaments glabrous, smooth. Pappus snow-white, 8–12 mm long, with serrate bristles, dense, shorter than its thickness, not connate into ring, persistent; achenes 3.5–5 mm long; obpyramidal, four-angled, glabrous, smooth, dark brown, often with white cartilaginous ribs, at

edges mildly transversely rugate-rugose, with sharp-toothed corona having filiform pappogenus in center, and nectary at tip. Flowering VI–VIII; fruiting VII–IX.

Forest-steppe, steppe and semidesert zones, where it grows in feather-grass covered, stony, saline steppes and saline meadows, on wastelands and among crops.—*European Part*: Bessarabia, Black Sea Region, Crimea, Middle Dnieper, Volga-Don, Lower Don, Volga-Kama, Trans-Volga Region, Lower Volga; *Caucasus*: Ciscaucasia; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Angara-Sayans (south). *General distribution*: Western China (Sinkiang). Mongolia. Type in London.

34. **J. stoechadifolia** (MB.) DC. Prodr. VI, 674; Ldb. Fl. Ross. II, 762; Boiss. Fl. or. III, 571; Schmalh. Fl. II, 109; Vozn. Rosl. USSR, 564; Grossh. Fl. Kavk. IV, 169; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 194.—*Serratula stoechadifolia* MB. Fl. taur.-cauc. II (1808) 266.—*S. salicifolia* Willd. in herb. no. 14853.—*S. affinis* Pall. Ind. Taur. (1801).— *Ic.*: MB. Cent. pl. rar. tab. 49; Prodan, Descr. Pl. Romaniae, II (1923), tab. 38.

Perennial. Plants 15–40 cm high, developing numerous stems; stems erect, whitish-grayish arachnoid-hairy, sulcate-cylindrical, with scattered small sessile glandular hairs, branched only in inflorescence. Leaves linear, undivided and entire, cuspidate, with callose thickening at apex, scabrous above due to dense papillae, with numerous small glandular hairs in depressions, with depressed midrib, green, glabrous or weakly arachnoid-hairy, usually strongly involute, white-tomentose beneath, with prominent greenish or brownish midrib; basal leaves in dense rosettes, up to 7 cm long; cauline leaves reduced above up to capitula. Capitula in corymbs, with many florets. Involucre cylindrical, 15–20 mm long, whitish arachnoid-hairy-floccose; outer bracts oblong-ovate, middle more oblong, with obtuse, prominent, or entirely dark green or dirty purple midrib, subobtuse or subacute, all bracts imbricately appressed, five- or 581 six-rowed; innermost bracts oblong-lanceolate, membranous in upper half, silvery white or purple, covered with small appressed bristles and sessile glandular hairs, along margin and often also at apex ciliate-fimbriate. Receptacle covered with smooth, glabrous, curly scales, up to half as long as involucre. Corolla pink-purple, with scattered sessile glandular hairs, (14)16–18 mm long, sharply narrowed over 7–9 mm, with 4–6 mm long lobes of limb; apical appendages of anthers 2–3 mm long, gradually narrowed above, often purple, basal appendages caudate, flexuous, 1.5–2.5 mm long; stigmas with very small papillae on outer side; style glabrous. Pappus almost as long as achene, with few prominent bristles, up to 10–12 mm long, with very dense, serrate bristles not

connate into ring, divaricate during fruit-maturation; achenes 7–7.5 mm long, oblong, four-angled, with small teeth above, milky-white along teeth, upper part, ribs, and along edges below, dark brown in upper half of edges, glabrous, smooth, with somewhat prominent, longitudinal, parallel striations, with pappogenus in the center of tip, terminating in five-toothed nectary. Flowering VI–VII; fruiting VII–IX.

Stony places and limestone deposits, chalks, steppes and dry pine forests.—*European Part*: Crimea, Black Sea Region(?), Lower Don, Volga-Don (south); *Caucasus*: Ciscaucasia, western Transcaucasia (south). *General distribution*: Bulgaria, Romania. Described from Karasu-Bazar. Type in Leningrad.

Note. Very recently, the Lower Don populations of this species have been described as a separate race, *J. brachycephala* Klok. (*Tr. Sp. Rosl. Gerb. Fl. URSR, Tsent.* II, 1962, 32, No. 197).

Series 2. Pinnatae Iljin.—Lower leaves pinnatisect.

35. *J. pulchella* (Fisch. and Mey.) DC. Prodr. VI (1837) 676; Boiss. Fl. or. III, 572; Trautv. in Tr. Peterb. Bot. Sada, II, 456; Grossh. Fl. Kavk. IV, 169; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 1–2, 194.—*Serratula pulchella* Fisch. and Mey. ex DC. Prodr. l.c.

Perennial. Almost semishrub; plants 25–60 cm high. Stems few, erect, virgate, ribbed-sulcate, whitish-grayish-arachnoid-hairy throughout, covering numerous sessile glandular hairs, less often simple, usually branched, with upward spreading branches. Basal and lower cauline leaves pinnatisect into long, linear, distant, usually obliquely opposite segments, which, in turn, sometimes with short sparse appendages, short-petiolate, sharply erect; upper leaves linear, undivided and entire, sessile, densely appressed, reduced upward, not reaching capitula, with callose thickening at apex; all leaves grayish due to fine arachnoid-hairy pubescence, involute, reticulate-rugose above, with numerous, deeply sunken sessile glandular hairs in pits, with prominent lustrous midrib, more dense pubescence and less distinct glandular hairs beneath. Capitula numerous, in corymbs. Involucre narrow-cupuliform, usually 15–18(20) mm long, grayish due to fine flocculose pubescence; involucre bracts compactly appressed, with scattered sessile glandular hairs and prominent obtuse midrib, greenish or purple in outer bracts, and dirty purple in middle and inner bracts, with two less prominent lateral veins; outermost bracts small, oblong, gradually broader inward, innermost acuminate, membranous above; all bracts finely divided along margin. Receptacle covered with smooth acuminate scales, almost up to half as long as involucre. Corolla pink, 17–20 mm long, narrowed over 7–10 mm length, with 4–6 mm long lobes of limb, and scattered sessile glandular hairs; apical appendages of anthers 3–3.5 mm long, abruptly narrowed at apex

in a short cusp; basal appendages membranous, divided below, 2–2.5 mm long; stigma finely papillose on outer side, not divided up to base, with tuft of short, 2–3 mm long bristles at base; style glabrous; filaments light colored, glabrous. Pappus persistent, about 10 mm long, of serrate-barbate bristles, barbules often shorter than thickness of bristles, especially in more prominent and somewhat flat bristles; bristles not connate into ring, only outermost short bristles persisting on achene; achenes elongate, gradually narrowed only toward base, four-angled, about 6 mm long, glabrous, smooth, dark brown, with corona of short teeth, pappogenus short-cylindrical, with five-toothed short nectary in the center of tip. Flowering V–VIII; fruiting VIII–IX.

Stony slopes of mountains, limestone rocks.—*Caucasus*: Southern Transcaucasia. *General distribution*: Iran. Described from Azerbaidzhan, in the vicinity of Koi from the collections of Szovits. Type in Leningrad.

36. *J. kapelkinii* O. Fedtsch. in Tr. Pochv.-Bot. Eksp. Pereselench. Upravl. II, 5 (1910) 44; O. and B. Fedtsch. Perech. Rast. Turk. IV, 297; Iljin in Tr. Turk. Nauchn. Obsch. 2, 4.—*lc.*: O. Fedtsch. op. cit.

Perennial. Plants 8–20 cm high, almost semishrubs, producing leafy vegetative branches as well as erect, fertile, simple stems or even arachnoid stems with solitary branches, leafy in lower two-thirds. Leaves narrow-linear, entire, with callose thickening at apex, strongly revolute, green, slightly rugose, and weakly arachnoid-hairy above, white-tomentose beneath, sessile, reduced toward upper side; basal leaves numerous. Capitula solitary. Involucre cupuliform, 10–12 mm long and 8–10 mm wide at base, young involucre somewhat arachnoid-hairy, roundish at base; outer bracts appressed, lanceolate, brown or dirty-purple, densely covered with short appressed bristles and sessile glandular hairs. Receptacular scales half as long as involucre or slightly longer; corolla pale pink, 12–15 mm long, narrowed over 5–6 mm of its length, with 3.5–4 mm long lobes of limb, with scattered sessile glandular hairs; apical appendages of anthers 2–2.5 mm long, abruptly narrowed in cusp. Pappus deciduous, 6–8 mm long, white, barbate, with dense barbules, almost as long as thickness of bristles; bristles connate into ring, with entire membranous base, bearing cupulate pappogenus with small finely toothed nectary in center; achenes elongate, four-angled, 4.5–5 cm long, glabrous, with small-toothed corona, distinctly rugose on edges, with dome-shaped pappophorus. Flowering at end of VI–VII; fruiting VII–VIII.

Gravelly slopes of hills, saline and sheep's fescue-feather grass steppes, exposures of white clay.—*Western Siberia*: Irtysh (southwest); *Soviet Central Asia*: Balkhash Region. Endemic. Described from Borla-Chabra Hill in the Atbasar Region. Type in Leningrad.

Note. Hybrids with *J. multiflora* (L.) B. Fedtsch. occur.

Section 4. Integrae Iljin sect. n. in Addenda XVI, 721.—Stem more or less winged; leaves undivided and entire, occasionally ternate, decurrent leaves found between undivided leaves; achenes glabrous, smooth, often scabrous or with smooth striations and ribs, usually with ring of teeth under corona; pappus usually shedding entirely together with pappogenus (except in *J. kokanica* Iljin, *J. rhizomatoidea* Iljin, and *J. trifurcata* Iljin, in which the pappus is persistent). Plants predominantly of the Tien Shan Mountain system. About 12 species in the USSR.

Type of section: *J. abolinii* Iljin.

1. Involucral bracts equal, except innermost, apically terminating in long, filiform, herbaceous, flexuous appendage (western Tien Shan) 43. **J. tortisquamea** Iljin
- + All involucral bracts without herbaceous flexuous appendage..... 2.
2. All involucral bracts appressed 3.
- + Outermost involucral bracts slightly recurved or lax and deflexed 10.
3. Leaves not decurrent 4.
- + All cauline leaves decurrent 7.
4. Stem with more or less evenly distributed leaves..... 5.
- + Leaves mainly in rosettes 6.
5. Plants strongly branched; leaves undivided, sessile, with roundish base, narrowly linear, green on both sides; involucre cyathiform, achenes very small, gradually narrowed below, glabrous, smooth, less than 3 mm long (Pashaata Ravine)..... 39. **J. stenophylla** Iljin
- + Leaves undivided, white-tomentose beneath, green above; involucre cup-shaped; achenes about 6 mm long, glabrous and rugose-tuberculate above 40. **J. caespitans** Iljin
- ++ Achenes two times as long, convex below corona, leaves ternately-divided..... 48. **J. trifurcata** Iljin
- 584 6. Leaves oblong or lanceolate, always entire; achenes below corona with scattered teeth (Buam Ravine) 37. **J. abolinii** Iljin
- + Leaves obspatulate or oblong-obspatulate, sometimes mixed with lanceolate, entire or with isolated teeth at base of lamina; achenes toothed to two-thirds to three-fourths of their length (Alai Range) 37. **J. schachimardanica** Iljin
7. Leaves arachnoid-hairy beneath, sometimes toothed..... 42. **J. capusii** Franch.
- + Leaves green on both sides 8.

8. Pappus persistent; achenes glabrous, with row of teeth only below corona (Turkestan Range) 46. **J. kokanica** Iljin
 + Pappus deciduous, all bristles connate into ring 9.
9. Plants large, with 30–40 mm long capitula and large basal leaves; pappus bristles plumose-barbate (Darbaza-Bel' Pass in Pamiro-Alai) 45. **J. macranthodia** Iljin
 + Capitula half as long; pappus bristles serrate-barbate, with dense barbules (western Tien Shan) 41. **J. eduardi-regelii** Iljin
10. Plants erect, with well developed fibrous roots; leaves oval to lanceolate; outer involucre bracts somewhat recurved; pappus shedding entirely; achenes of unclear structure (central Tien Shan) 44. **J. androssovii** Iljin
 + Plants with long creeping rhizome, covered with membranous scales; stem ascending; leaves linear, thin; involucre bracts light green, translucent, divergent, outer bracts recurved; pappus persistent; achenes about 4 mm long, toothed above below corona (Karatau) 47. **J. rhizomatoidea** Iljin

Series 1. Scapiformes Iljin.—Plants with short stem and rosulate leaves.

37. **J. abolinii** Iljin in *Izv. Glavn. Bot. Sada*, XXVII, 1 (1928) 83.

Perennial. Plants 15–20 cm high, with strong woody tap root, converted at soil surface in many-headed caudex bearing rather large number of shoots. Stems woolly-tomentose at base, with remains of fallen leaves, simple, erect or weakly ascending, flocculose-arachnoid, leafless in upper part. Basal leaves numerous, oblong or lanceolate, acute, undivided and entire, sometimes somewhat hairy, gradually narrowed in somewhat short petiole, pale greenish above, at some places flocculose-arachnoid-hairy, grayish beneath due to arachnoid-hairy pubescence; lower cauline leaves like basal, upper sparse, linear, sessile. Capitula solitary. Involucre up to 15 mm long, cupuliform, with glabrescent flocculose-arachnoid-hairy pubescence at base, other parts glabrous, green; involucre bracts lanceolate, acute; middle bracts lanceolate or linearly lanceolate, gradually acuminate; inner bracts prominent, with prominent veins, acuminate. Receptacle densely squamose, scales up to one-third as long as involucre. Pappus snow-white, up to 5 mm long, usually of few bristles, bristles short-barbate, barbules dense, approximately as long as thickness of bristle; achenes 5–6 mm long, oblong-obpyramidal, with obtusely roundish ribs above and here somewhat swollen, glabrous and small toothed above along edges. Flowering VI(?); fruiting VII. (Plate XLV, Fig. 2.)

Red gypsum sandstones.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the Buamsk Ravine. Type in Leningrad.

38. **J. schachimardanica** Iljin in Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 386, Fig. 4.

Perennial. Plants about 20–25 cm high, caespitose, with strong tap root and aerial stem, densely covered with brown scales and remains of petiole. Stems few, simple or with isolated long, upward spreading branches in the lowermost part, sparsely arachnoid-hairy, finely sulcate, leafy below, leafless or with isolated small simple leaves above; basal leaves forming dense, rosettes of many leaves, obspatulate or oblong-obspatulate, less often mixed with oval, entire leaves, laminas only at base with single, less often two pairs of triangular or triangular-oblong teeth, abruptly cuspidate, less often acute or acuminate, green and glabrous above, whitish-grayish beneath due to arachnoid-hairy tomentum, gradually narrowed in long petiole, almost as long as lamina, somewhat broadened at base, with densely woolly bud in axil. Capitula solitary, with many florets. Involucre cupuliform, 10–10.25 mm long, three- or four-rowed, with rather loosely arranged bracts; involucre bracts with three prominent veins, oblong-lanceolate, acuminate, thin-membranous along margin, somewhat serrate, puberulent above (in inner bracts), sparsely arachnoid-hairy; innermost bracts gradually narrowed into membranous reddish awn. Receptacle covered with short (about 3 mm long), smooth, acuminate scales. Corolla 11.5–13.5 mm long, on 3.5–5 mm long stalk and 2.5–3.5 mm long lobes of limb, slightly incurved above, pink, with few, scattered sessile glandular hairs; apical appendages of anthers about 2.5 mm long, whitish, narrowly attenuate at apex and slightly incurved; basal appendages setaceous, slightly divided, about 2 mm long; filaments glabrous; stigma about 2 mm long, bifid up to base, covered with rather short papillae, basally with a brush of short, erect bristles; style glabrous. Pappus colorless, consisting of 4–5 mm long unequal bristles and 4–10 mm long bristles with very dense barbules almost as long as or usually one and one-half times as long as thickness of bristle, pappus shedding, leaving inconspicuous annulus with fused bases of bristles, except outer, shortest and persistent; achenes oblong-obpyramidal, 5–6 mm long, four-angled, olive-brown, lighter along ribs, with uniformly toothed border at apex, edges slightly convex, covered throughout with rows of one-toothed scales connate adbasal to achene. Flowering VI; fruiting VII.

Sandstones, conglomerates and products of their weathering.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Kara-Kazyk River Basin, from the vicinity of the Shahimardan Resort. Type in Tashkent.

Series 2. Sessiles Iljin.—Leaves sessile, nondecurent.

39. **J. stenophylla** Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1 (1933) 185.

Perennial. Plants up to 25–30 cm high, bright green, many-stemmed. Stems slender, in lower part up to 2 mm, in upper part up to 0.75 mm thick, branched from base, with spreading branches, not branched above, glabrous or slightly and sparsely arachnoid in upper part only in very small patches, brownish basally with scaly recurved remains of leaves, densely leafy in middle. Leaves linear, acuminate, undivided and entire, strongly revolute, almost up to midrib, one-veined, concolorous, with scattered, sunken, very fine glandular hairs, sessile, with slightly roundish base. Capitula solitary, on long leafless peduncles. Involucre cyathiform, distinctly narrowed toward base, 12–15 mm long, broadened up to 10–12 mm in width at fruiting, yellowish-brownish, greenish with florets, glabrous and only scarcely flocculose-arachnoid at base. Involucral bracts oblong-lanceolate, acuminate, appressed, with membranous border; innermost bracts usually pinkish-purple. Receptacle squamose; scales finely pointed, yellowish, smooth, almost half as long as involucre. Pappus about 15 mm long, whitish, barbate, with barbules one and one-half times as long as thickness of bristles or almost as long, dense; achenes (immature) very small, glabrous, smooth, four-angled, with small teeth above along edge. Fruiting IX. (Plate XLIII, Fig. 2.)

Rocks.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the ravine of the Pashaata River, Namangan District. Type in Leningrad.

587 40. **J. caespitans** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 11–12 (1924) 167; Iljin in Tr. Turk. Nauchn. Obshch. 2, 24.

Perennial. Semishrub, 15–30 cm high, with many-headed caudex, many stems. Root very thick, branched, woody. Stems many, divaricately branched from base, almost virgate, angular, sulcate, somewhat arachnoid-hairy, greenish. Leaves oblong or lanceolate, acute or acuminate, less often subobtuse, gradually narrowed toward base, sessile; basal leaves short-petiolate, with petioles broadened at base, undivided and entire or sometimes with one to three distant teeth; upper leaves linear or almost filiform, gradually reduced toward stem apex, green or grayish-greenish, punctate and weakly arachnoid-hairy, whitish or gray-tomentose beneath with distinct midrib and few indistinct lateral veins on both sides. Capitula on long peduncles, often slightly divergent, about 20 mm wide including florets. Involucre 15–20 mm wide, slightly arachnoid-hairy or subglabrous, dirty purple or green and purple above, five- or six-rowed; bracts linear-lanceolate, acuminate, with distinct veins, almost entire, appressed (sometimes outermost bracts weakly deflexed),

outer bracts shorter. Receptacle squamose; scales more or less dense, smooth, short. Corolla red-purple, 15–17 mm long, its narrow part one-third as long as broad part, with 4–5 mm long limb; anther appendages setiform, 1–2 mm long; filaments smooth. Pappus deciduous, with very dense barbules, shorter than thickness of bristles, or almost as long, connate at base into ring; achenes obpyramidal, four-angled, about 6 mm long, glabrous and lustrous, rugose-tuberculate, with spinescent teeth along edges and toothed corona enclosing flask-shaped pappophorus with five-lobed nectary at its throat. Flowering VII–VIII; fruiting VIII–IX. (Plate XLIII, Fig. 1.)

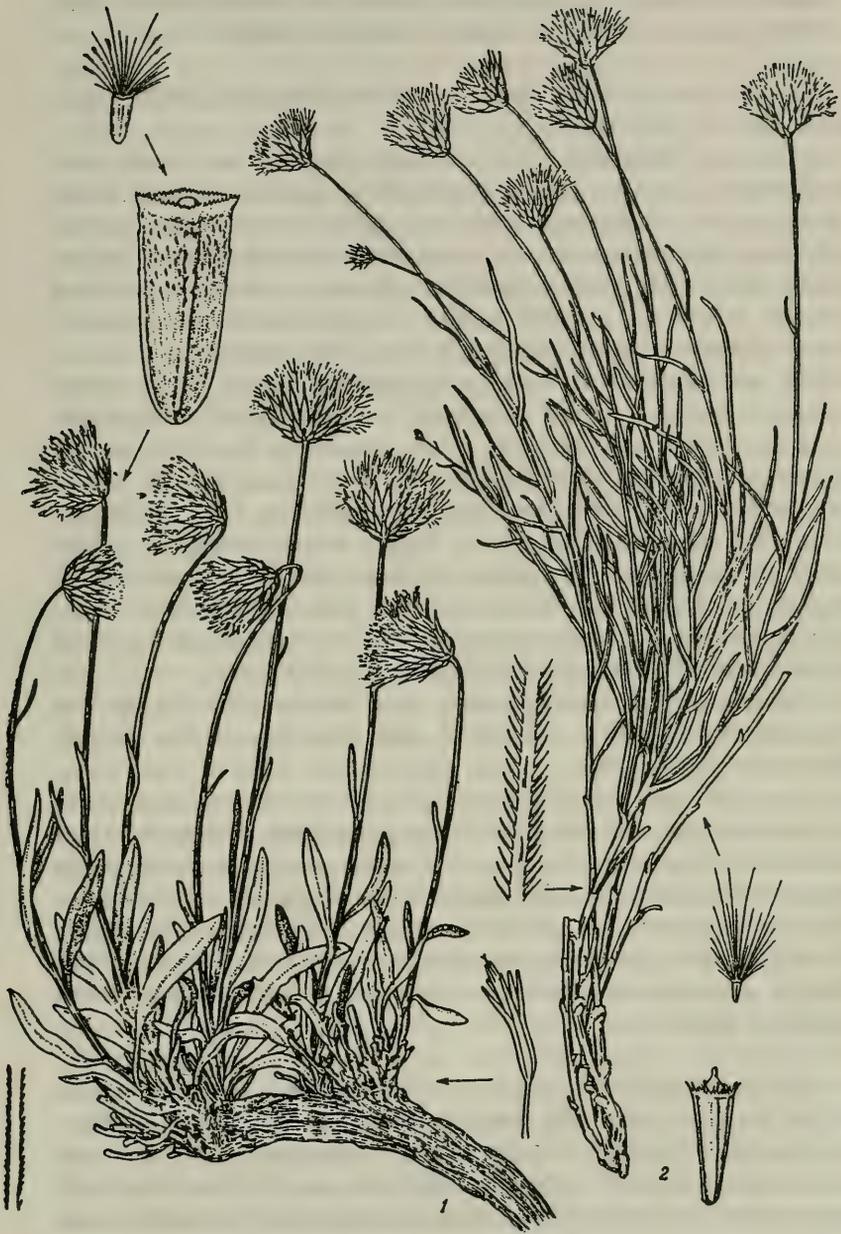
Subalpine belt, mostly on stony and gravelly slopes.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the rise towards the pass between the Kok-Bulak and Ak-Kur rivers. Type in Leningrad.

Series 3. Decurrentes Iljin.—Cauline leaves decurrent.

41. *J. euardi-regelii* Iljin in Tr. Turk. Nauchn. Obsch. 2 (1925) 18.—*J. heterophylla* auct. non Jaub. and Sp.: O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 296.—*lc.*: Iljin, op. cit.

Perennial. Semishrub, 25–40 cm high, strongly branched in lower part, green branches of current year glabrous or glabrescent with arachnoid hairs, simple or with few virgate branches. Leaves oblong-lanceolate or even linearly lanceolate, less often oblong, acute or acuminate, entire or often with remote solitary teeth, narrowly recurved, 588 green and glandular hairy on both sides or with thin, indistinct arachnoid-hairy indumentum beneath; upper leaves weakly scabrous, sessile, narrowly decurrent; lowermost leaves gradually narrowed into petiole, uppermost strongly reduced so that stem appears leafless above. Capitula solitary. Involucre narrow-cupuliform, roundish at base, 10–15 mm long and 7.5–12 mm wide, green, purple above, glabrous or weakly arachnoid hairy-flocculose; involucre bracts appressed, lanceolate, acuminate, outer smaller. Receptacle covered with membranous hairs, one-third to half as long as involucre. Corolla pink, 12–15 mm long, narrowed below over 5–6 mm length, with 3.5–4 mm long lobes of limb. Pappus deciduous, snow-white, 9–12 mm long, with barbules equal or slightly longer than thickness of bristles; bristles connate into ring and shedding entirely together with pappogenus and nectary; ring extended into membranous base, with purple pappogenus, having pitcher-shaped nectary in center; achenes roundish to four-angled, 5–6 mm long and 3–4 mm thick, brownish admedially, smooth, with sharply toothed corona, convex below corona.

Mountain slopes, mostly in juniper forests.—*Soviet Central Asia*:



Tien Shan. Endemic. Described from western Tien Shan, from mountains between Ak-Tag-Tai and Ak-Sagaty. Type in Leningrad.

42. *J. capusii* Franch. in Ann. Soc. Nat. Bot. XVI (1883) 328.—
Exs.: H.F.A.M. No. 490.

Perennial. Semishrub, 15–30 cm high. Stems several, usually with long branches in lower half, and leafy. Basal and lower cauline leaves oblong or more often oblong-obovate, entire, narrowed into petiole, subobtusate, other leaves narrower, lanceolate, sometimes subacute or even acute, sessile and weakly decurrent, all leaves green and scabrous beneath, grayish due to finely arachnoid-hairy pubescence, occasionally almost glabrous. Capitula solitary, on long leafless peduncles. Involucre 10–15 mm long and 6–10 mm wide, glabrous, green, purple above; involucre bracts appressed, acuminate, lowermost often oblong-ovate, reduced, others broadly lanceolate to linear-lanceolate. Receptacle densely squamose; scales up to half as long as involucre or slightly longer. Corolla pink-purple, 10–16 mm long, narrowed over 3–5.5 mm length, with 2.5–4 mm long lobes of limb. Pappus entirely deciduous, weakly yellowish, 7–10 mm long, densely barbate, with barbules as long as thickness of bristles; achenes about 6 mm long, smooth, with isolated spiny tubercles and toothed edge at apex, enclosing a short conical pappophorus. Flowering VI–VII; fruiting VII–VIII.

Stony slopes in upper mountain zone.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from Ona-Ulgan in the Chirchik Mountains. Type in Paris.

Note. The author of this species included it among the relatives of *J. trautvetteriana* Rgl. and Schm. without any basis whatsoever. These are species from different sections. The author made another mistake by listing both of these species under section *Derderiae*. Our herbarium does not have either the authentic specimen or the cotype of *J. capusii* Franch.; however, neither its description nor its locality raises any doubt that the specimens identified by us and other collectors belong to this particular species.

43. *J. tortisquamea* Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 18; in Bot. Mat. Gerb. Bot. Sada, V, 58.—Exs.: H.F.A.M. No. 496.

Perennial. Plants 50–70(100) cm high, light green, almost glabrous. Stems branched from middle; branches virgate, with scattered, soft arachnoid hairs. Leaves sessile, decurrent, oblong or oblong-lanceolate, entire, acuminate, slightly scabrous above, with sessile glandular hairs beneath, strongly reduced on branches, distant, narrowly linear or almost filiform. Capitula solitary. Involucre broadly cylindrical, rounded at base, 15–20 mm long and 10–15 mm wide, green, almost glabrous, all bracts

equal, outer linear-filiform, herbaceous, sinuate; inner bracts linear-lanceolate, acuminate. Receptacle densely covered with long scales, connate up to two-thirds, mostly in lower part. Corolla pink, 15–18 mm long, narrowed below over 4.5–6 mm length, with 4–5 mm long lobes of limb. Pappus deciduous, 5–8 mm long, dirty-whitish, barbate, with dense, sessile barbules shorter than thickness of hair, hairs connate into ring at base with fleshy patellate pappogenus and nectary in center; achenes smooth, yellowish smoky, 7 mm long and 2.5–3 mm thick, toothed along top edge, convex below corona, with weakly developed and more or less tuberculate pappophorus in center of apex. Flowering VI–VII; fruiting VII–VIII(?).

On grassy, clayey-stony soil, slopes, in thickets of shrubs.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from Brich-Mulla, near Chimgan. Type in Leningrad.

44. **J. androssovii** Iljin in Bot. Mat. Gerb. Bot. Sada, V, 11–12 (1924) 168; Iljin in Tr. Turk. Nauchn. Obsch. 2, 18.—Iljin, op. cit. (1925), Plate III.

591 Perennial. Plants 40–70 cm high, light green. Root somewhat thick, woody. Stems few, simple or branched in lowermost part, weakly sulcate, almost glabrous or covered with short scattered hairs, slightly arachnoid-hairy below capitulum and sometimes glandular-hairy. Leaves oblong or lanceolate, acute or subobtusely, undivided and entire, not convolute, glabrous and green on both sides, along veins usually with rather short, sparse hairs; basal leaves narrowed into short arachnoid-hairy petiole; lower cauline leaves sessile, slightly narrowed toward base, narrow-decurrent; middle and upper leaves usually unilaterally decurrent, in upper half or sometimes at the base of two halves of lamina with roundish auricles; one or two uppermost leaves strongly reduced, remote. Capitula solitary, 20–25 mm long. Involucre 15–20 mm wide above, five- or six-rowed, almost glabrous or slightly sparsely arachnoid-hairy, with lanceolate-linear bracts, narrowed toward base; outer bracts slightly recurved, acuminate, innermost long attenuate, with distinctly projecting veins, appressed, rather hispid on outer side, slightly toothed above. Receptacle densely covered with smooth hairs. Corolla pale-purple, with scattered glandular hairs especially below; 17–18 mm long, narrowed over 5–6 mm; basal appendages of anthers setose, 2–2.5 mm long; filaments smooth. Pappus deciduous, barbate, of unequal bristles, with dense barbules, slightly exceeding diameter of hair, bristles connate into ring with hollow base; achenes four-angled, obpyramidal, yellow, toothed above along edges, glabrous and tuberculate-spiny, particularly in upper part, smooth near base, with dome-shaped pappophorus at tip. Flowering VI–VII; fruiting VI–VIII(?).

Stony slopes of mountains.—*Soviet Central Asia*: Pamiro-Alai (eastern). Endemic. Described from Uch-Kurgan. Type in Leningrad.

45. *J. macranthodia* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 5 (1924) 66; Tr. Turk. Nauchn. Obshch. 2, 18.

Perennial. Plants 35–55 cm high. Stems few, simple or with fewer branches, greenish, sulcate, scabrous, leafless from middle. Leaves oblong or oblong-lanceolate, entire, or less often with few distant, large teeth along margin, acuminate or acute, greenish on both sides, somewhat stiffly scabrous, especially above due to very short crisped hairs and, besides, with numerous sunken glandular hairs beneath; basal leaves petiolate, cauline leaves sessile, usually weakly decurrent; uppermost leaves very distant, linear or filiform. Capitula solitary, about 30 mm long (including florets). Involucre, cupuliform, rounded at base, broader above, up to 30 mm, glabrous, not arachnoid-hairy, five- or six-rowed; inner involucre bracts linear-lanceolate, acuminate, gradually reduced outward, increasingly hispid-scabrous on inner side, not arachnoid-hairy, with small teeth. Receptacle covered with smooth hairs. Corolla purple, with scattered glandular hairs or almost glabrous, 20–22 mm long, on 592 7–10 mm long stalk, with about 5 mm long limb; anther appendages setose, almost undivided, 2–3 mm long; filaments glabrous. Pappus deciduous, plumose, with plumes several times as long as thickness of hair, bristles connate into ring with common base, and nectary in center; achenes immature, striate-streaked, glabrous, with scattered spinules in upper part, serrate-spinose, with dome-shaped pappophorus at tip. Flowering VI; fruiting VII.

Foothills.—*Soviet Central Asia*: Pamiro-Alai (eastern). Endemic. Described from the Osh Region, near the Derbaz-Bel Pass along slope to the Tara Valley. Type in Leningrad.

Series 4. Persistentes Iljin.—Pappus persistent.

46. *J. kokanica* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 5 (1924) 66; Tr. Turk. Nauchn. Obshch. 2, 18.

Perennial. Plants 25–50 cm high, usually with distinctly developed caudices. Root thick, branched, woody. Stems simple or weakly branched, greenish, slightly sulcate, woolly tomentose at base and covered with scales, almost glabrous or somewhat scatteredly hairy over short distance, sometimes finely arachnoid-hairy at isolated places, leafless above. Leaves basal and cauline, oblong-lanceolate or lanceolate, entire or usually large-toothed, acuminate, basal leaves gradually narrowed into petiole, slightly broadened at base; cauline leaves sessile, usually narrow-decurrent; uppermost leaves strongly reduced, linear or filiform; all leaves

green on both sides or sometimes weakly grayish arachnoid-hairy beneath; besides with scattered, short, usually crisped hairs, on both sides, especially along margin and veins, scabrous, lower surface also with sunken and more or less numerous glandular hairs. Capitula solitary terminal, 20–25 mm long (with florets slightly narrowed at base). Involucre 15–20 mm wide in upper broader part, scaly, four- or five-rowed, almost glabrous and weakly flocculose-arachnoid-hairy; outer bracts oblong, middle and inner linear-lanceolate, acuminate, somewhat small-toothed. Receptacle densely squamose; scales glabrous, unequal, reaching one-third to half of involucre height. Corolla exerted from involucre, purple, with scattered glandular hairs, 17–19 mm long, on 6–8 mm long stalk and 4–5 mm long limb; basal appendages of anthers setose, almost undivided, 3–3.5 mm long; filaments glabrous or with scarcely visible tubercles above. Pappus barbulate-plumose, with numerous unequal bristles; mature achenes about 5 mm long and 2 mm wide, four-angled, obpyramidal, glabrous, striate-streaked, with thickened edges, spinose-toothed above along edges, edges with isolated spinules below, with patellate thickening and pappophorus at tip, with pitcher-shaped nectary in center.

Steppe mountain slopes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Rabat area at the exit from the gorge of the Karamuinak River. Type in Leningrad.

593 47. **J. rhizomatoidea** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 346.—*lc.*: *Ibid.* p. 349, Fig. 2.

Perennial. Plants 8–15 cm high, with long-branched rhizomes, covered with whitish, glabrous, lustrous sheaths of lower leaves and with deep tap root. Stems simple, ascending, bright green, finely sulcate, lustrous, with sessile glandular hairs and scattered pubescence, more dense below capitulum. Leaves rosulate, like lower cauline leaves narrowed toward base, slightly broadened at very base, amplexicaul; cauline leaves sessile, narrowly decurrent, narrowly lanceolate, usually 5–8 mm long and 3–5 mm wide, acute, undivided and entire, one-veined, usually revolute, glabrous beneath except midrib, and with sessile glandular hairs, upper surface covered with short hairs, rather frequent and mixed with short-stalked and sessile glandular hairs. Capitula solitary, on short peduncles. Involucre wide, cupuliform, about 2 cm long, glabrous, lustrous, arachnoid-hairy, only at base, glabrescent; involucre bracts almost equal, innermost bracts narrowly lanceolate; all bracts acuminate, with sessile, fine, scattered glandular hairs, green, with whitish membranous border and small teeth here, usually three-veined. Corolla 18–20 mm long, on 6–7 mm long stalk, with about 5 mm long limb, and very thin lobes, pinkish, with numerous sessile glandular hairs; apical

appendages of anthers 2.5–3 mm long, narrowed above; basal appendages caudate, about 2 mm long, divided up to base, at least into two parts, pubescent, stigma branches long. Pappus deciduous, 7–8 mm long, snow-white, barbate, with barbules equal or much longer than thickness of hair; achenes four-angled, obpyramidal, 3.5–4 mm long, brownish, corona small-toothed at edge, longitudinally rugose along edges, with tubercles modified into appressed spinules in upper half, apex with smooth conical pappogenus, in center on stalk with membranous five-partite nectary. Flowering VII; fruiting VIII–IX. (Plate XL, Fig. 12.)

Stony and rocky habitats.—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from the Utelshuya River Valley in the Karatau Mountains. Type in Tashkent.

Note. The species is quite unique and stands by itself among all other species of the section and may be split off into a separate subsection.

48. **J. trifurcata** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 382, Fig. 1.

Perennial. Plants 8–12(15) cm high, with long, slender, branched roots, forming perennating buds. Stems several, simple, grayish. Basal leaves in compact rosettes, narrowly oblong to linear, about 2–3(4) cm long, short-petiolate, like lower cauline leaves, usually three-partite at apex, with entire margin, strongly convolute, almost up to midrib, on both sides whitish-grayish due to dense indumentum, finely punctate; upper cauline leaves remote, short, sessile, always simple. Capitula solitary. Involucre cupuliform, about 10–12 mm long, imbricate, four- or five-rowed, sparsely arachnoid-hairy; involucre bracts oblong, with prominent midrib; outer bracts appressed, yellowish-green, reddish only above; middle bracts brighter, membranous along margin, cuspidate; inner bracts entirely purple or only mottly-purple, with wide membranous border, abruptly narrowed from gibbous tip into oblong-triangular, slightly recurved, membranous cusp, with small teeth. Receptacle squamose with short, smooth, acuminate scales. Florets relatively less numerous; corolla pale pink, with sessile glandular hairs, about 12–13.5 mm long, narrowed below over 5–5.5 mm length, and with 3.5–4 mm long lobes of limb, tuberculate at tip; apical appendages of anthers 2–2.5 mm long, arcuate at tip, basal appendages 2–2.5 mm long, caudate, curly; filaments glabrous. Pappus persistent, 4–5 mm long, slightly shorter than mature achene, barbate, with very dense barbules, almost as long as or usually one and one-half times as long as thickness of bristles; achenes 5–5.5 mm long, oblong, obpyramidal, four-angled, glabrous, smooth, with small-toothed border above. Fruiting VII.

Alpine zone, on rocks and screes.—*Soviet Central Asia*: Tien Shan

(western). Endemic. Described from the Chatkal Range, on the drainage-divide between the Karagaily and Karasu rivers. Type in Tashkent.

Section 5. Suffrutices Iljin sect. n. in Addenda XXVI, 721.—Semishrubs with undivided and entire, linear or filiform leaves; involcral bracts appressed, sometimes only apices of cusps recurved; pappus serrate or serrate-barbate, persistent (deciduous in *J. sintenisii* Bornm.); achenes glabrous, smooth, often with longitudinal striations or glabrous folds; pappogenus always present, pappophorus present only in *J. sintenisii* Bornm.

Type of section: *J. mugodsharica* Iljin.

1. Semishrubs with long woody branches 2.
 + Semishrubs with strongly branched rhizome, forming many-headed caudex in soil 4.
 2. Capitula small; involucre not longer than 12 mm; pappus bristles serrate; achenes glabrous, 1.75–2 mm long (Mugodzhary, Boktaubai Mountain) 51. **J. mugodsharica** Iljin
 + Capitula larger, involucre 14–18 mm long; achenes 5–6.5 mm long, with poorly developed longitudinal striations or streaks, smooth 3.
 3. Involucre cylindrical or oblong-narrow cyathiform; involcral bracts abruptly narrowed into short cusp, finely arachnoid hairy-tomentose on outer side, entire or inequidentate (Karatau) 50. **J. multiceps** Iljin
 + Involucre cupuliform; involcral bracts gradually acuminate, densely covered on outer side with rather short, appressed bristles, finely and densely uniformly ciliate (western Tien Shan and Karatau) .. 49. **J. suffruticosa** Rgl.
 4. Involcral bracts with prominent veins, narrowed into membranous, long, recurved cusp; pappus serrate, 5–6 mm long, with inner bristles up to 10 mm long; achenes 5 mm long (Fergana) 53. **J. orientalis** Iljin
 + Involcral bracts with inconspicuous veins; cusps usually appressed, and if recurved, then not membranous; pappus serrate-barbate, 7–8 mm long, with inner bristles up to 20 mm long; achenes 5–6 mm long (Kopetdag) 52. **J. sintenisii** Bornm.

Series 1. Ligneae Iljin.—Stem basally and its lower branches prostrate, ascending, sparse.

49. **J. suffruticosa** Rgl. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 166; Trautv. in Tr. Peterb. Bot. Sada, VIII, 1, 513; O. and B. Fedtsch. Perech.

Rast. Turk. IV, 299 p. p.—*J. suffruticosa* var. *major* Winkl. ex Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 16.—Exs.: H.F.A.M. No. 495.

Perennial. Semishrub, 30–50 cm high, with long, woody branches below, 3–6 mm thick, producing numerous vegetative, densely leafy shoot. Stems of current year elongate, simple, leafless above, arachnoid-hairy. Leaves filiform-linear or linear, green and glabrous or finely arachnoid-hairy above, grayish beneath due to fine tomentum, strongly revolute, often almost covering lower surface, entire, sessile, strongly reduced above and disappearing. Capitula solitary. Involucre cupuliform, 14–18 mm long and 10–15 mm wide, almost glabrous, young with glabrescent arachnoid-hairy pubescence, green, purple above, somewhat appressed at base; involucre bracts appressed, acuminate; outer bracts oblong, others lanceolate, with scarcely visible, appressed bristles, ciliolate along margin. Receptacle densely squamose; scales connate, almost up to half as long as involucre. Corolla pinkish-purple, 14–17 mm long, narrowed over 5–7 mm length and with 3.5–4.5 mm long lobes of limb. Pappus persistent, snow-white, 7–10 mm long; achenes (5)6–6.5 mm long, yellowish-brown, glabrous, almost smooth, without teeth along upper edge and ribs, toothed above along edge, with traces of parallel ridges, apex with two-tiered pappogenus; upper petallate, with nectary on small elevation in center, lower almost hemispherical. Flowering V–VI; fruiting V–VII. (Plate XLVI, Fig. 3.)

Gravelly and tuffaceous mountain slopes, rocks, among juniper forests.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from Karatau. Type in Leningrad.

596 50. **J. multiceps** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 4–5 (1924) 4; Tr. Turk. Nauchn. Obshch. 2, 16.

Perennial. Semishrub, 15–25(30) cm high, forming loose turf with strong, usually vertical tap root, branched above, fibrous, producing numerous short woody stems at soil surface, covered with remains of old leaves. Stems numerous, simple or often with isolated short branches. Leaves filiform, entire, strongly revolute usually up to midrib, sessile, dense in lower half of stem, shorter and much remote above, leafless below capitula, arranged in rosettes at the end of caudices, flocculose-arachnoid-hairy, glandular-punctate. Capitula numerous or solitary. Involucre oblong-cylindrical, usually 14–16 mm long and about 6–8 mm wide, often slightly narrowed at base, with appressed bracts; outer bracts shorter, others oblong-oval, with somewhat prominent veins, abruptly narrowed into relatively short cusp, finely arachnoid hairy-tomentose on outer side, entire or with fine isolated, and irregular teeth. Corolla pink-purple, 13–14 mm long, narrowed over 5–6 mm, with about 4 mm long lobes of limb. Pappus persistent, colorless, short-barbate,

with dense barbules, usually shorter than thickness of bristles; achenes obpyramidal, obtusely four-angled, slightly broader below corona, mature achenes 6–6.5 mm long, strongly narrowed at base, with toothed corona at apex, edges and ribs without teeth, tuberculate, white-cartilaginous below ribs, with parallel longitudinal ridges, with small patelliform pappogenus at apex having nectary in center. Flowering VI–VIII; fruiting VIII. (Plate XLVI, Fig. 1.)

Rocks, gravelly and loamy-gravelly mountain slopes.—*Soviet Central Asia*: Tien Shan (Karatau Range). Endemic. Described from Karaguz. Type in Leningrad.

51. **J. mugodsharica** Iljin in Mat. Komiss. Eksp. Issl. Akad. Nauk. SSSR, 26 (1930) 277, Fig. 1; Pavlov, Fl. Tsentr. Kazakhst. III, 304.—**lc.**: Iljin, op. cit. Fig. 1.

Perennial. Semishrubs, 10–20 cm high, with prostrate woody stems, producing short branches, covered with remains of dead leaves and reducing rosette of leaves, from center of which arise simple, erect, leafless, arachnoid-hairy branches in upper part. Leaves linear-filiform, entire, strongly convolute, slightly broadened at base; cauline leaves sessile. Capitula solitary, with almost glabrous, 10–12 mm long and 5–8 mm wide involucre; outer involucral bracts oblong-triangular; middle bracts lanceolate or oblong; inner bracts linear-lanceolate; all bracts pointed. Pappus 2.5–3.5 mm long, serrate, with dense teeth shorter than thickness of bristles; achenes 1.75–2 mm long, smooth, compressed, four-angled.

597 Gravelly soils.—*Soviet Central Asia*: Aralo-Caspian Region. Described from Mugodzhaz-Botubai Mountain and vicinity of town of Mugodzharskii. Endemic. Type in Leningrad.

Series 2. Grumosae Iljin.—Rhizomes clustered; stems with dense rosette of basal leaves.

52. **J. sintenisii** Bornm. in Beih. Bot. Centralbl. XX, 2 (1906) 165; O. and B. Fedtsch. Perech. Rast. Turk. IV, 299; Iljin in Tr. Turk. Nauchn. Obshch. 2, 16.—*J. suffruticosa* var. *latifolia* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1890) 145; O. and B. Fedtsch. op. cit. 299; spec. kopetdag.—*J. arachnoidea* f. *aprica* Bornm. l. c.—**lc.**: Iljin, op. cit. Plate 37; Fl. Turkm. VII, 231.—**Exs.**: Ed. H.B.P.M. No. 99.

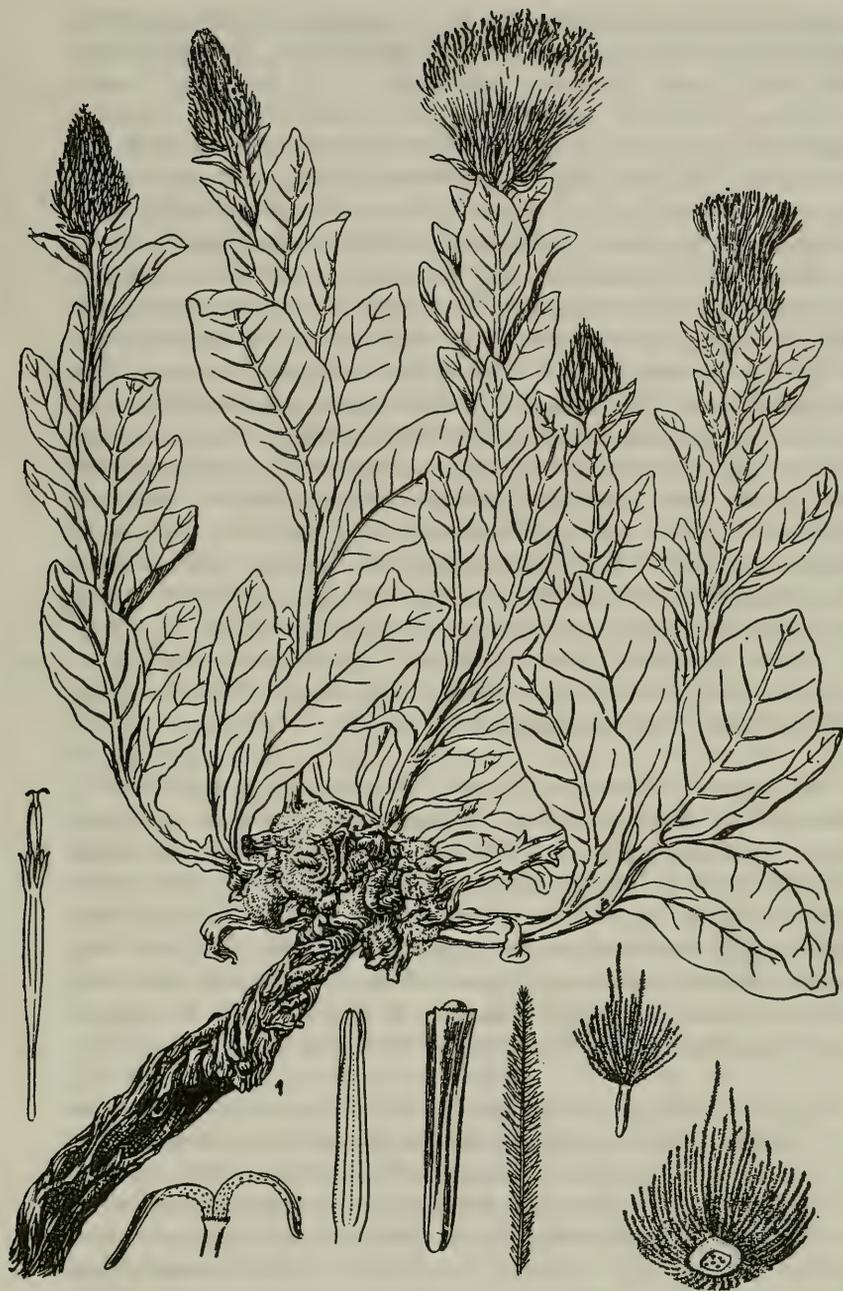
Perennial. Semishrub, 20(15)–40(50) cm high, with fibrous root branched above, and strongly branched rhizomes densely covered with dark brown scales—remains of old leaves. Stems numerous, simple, relatively slender, finely-sulcate, usually with scattered, sessile, fine glandular hairs, grayish due to sparse arachnoid-hairy pubescence, leafy

predominantly at base and up to middle, less often up to two-thirds in dwarf forms, almost leafless above. Leaves narrow-oblong or oblong-linear, tender, 3–7 mm long and 1–3 mm wide, gradually narrowed on lower side and rather broadened at base, short-cuspidate, especially in broad-leaved forms, reaching 4.5–10 cm in length and 5–6 mm width; all leaves entire, convolute, less often almost flat or sparsely pinnatifid and pinnatilobate or only obtusely toothed, usually with fine sessile glandular hairs on both sides, grayish-green above with depressed midrib, more or less prominent on lower sides, whitish beneath due to tomentum; cauline leaves gradually reduced above, solitary, usually indistinct. Capitula solitary, usually narrow-cupuliform. Involucre imbricate, 10–15 mm long, and 7–10 mm wide (at anthesis); outer involucral bracts very short, lanceolate, oblong-ovate or oblong-lanceolate, grayish-green due to arachnoid-hairy pubescence, with narrow dark green or brown-greenish, appressed or recurved apices, carinate, with scattered sessile glandular hairs; middle and especially inner bracts oblong, usually dirty purple, but with many sessile glandular hairs, terminating into long, appressed, brownish cusps, very finely and frequently toothed. Receptacle squamose; scales smooth, glabrous, 3–6 mm long, often split above. Corolla pink, with scattered, sessile glandular hairs, 14–16 mm, usually 15 mm long, narrowed over 5–6(6.5) mm length, with 4–5 mm long lobes of limb; apical appendages of anthers 2–2.5 mm long, whitish, oblong-acute, basal appendages setaceous, colorless, weakly divided. Pappus deciduous, 7–8 mm long, with two hairs up to 20 mm long, snow-white, with many bristles, densely barbate-serrate; bristles connate
 598 into ring with common base, developing pappogenus at apex with tumbler-shaped membranous nectary. Flowering IV–VI(VII); fruiting VI–IX.

Steppe and juniper zone, in ravines, rocks, stony slopes.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Sundosag. Cotype in Leningrad.

53. **J. orientalis** Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 17 (pro subsp. *orientalis*).—*J. suffruticosa* Fedtsch. non Rgl.; O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 299 (specimina ferganica).

Perennial. Plants 20–30 cm high, grayish; tap root straight, fibrous, terminating into many-headed caudex with rosettes of usually numerous basal leaves. Stems few, simple, leafy only in lower one-third part, 1–2 mm thick, finely sulcate-ribbed, with scattered sessile glandular hairs, finely sparsely arachnoid-hairy. Basal leaves usually 5–8 mm long, cauline leaves sessile; all leaves linear, entire, subobtusely or usually short-cuspidate, punctate, with depressed midrib and greenish-grayish above due to sparse arachnoid-hairy pubescence, whitish beneath due to more



dense arachnoid tomentum, strongly convolute, upward spreading, reducing up to one-third part of stem, absent above. Capitula solitary, with many florets. Involucre cupuliform, 12–16 mm long, usually five-rowed, imbricate; involucre bracts oblong-oval, outer shorter, innermost narrowly lanceolate; all bracts appressed, terminating in long membranous, recurved cusp, with prominent veins, especially midrib, covered with short, crisped, arachnoid hairs and scarcely visible, more or less densely appressed, golden bristles, ciliate along margin. Receptacle squamose; scales smooth, pointed one-fourth to one-third as long as involucre. Corolla pinkish-purple, 13–14 mm long, with scattered sessile glandular hairs, narrowed over 5 mm length, with 4–5 mm long lobes of limb; apical appendages of anthers 2.5–3 mm long, acuminate, basal appendages setaceous, about 2–2.5 mm long, divided below; filaments glabrous. Pappus snow-white, pappus bristles almost as long as achenes, and four longer flat hairs two times as long, bristles serrate; achenes about 5 mm long, four-angled, obpyramidal, light-colored, yellowish, glabrous, smooth, weakly fine-striate longitudinally, with weak longitudinal folds, and toothed corona, with scarcely visible lustrous dots or glandular hairs above below corona, and dense thick annular pappophorus bearing conical nectary. Flowering V; fruiting VI.

600 Stony wormwood-saltwort desert.—*Central Asia*: Syr-Darya. Endemic. Described from the vicinity of the village of Kara-Kurgan in Fergana Valley. Type in Leningrad.

Section 6. Floccosae (Sosn.) Iljin comb. nov.—Sect. II. *Platycephalae* Benth. and Hook. Subsect. *Floccosae* Sosn. in Zhurn. Russk. Bot. Obsch. XI, 1–2 (1926) 195.—§4. *Pinnatilobatae* DC. Prodr. VI (1937) 697 p. p.—§1. *Involucro cylindrico* Ldb. Fl. Ross. II, 2 (1845–1846) 761 p. p.—§3. *Pinnatae* Boiss. Fl. or. III (1875) 572 p. p.—Stems virgate, branched; involucre cylindrical; corolla 25–35 mm long; pappus entirely deciduous, pappus bristles connate into thick ring, nectary exerted from ring; pappogenus developing inside at border of ring; pappophorus conical or smoothly dome-shaped.

1. Leaves glabrous above, whitish only along midrib due to fine arachnoid-hairy tomentum, somewhat arachnoid hairy beneath; basal and lower cauline leaves sinuate-toothed, or margin entire; involucre glabrous, outer bracts uncate along half length; pappus bristles barbate, barbules as long as or shorter than thickness of bristles 54. **J. armeniaca** Sosn.
- + Leaves glabrous on both sides, slightly arachnoid-hairy above only along midrib; basal and lower cauline leaves pinnatipartite or pinnatisect; involucre arachnoid hairy-flocculose, outer bracts with

herbaceous appendage, uncate; pappus bristles long-barbate, barbules two to five times as long as thickness of bristles
 55. *J. elegans* (Stev.) DC.

54. *J. armeniaca* Sosn. in Vestn. Tifl. Bot. Sada, No. 49 (1920) 31; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 2 (1926) 195; Grossh. Fl. Kavk. IV, 172.

Perennial. Plants 15–30 cm high, with stiff caudex. Stems numerous, flocculose-tomentose at base due to dense woolly buds in axils of approximate petioles of dead leaves, angular-sulcate, erect, usually densely leafy, less often simple, usually branched in lower half, with long upward spreading branches. Basal and lower cauline leaves oblong or lanceolate-linear, sinuate and sparsely toothed, less often almost undivided, gradually narrowed into flat petiole, broadened at base, leaves withering much before anthesis; upper leaves oblong-lanceolate or linear, undivided and entire, narrowed at base; all leaves acute or cuspidate, with callose thickening at apex, convolute, somewhat hard, arachnoid-hairy in axils, green on both sides, with dense sessile glandular hairs, weakly rugose and glabrous above, slightly arachnoid-hairy only along midrib, slightly arachnoid-hairy beneath. Capitula 15–25 mm long, solitary, with many florets. Involucre broadly turbinate or cupuliform, glabrous, usually six-rowed; outer bracts one-veined, from oblong or oblong-lanceolate base narrowed into uncate appendage at apex, almost half as long as middle bracts, arachnoid-hairy on inner side; inner bracts oblong-linear, membranous and gradually acuminate, purple, usually pubescent on outer side, all bracts ciliolate along border. Receptacle squamose; scales thin, long, acuminate, one-fourth to one-third as long as involucre. Corolla 25–30(32) mm long, pale pink, with dense, sessile glandular hairs, gradually narrowed over 6.5–10 mm length, with 6–7 mm long lobes of limb; apical appendages of anthers 6–7 mm long, acuminate, basal appendages 3–4 mm long, setaceous, divided below; stigma 3–4 mm long, bifid up to base, basally with separate, squarrose, short bristles, gradually terminating into papillae; style glabrous; filaments glabrous, ferruginous-brownish. Pappus 18–20 mm long, with less numerous bristles connate into ring and shedding together with it, bristles barbate-serrate, with barbules shorter or almost as long as thickness of bristles; achenes immature, 6–7 mm long, oblong; four-angled, but not pyramidal, slightly narrowed toward base, glabrous, smooth, whitish, with corona of long teeth, modified along border as parallel striations; pappophorus as white membranous, roundish base, with five-angled reddish star and a nectary inside. Flowering V–VII; fruiting VII–VIII(?). (Plate XL, Figs. 3–5.)

Rocks, stony slopes, especially with phryganoid vegetation; on stony river banks.—*Caucasus*: Southern Transcaucasia. Endemic; possibly may

be found in Iran. Described on the basis of specimens from Migri in the Nakhichevan Republic from the ravine of the Araksa River between town of Ordubad and Karchevan post. Type in Tbilisi.

55. *J. elegans* (Stev.) DC. Prodr. VI (1837) 675; Boiss. Fl. or. III, 572; Ldb. Fl. Ross. II, 762; Grossh. Fl. Kavk. IV, 171; Sosn. in Zhurn. Russk. Bot. Obshch. 11, 2, 195.—*Serratula elegans* Stev. in Mem. Soc. Nat. Mosc. IV (1813) 101; Stev. in Trans. Linn. Soc. XI, 414; MB. Fl. taur.-cauc. III, 547.—**lc.**: Trans. XI, tab. 37; Grossh. and Prilinko, Geobot. Ocherk Kavk. Stepei (1929) Plate 15.—**Exs.**: Pl. or. exs. No. 249.

602 Perennial. Plants 15–60 cm high, with stiff caudex at stem base, covered with pubescence of dense woolly flufly mass. Stems several, erect, branched in lower half; branches horizontal and also erect or slightly arcuate, cylindrical, glabrous, not strongly sulcate, densely covered with sessile glandular hairs, arachnoid-hairy only below capitulum. Basal leaves pinnatisect, less often pinnatipartite, oblong, gradually narrowed into flat petiole broadened at base, with more or less long and narrow, linear, acuminate segments; lower cauline leaves short-petiolate or sessile, either mostly pinnatipartite or sinuate-toothed, also pinnatisect; other leaves on branches more or less undivided, linear-oblong or linear, with entire margin or weakly toothed, somewhat strongly convolute, acute or acuminate, almost reaching capitulum; all leaves hard, green and glabrous on both sides, whitish above and along midrib due to fine arachnoid-hairy pubescence, rugose and with sessile glandular hairs, more strongly glandular beneath. Capitula solitary, with many florets. Involucre poculiform, grayish due to arachnoid-hairy pubescence, usually seven-rowed, appressed, all bracts with single prominent vein; outer bracts narrow-membranous and finely serrate, besides innermost, with herbaceous apex, short uncate; innermost bracts gradually long-acuminate, covered with appressed short bristles on outer side, somewhat purple. Receptacle squamose; scales smooth, acuminate, much shorter than involucre. Corolla (25)27–30(31) mm long, gradually narrowed over 10–12 mm length, with 4–6 mm long lobes of limb, covered with sessile glandular hairs; apical appendages of anthers 4–5 mm long, gradually narrowed above, basal appendages setaceous, 3–4 mm long, divided, smooth; stigma about 2 mm long, bifid up to base, with short tuft of bristles at base, and fine papillae on outer side; style glabrous; filaments brownish, glabrous, smooth. Pappus deciduous, about 17–20 mm long, pappus bristles connate into ring and easily shedding at fruiting, with distinct sparse barbules, two to two and one-half times as long as thickness of bristles, and barbules on two to five prominent thicker bristles shorter, equal or one and one-half times as long as their

thickness, more dense and usually allover, thick ring forming inside pappus at tip, through which columnar pappophorus penetrates; achene four-angled, oblong, slightly narrowed toward base, 7–7.5 mm long, with regularly toothed corona above, columnar pappophorus bearing a nectary exerted from inside and middle glabrous, smooth, with indistinct ridges along edges, hilum usually slightly lateral. Flowering VI–VIII; fruiting VIII–IX.

Steppe slopes, gravelly and sandy deposits, limestone deposits.—*Caucasus*: Eastern Transcaucasia, southern Transcaucasia (rarely). Endemic. Described from the vicinity of the village of Dzhanak Bulak, near the Gokchai River. Type in Leningrad.

Section 7. Penduliflorae Iljin sect. n. in Addenda XXVI, 721.—

Plants with strongly pendulous ray florets; corolla gradually narrowed below, pink or purple, with scattered sessile glandular hairs. Pappus persistent, except in *J. comarovii* Iljin, *J. elegantissima* Iljin (entirely shedding) and *J. kamelinii* Iljin (partially shedding in central part). Achenes large, glabrous, with more or less prominent or poorly visible, longitudinal, parallel, smooth, ridges, mostly modified into sharp tubercles, below corona. Pappophorus usually not developed (present only in species with deciduous pappus: *J. komarovii*, *J. elegantissima* and *J. kamelinii*), dome-shaped pappogenus present in all species as thick, beet-red, broad cup, whitish on inner side, nectary relatively large and on more or less short manubrium. A total of about 15 species in this section, so far known only from the USSR.

Type of section: *J. robusta* Schrenk.

1. Plants stemless or with short up to 10 cm long stem 2.
- + Plants with well-developed stem 3.
2. Stem short; leaves almost all basal, or spatulate, white-tomentose beneath, green above, with depressed veins; involucre bracts appressed; pappus bristles barbate (southern Tadzhikistan) 71. **J. impressinervis** Iljin
- + Plant stemless or with weakly developed stem; leaves concolorous; involucre bracts uncatate (mountains of southern Tadzhikistan) 72. **J. apoda** Iljin
3. All leaves undivided and entire 4.
- + All leaves usually pinnatifid, pinnatifid or pinnatisect, less often only sinuate-toothed 11.
4. Pappus deciduous entirely or partially; pappophorus and pappogenus always present 5.
- + Pappus persistent; only pappogenus present 6.
5. Robust plants with large, somewhat hard, decurrent leaves, reaching capitula; involucre bracts, except innermost terminating into long,

- smoothly incurved, spinose tip. Pappus plumose; achenes up to 8–9 mm long, linear, glabrous (Khan-Tau Mountains) (subsection *Robustae*)..... 56. **J. robusta** Schrenk
- + Leaves herbaceous, decurrent, but absent in upper part of stem; involucre bracts appressed, not terminating into strong spine 6.
- ++ Leaves nondecurrent, linear, entire 59. **J. elegantissima** Iljin
6. Plants entirely covered with glandular and flexuous granose hairs, often reduced and terminating into papillae (Zeravshan, western Pamir) (subsection *Papilligerae*)..... 7.
- + Stem and leaves with only sessile glandular hairs and with or without arachnoid-hairy pubescence, or always without granose flexuous hairs. Pappogenus developed, Pappophorus absent (subsection *Persistentes*) 8.
7. Plants densely covered with granose, vacuolated flexuous hairs; pappus partially deciduous (western Pamir, upper Zeravshan) 58. **J. kamelinii** Iljin
- + Plants densely covered with granose pappillae and scattered, granose flexuous hairs, or without them. Pappus entirely deciduous (western Pamir) 57. **J. komarovii** Iljin
8. Leaves long, narrow, linear, narrowly and shortly decurrent, convolute almost up to midrib, arachnoid-hairy beneath, like stems. Capitula numerous, on long, leafless bent peduncles (Karatau, Syr-Darya)..... 63. **J. cephalopoda** Iljin
- + Leaves oblong-oval, usually laterally irregularly decurrent, not convolute, narrowed towards both ends. Capitula on long, straight erectopetent peduncles 9.
9. Leaves distinctly gray-arachnoid hairy beneath (Uzbekistan, and Tadzhikistan) 60. **J. trautvetteriana** Rgl. and Schm.
- + Both sides of leaves green, not arachnoid-hairy 10.
10. Barbules of pappus bristles, three to four times as long as thickness of bristles 62. **J. popovii** Iljin
- + Barbules of pappus bristles as long as, slightly shorter or longer than thickness of bristles (Baisun)..... 61. **J. gracilis** Iljin
11. Stem slender; all leaves petiolate, even uppermost leaves not decurrent and not curly; capitula more or less narrow, on long bent peduncles (Khodzha-Kazian mountains) 64. **J. bucharica** Winkl.
- + Stem thicker; cauline leaves always sessile 12.
12. Leaves distinctly decurrent 13.
- + Leaves not decurrent, sometimes only semiamplexicaul or with leaf bases coalesced with corresponding branch 15.

13. Plants grayish arachnoid-hairy; stem branched, mainly in lower half; cauline leaves decurrent, distinctly sinuate; capitula large, with 20–30 mm long involucre, also arachnoid, on straight upward spreading branches (southern Kyzyl-Kum, northern Kara-Kum) ..
..... 65. **J. psammophila** Iljin
+ Stem branched up to the tip; branches more or less arcuately incurved; involucre 15–20 mm long 14.
14. Involucre not arachnoid-hairy; glandular and with short appressed bristles; stem dark green, almost glabrous; leaves hard, linear, convolute, finely sinuate-toothed (northwestern foothills of Karatau)
..... 67. **J. karatavica** Iljin
+ Involucre, like entire plant, arachnoid-hairy; leaves oblong-lanceolate, boldly sinuate-toothed, pinnatifid or less often pinnatifid (Kopetdag and northwestern foothills of Pamiro-Alai)
..... 66. **J. lasiopoda** Trautv.
15. Leaves always sinuate; cauline leaves sessile, semiamplexicaul, pinnatifid or pinnatisect. Capitula large, on long, erect peduncles
..... 68. **J. botschantzevii** Iljin
+ Leaves not sinuate, undivided, oval, oblong-oval or lyrate-pinnate, with larger terminal lobe, toothed or lobate 16.
- 605 16. Entire plant with glabrescent, flocculose-arachnoid-hairy pubescence, with less deeply depressed midrib, almost not rugose above, densely covered with sessile glandular hairs, not sunken in pits; pappus bristles somewhat thick, with more or less dense, long, three to four times as long as thickness of bristles, arcuate and obliquely arranged barbules (Fergana Valley)
..... 69. **J. winkleri** Iljin
+ Entire plant, especially stem, uniformly pubescent with crisped arachnoid-hairy pubescence; leaves with distinctly depressed midrib, strongly finely rugose, with scattered sessile glandular hairs, in deep alveoles; pappus bristles sparse and short-barbate; barbules as long as thickness of bristles, shorter, or more than one and one-half to two times as long, semiappressed to axis (Buruyutau Mountains in Vakhsh Valley) 70. **J. tadshikistanica** Iljin

Subsection 1. Robustae Iljin.—Leaves reaching up to capitula; involucre bracts terminating into long spines.

56. **J. robusta** Schrenk in Bull. Acad. Sc. Pétersb. III (1844) 109; Trautv. in Tr. Petersb. Bot. Sada, VIII, 2, 515; O. and B. Fedtsch. Perech. Rast. Turk. IV, 303; Iljin in Tr. Turk. Nauchn. Obshch. 2, 18.

Perennial. Plants 20–40 cm high, glabrous. Rhizome strong, terminating into turf of short, dense, woolly-tomentose caudices. Stems

very strong, thick, 5–8 mm thick at base, ribbed-sulcate, usually several, simple or weakly branched, like branches densely leafy up to capitula. Leaves somewhat hard, oblong or even almost oval, entire, often somewhat sinuate, acute or cuspidate, densely covered with sessile glandular hairs, with prominent veins on lower side; basal leaves gradually narrowed into short and strong basally broadened petiole; cauline leaves (except lower and uppermost) strongly decurrent, uppermost reduced and strongly narrowed; all leaves green on both sides. Capitula solitary, large. Involucre 30–40 mm long and 25–35 mm wide, together with squarrose appendages somewhat turbinate at base, yellow-green, sometimes arachnoid-hairy-flocculose at base; involucre bracts numerous, gradually narrowed into 8–15 mm long, somewhat strong, initially divergent cusps, later almost arcuately incurved, covered with rather short bristles, innermost bracts erect. Receptacle covered with yellowish hairs, several times shorter than involucre. Corolla pink, 28–45 mm long, gradually narrowed over 10–20 mm, with 5–10 mm long lobes of limb, covered with sessile glandular hairs; apical appendages of anthers acuminate, 5–7 mm long, basal appendages setaceous, about 5 mm long, slightly divided; filaments papillose; style glabrous, stigma branches bifid almost up to base, densely papillose, flat, 4–5 mm long, with short bristle below branches. Pappus deciduous, snow-white, 20–25 mm long, including two long bristles, many-rowed with unequal bristles, plumose, easily detached from achene on maturation, with ring at base and drawn out membranous base, thickened into patelliform pappogenus, bearing pentagonal membranous nectary in center; achenes linear, 8–9 mm long and about 1.5 mm thick, smooth, yellowish-brown, with toothed border above, and oblong-conical whitish pappophorus inside. Flowering VI–VIII; fruiting VII–VIII. (Plate XLIV.)

Varicolored clayey, stony slopes and rocks.—*Soviet Central Asia*: Tien Shan. Endemic. Described from Khantau (Chu-Ili Mountains). Type in Leningrad.

Note. An extremely distinctive species, combining characters of this section as well as of section *Derderiae* Boiss. We have placed it in a separate subsection. The Khantau Mountains, where it grows, are generally distinguished by sharp endemism. Besides this jurinea, the most striking example to use would be *Niedzwetzkiia semireczenskia*, a species from the tropical family Pedaliaceae.

Subsection 2. Papilligerae Iljin.—Pappophorus and pappogenus developed.

57. **J. komarovii** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 4 (1924) 59; Iljin, Tr. Turk. Nauchn. Obsch. 2, 19.

Perennial. Plants 25–80 cm high, many-stemmed, light green. Root thick, strongly branched, woody. Stems densely woolly-arachnoid-hairy near collar, finely sulcate, subglabrous with isolated scattered, rather short hairs, slightly arachnoid-hairy below capitula, simple or usually with few virgate branches, strongly leafy from base to middle. Leaves oblong undivided and entire, acuminate or acute, mainly with appressed glandular hairs above, especially in upper leaves, on both sides green and almost glabrous or with scattered hairs, short along veins; basal leaves less numerous, gradually narrowed into petiole; cauline leaves sessile, strongly long-decurrent, upper ones small, linear. Capitula solitary, 3–4 cm long. Involucre relatively broad, cupuliform, more or less narrowed toward base, five- to seven-rowed; involucre bracts linearly-lanceolate, reduced above, on outer side weakly and sparsely arachnoid-hairy, on inner side glabrous. Receptacle covered with smooth, unequal hairs, almost half as long as involucre. Corolla pink, up to 27–30 mm long, narrowed over half, glabrous, almost two times as long as involucre, slightly projecting, with about 5–6 mm long limb; appendages of anthers setaceous, 3–3.5 mm long or weakly divided; filaments glabrous. Pappus easily shedding, with many bristles, with slightly yellowish tinge, bristles barbate-plumose, unequal, with barbules almost three times as long as thickness of bristles, all bristles connate into ring; achenes four-angled, glabrous with indistinct parallel ridges, and isolated short tubercles or teeth above, below toothed corona, pappophorus almost oblong, dome-shaped, whitish in middle of corona with five-toothed membranous nectary in center. Flowering VII–VIII; fruiting VIII–IX.

Rocks, stony slopes in alpine belt.—*Soviet Central Asia*: Pamiro-Alai (eastern part). Endemic. Described from Shugnan, from the valley of the Garmchashma River. Type in Leningrad.

58. *J. kamelinii* Iljin sp. n. in Addenda XXVI, 721.

Perennial. Plants 25–40 cm high. Stem solitary or several, sulcate-angular, with whitish ribs and green furrows, densely covered with sessile glandular hairs and long, vacuolate, granose, many-celled flexuous hairs. Like leaves, stems also weakly arachnoid-hairy only in upper part, especially below capitulum, usually with long branches in lower half. Leaves usually crowded in lower half of stem; basal leaves gradually narrowed into petiole, narrow-lanceolate like cauline leaves, only uppermost leaves linear and strongly reduced; all leaves undivided and entire, acuminate, green on both sides, densely covered with hairs as on stem, especially younger, besides with numerous sessile glandular hairs, midrib depressed above, prominent and whitish beneath; cauline leaves always sessile, often asymmetrically decurrent, uppermost leaves

semialexicaul, with small auricles, all spreading. Capitula solitary, with many florets, 25–35 mm wide at anthesis. Involucre 15–20 mm long, all involucre bracts appressed, oblong to narrowly lanceolate; outer, and often also middle bracts greenish, cuspidate or short-acuminate, broadly white-membranous along margin, one- to three-veined, arachnoid-hairy on outer side, and also with scattered glandular hairs; inner bracts acuminate, with purple tinge, densely glandular, but not arachnoid-hairy, like all other bracts ciliolate along border. Receptacle densely squamose, scales smooth, acuminate, one-third to half as long as involucre. Corolla 24–27 mm long, pink or purple, with scattered sessile glandular hairs, gradually narrowed over 10–13 mm length, with 5–6 mm long lobes of limb. Pappus snow-white, partially deciduous, lateral[†] bristles persistent; bristles in middle with barbules one and one-half to three times as long as thickness of bristles, bristles weakly connate into ring (except outermost), with membranous base, bearing thick, brown, stalked pappogenus in center, terminating with membranous, five-lobed, flexuously frilled nectary; mature achenes about 7 mm long, oblong, whitish, smoky above, glabrous, with indistinct, longitudinal, smooth striations, terminating into spinules only below corona; corona unequally toothed, slightly recurved, pappophorus dome-shaped on small elevation inside corona, with remains of manubrium above. Flowering VI; fruiting VI–VIII(?).

Stony slopes.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Zeravshan. Type in Leningrad.

59. ***J. elegantissima*** Iljin in Addenda XXVI, 722.

Perennial. Plants 50–60 cm high, branched right from base, entirely green, weakly arachnoid-hairy pubescent and with numerous sessile glandular hairs; branches long, arcuately spreading above, slender. Leaves linear, undivided and entire, one-veined, gradually narrowed toward base, sessile, not decurrent, concolorous, usually more or less horizontal, woolly fluff in axils of lower leaves. Capitula on long peduncles, solitary. Involucre almost poculiform, 20–25 mm long, involucre bracts appressed, acuminate, green, almost glabrous, with prominent veins; outer bracts strongly reduced, innermost gradually acuminate into awn. Corolla pinkish, with scattered sessile glandular hairs, up to 25–27 mm long, narrowed over 6–10 mm, with 6–7 mm long lobes of limb, outer corolla lobes strongly pendulous. Pappus deciduous, with plumose bristles connate into ring, and with pappogenus and nectary on its membranous base; achenes oblong, 9–10 mm long, with smooth longitudinal ribs,

[†][sic]; recte outer—Sci. Editor.

with band of teeth only below corona, and with dome-shaped pappophorus inside corona. Flowering VI–VII; fruiting VII–VIII.

On gypsum rocks.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from the upper reaches of the Yakkabak-Darya River from the vicinity of the village of Tashkurgen. Type in Tashkent.

Subsection 3. Persistentes Iljin.—Only pappogen present.

Series 1. Graciles Iljin.—All leaves undivided and entire.

60. *J. trautvetteriana* Rgl. and Schmalh. in A.P. Fedtsch. Putesh. v Turk. III, No. 18 (1882) 52; O. and B. Fedtsch. Perech. Rast. Turk. IV, 320 (specimina serawschanica); Iljin in Tr. Turk. Nauchn. Obshch. 2, 191.—*J. lasiopoda* f. *integrifolia* Iljin in herb.—*Exs.*: H.F.A.M. No. 487.

Perennial. Plants 20–60 cm high. Root woody, usually branched, often many-headed above. Stems solitary or few, erect, simple or with few branches, sulcate, rather short and somewhat sparsely hairy, at some places flocculose-arachnoid-hairy, especially strongly below capitulum, woolly-tomentose near base, leafy up to middle. Leaves morphologically resembling those of willow, oblong-lanceolate or lanceolate, undivided and entire, acute or acuminate, green, very finely rugose, almost glabrous and rather scabrous above, grayish arachnoid-hairy beneath, especially young leaves, and with weaker arachnoid-hairy pubescence scattered glandular hairs visible; basal leaves narrowed into somewhat winged petiole; cauline leaves distinctly decurrent, sessile, more or less narrowed below, uppermost leaves reduced to linear. Capitula solitary. Involucre narrow cupuliform, 15–25 mm long and 7–12 mm wide, somewhat narrowed toward base, arachnoid-hairy; outer bracts ovate-oblong to linear, strongly reduced, sometimes appressed, green in upper part; middle bracts strongly arachnoid-hairy, narrowly lanceolate, purple along margin; inner bracts exerted, finely acuminate and membranous, purple, lax, without serration along margin, like other bracts. Receptacle densely covered with unequal smooth bristles, reaching up to half of involucre height. Corolla pink, pendulous, 23–30 mm long, narrowed over 8–12 mm, with 5.5–7 mm long limb, and scattered glandular hairs, transversely rugose in middle; basal appendages of anthers setaceous. Pappus persistent, serrate, with dense barbules shorter than thickness of bristles, pappus bristles rather numerous, snow-white; achenes 5–6 mm long, yellow, indistinctly four-angled, glabrous, smooth, spiny-toothed above along edges with cupuliform pappogenus at apex, with nectary in center. Flowering V–VI; fruiting VI–VII.

Gravelly slopes of foothills and varicolored rocks.—*Soviet Central*

Asia: Pamiro-Alai (western part). Endemic. Described from the Aksai Mountains in the Zeravshan Valley. Type in Leningrad.

61. **J. gracilis** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 4 (1924) 60; Iljin in Tr. Turk. Nauchn. Obsch. 2, 19, Plate 1.

Perennial. Plants 25–60 cm high, many-stemmed, light green. Roots relatively thick, usually with short many-headed caudex. Stem virgate, branched from base to middle or up to two-thirds length, and leafy in this part, striate-sulcate, glabrous or subglabrous, woolly-tomentose at base. Leaves oblong to lanceolate, undivided and entire, or with sparse teeth in lower half, acute, glabrous on both sides, green with scattered appressed glandular hairs beneath, smooth or slightly scabrous above, sessile, long and rather broadly decurrent; basal leaves narrowed gradually into petiole with slightly broadened base, withering early; uppermost leaves small, linear to filiform, not decurrent. Capitula solitary. Involucre 12–20 mm long, cupuliform, not arachnoid-hairy, five- or six-rowed; outer involucre bracts more lax, sometimes recurved, green, acute or subobtusate, reduced, other bracts lanceolate, appressed, purple, membranous along margin and somewhat serrate, acuminate. Receptacle densely squamose, scales smooth, reaching almost up to half to involucre height. Corolla pink, pendulous, 22–28 mm long, narrowed over 8–12 mm, with 5–7 mm long limb, densely covered with sessile glandular hairs; basal appendages of anthers setaceous; filaments glabrous. Pappus 610 persistent, snow-white, with unequal dense bristles, bristles short-barbate, with barbules shorter than thickness of bristles, or almost as long; achenes four-angled, obpyramidal, about 6 mm long, yellow, smooth, spinose-toothed above along edges, usually with three-fid teeth, often with row of similar spinules slightly below margin, with broad cupuliform, thickened, finely toothed pappogenus at apex, with large five-toothed nectary in center, on short stalk. Flowering V–VI; fruiting VI–VII(?).

Low-hill steppes, on varicolored rocks, stony slopes.—*Soviet Central Asia*: Pamiro-Alai Region (extreme west). Endemic. Described from Baisun. Type in Leningrad.

Note. In the herbarium of the Botanical Institute, Academy of Sciences of the USSR, this species has been identified by V.I. Lipsky as *J. trautvetteri* var. *glabrata* Lipsky.

62. **J. popovii** Iljin in Izv. Glavn. Bot. Sada SSSR, XXVII, 1 (1928) 80.

Perennial. Plants usually with many-headed caudex. Stems numerous, usually branched in lower part, less often simple, sulcate, glabrous, leafy up to middle. Leaves densely arranged, oblong, oblong-oval or broadly lanceolate, undivided and entire, acute, narrowly revolute and strongly

scabrous, green and glabrous on both sides, or slightly scabrous above, with prominent veins beneath, sessile, broadly decurrent. Capitula solitary, on long peduncles, medium. Involucre narrowly cupuliform, 15–20 mm long and 10–15 mm wide, glabrous, with linear or narrowly lanceolate bracts; outer bracts short, weakly recurved, other bracts appressed; innermost bracts prominent and acuminate. Receptacle densely covered with smooth bristles. Corolla pink, exserted from involucre, outer pendulous, 22–25 mm long, narrowed over 8–10 mm, with about 5 mm long limb; basal appendages of anthers setaceous, almost not divided, 2–3 mm long; filaments smooth. Pappus persistent, white, densely barbate; achenes (immature) glabrous, four-angled, toothed above along edges; pappogenus cupuliform enclosing five-lobed nectary. Flowering V; fruiting VI(?).

Herb slopes.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Kugitang near the village of Kizyl-Alma. Type in Leningrad.

Note. In the herbarium of the Botanical Institute, Academy of Sciences of the USSR, this species has been identified by M.G. Popov as *J. trautvetteri* var. *nuda* M. Pop.

63. **J. cephalopoda** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 10 (1937) 244.—*lc.*: *Ibid.* Fig. 1.

Perennial. Semishrub up to 75 cm high, with many-headed caudex. Stems erect, flocculose-arachnoid-hairy, longitudinally sulcate, branched; branches short, somewhat arcuate, leafless, one-headed. Leaves linear, acute, green, glabrous above, one-veined, gray arachnoid-hairy beneath, entire, involute; basal and lower cauline leaves numerous, 10–20 cm long and 2–5 mm wide, gradually narrowed toward base, somewhat broadened at base; cauline leaves shorter, sessile, not decurrent. Capitula on 2.5–6.5 cm long peduncles, terminal, arcuately ascending. Involucre 15–17 mm long, pubescent, greenish, slightly dirty purple above; involucre bracts appressed, with prominent veins, along margin narrowly, almost transparently frilled; outermost bracts few, strongly reduced, oblong-ovate, middle bracts lanceolate, innermost longest, linear-lanceolate, acuminate. Receptacle densely covered with short, about 5–6 mm long hairs. Florets purple, ray florets pendulous; corolla 20–22 mm long, narrowed over 9–10 mm, with 4.5–5 mm long lobes of limb. Pappus persistent, white, 7–8 mm long, with barbate hairs; barbules 2–3 times as long as hair diameter; achenes 6–7 mm long, 4-angled, obpyramidal, with dentate corona, teeth at edges decurrent into long parallel folds, with large, cupuliform, thickened, minutely dentate pappogenus at apex along edges, enclosing poculiform, 5-dentate nectary. Flowering IV(?)–V; fruiting V–VI.

Gravelly and sandy mountain ridges in desert zone.—*Soviet Central Asia*: Karatau. Endemic. Described from foothills of Karatau, from the banks of Kyzyl-Kum. Type in Leningrad.

Series 2. Pinnatae Iljin.—Leaves lyrate, pinnatisect or toothed.

64. **J. bucharica** Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 525; O. and B. Fedtsch. Perech. Rast. Turk. IV, 300; Iljin in Tr. Turk. Nauchn. Obshch. 2, 19.

Perennial. Plants 15–60 cm high. Roots somewhat thick, woody-fibrous, bearing caudex. Stems solitary or usually many, simple or often more or less long-branched; branches usually in lower half or two-thirds, striate and finely sulcate, at base usually arachnoid hairy-woolly-tomentose, less often weakly tomentose, remaining part flocculose-arachnoid-hairy, leafy. Leaves whitish-gray beneath due to more or less densely arachnoid-hairy pubescence, greenish above with only arachnoid-hairy coating, often glabrescent, or even entirely glabrous, green, with very fine appressed glandular hairs; basal leaves long-petiolate, petioles somewhat broadened at base; lower cauline leaves on shorter petioles, also somewhat broadened at base; middle cauline leaves sessile, usually with small auricles or somewhat short-decurrent; upper leaves distinctly reduced, sessile, usually without auricles and not decurrent, lanceolate or linear; basal, lower, and middle cauline leaves pinnatisect, and then usually with toothed rachis, or pinnatipartite, pinnatilobate or lyrate, occasionally all undivided (f. *integrifolia* Winkl.), with flat margins or narrow-sinuate, especially into pinnatisect laminas, sometimes in all leaves or only in uppermost leaves. Capitula solitary. Involucre narrow cupuliform, (15)20–25 mm long (7)10–15 mm wide, not or weakly arachnoid-hairy only in upper half, four- or five-rowed; lowermost bracts oblong-ovate, green, practically without frill or with quite narrow membranous border; middle bracts lanceolate, acuminate, more broadly membranous-frilled, pink-purple in upper part; innermost bracts remote, linear-lanceolate, pink-purple, attenuate in thin subulate cusp, on outer side, like middle bracts, covered with rather fine crisped hairs, often with isolated serration; all bracts with prominent veins, especially midrib. Receptacle covered with more or less densely smooth bristles, up to one-third as long as involucre, less often with shorter bristles. Corolla pink, 22–25 mm long, narrowed over 9–12 mm, with 5–6 mm long limb, covered with scattered glandular hairs, usually transversely rugose in middle, outer ones pendulous; basal appendages of anthers setaceous. Pappus persistent, snow-white, barbate or less often barbate-serrate; achenes obpyramidal, four-angled, 5–6 mm long, shorter than pappus, with prominently raised longitudinal ridges, especially thickened edges,



in upper one-third modified in teeth, often bifid, with toothed corona above, glabrous, sometimes with sparse fine glandular hairs between teeth; with cupuliform pappogenus at apex, usually 10-lobed, enclosing large five-lobed nectary. Flowering IV–V; fruiting V–VI.

Foothill zone: adyrs*, conglomerates, stony gravelly slopes, rocks.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Kodzhakazian. Type in Leningrad.

65. **J. psammophila** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 4 (1924) 58.

Perennial. Plants 20–50 cm high, grayish due to arachnoid-hairy pubescence, with thick, woody root, bearing densely crowded caudices, woolly-tomentose. Stems branched. Leaves usually several; basal leaves numerous, like lower cauline leaves, narrowed into relatively long petiole, pinnatilobate, pinnatipartite or pinnatisect; weakly sinuate, other cauline leaves sessile and decurrent; uppermost leaves linear, acuminate, undivided, with thin, glabrescent, flocculose-arachnoid-hairy tomentum on both sides. Capitula on very long leafless peduncles, solitary. Involucre about 25 mm long and 10–15 mm wide, grayish-tomentose; involucre bracts appressed, linear-lanceolate, acuminate; outer bracts significantly reduced, innermost finely acuminate, narrowly membranous and purple along margin. Receptacle covered with short hairs, one-sixth to one-fifth as long as involucre. Corolla bright pink, glandular-hairy, 25–30 mm long, gradually narrowed over 12–15 mm, lobes of limb 5–6 mm long, peripheral florets sharply pendulous. Pappus persistent, snow-white, 10–15 mm long, barbate-plumose, barbules four times as long as thickness of bristles. Achenes 5–7 mm long and about 3 mm thick, grayish, obpyramidal, with longitudinal ridges, alternating with more or less deep furrows, continuous below, discontinuous above due to tubercles, terminating into spines appressed above, with large corona above, with broad, irregularly sinuate marginally fleshy pappogenus at extreme tip, enclosing thick, large, five-angular nectary. Flowering V; fruiting at the end of V and VI. (Plate XL, Fig. 8.)

Stony slopes of foothills, outcrops of conglomerates, sandy steppes.—*Soviet Central Asia*: Kyzyl-Kum (southwest). Endemic. Described from the foothills of the Aktau Mountains in Kyzyl-Kum. Type in Leningrad.

66. **J. lasiopoda** Trautv. in Tr. Peterb. Bot. Sada, VIII, 2 (1883) 510; O. and B. Fedtsch. Perech. Rast. Turk. IV, 303; Iljin in Tr. Turk. Nauchn. Obshch. 2, 19.—**Exs.**: H.F.F.M. No. 492.

Perennial. Plants 30–60 cm high; roots bearing one-headed or few-

*Low foothills bordering Fergana depression—Translator.

headed caudex, covered with broadened bases of leaves. Stems solitary or few, somewhat thick, erect, striate-sulcate, arachnoid-hairy, woolly-tomentose near collar, branched only in upper half or one-third. Leaves green and glabrous above with scattered, fine, appressed glandular hairs, grayish beneath due to more or less densely arachnoid-hairy pubescence, oblong or lanceolate, usually sparsely pinnatifid or pinnatilobate, less often pinnatisect, occasionally entire, acute or acuminate, subobtusate, usually weakly sinuate, narrowly convolute; basal leaves, and sometimes lowermost cauline leaves, narrowed into more or less long petiole, abruptly broadened at base; cauline leaves sessile, often somewhat decurrent, uppermost lanceolate to linear; apical leaves almost entire. Capitula solitary, on relatively short peduncles, mostly incurved. Involucre almost cylindrical, 15–20 mm long and 7–10 mm wide, weakly flocculose-arachnoid-hairy, with appressed bracts, outermost bracts triangular-ovate, acute; middle bracts oblong to lanceolate, narrowly purple-bordered, acuminate; innermost bracts lax, narrow-lanceolate, attenuate into purple membranous cusp; all bracts with distinct veins, midrib prominent. Receptacle densely covered with smooth bristles, up
615 to one-third as long as involucre. Corolla pink or pink-purple, pendulous (in peripheral florets), 14–23 mm long, narrowed over 8–11 mm, with 4–6 mm long limb, weakly transversely rugose in broader part, with scattered glandular hairs throughout; basal appendages of anthers setaceous. Pappus persistent, snow-white, 7–9 mm long, with two longer, short-plumose bristles; achenes obpyramidal, four-angled, 5–6 mm long, with deeply incised longitudinal ribs, smooth in lower half, spinulose in upper half along edges, with toothed-spinose upper edge, pappogenus connate with pappus, fleshy, cupuliform, enclosing five-lobed nectary. Flowering V; fruiting V–VI.

Rocks, varicolored substrates, gypsum-clayey slopes of foothills.—*Soviet Central Asia*: mountainous Turkmenia, Tien Shan, Pamiro-Alai. Endemic. Described from Akhalteke in Turkmenia. Type in Leningrad.

Note. Trautvetter, while describing this species, compares it with *J. adenocarpa* Schrenk; however, these are not related species and belong to different sections.

67. *J. karatavica* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 4 (1924) 60.

Perennial. Plants about 40 cm high, green, weakly arachnoid-hairy. Stem erect, weakly branched in inflorescence. Cauline leaves narrow, almost linear, with less often distant and long teeth, convolute, green on both sides, sessile and short-decurrent; lower cauline leaves not decurrent, petiolate, uppermost filiform, bracteal. Capitula on short peduncles. Involucre broadly turbinate, but with roundish-narrow base,

20–23 mm long and about 10 mm wide, green, with purple tinge in upper part, not arachnoid-hairy, with sessile glandular hairs; involucre bracts linear-lanceolate, acute, inner bracts acuminate, with scarcely visible appressed bristles. Receptacle covered with bristles, almost one-third as long as involucre: Corolla bright purple, covered with sessile glandular hairs, 21–25 mm long, narrowed over 10–12 mm, with 5–6 mm long lobes of limb; peripheral florets sharply pendulous. Pappus persistent, snow-white, 9–10 mm long, barbate-plumose, with plumes three to four times as long as thickness of bristles; achenes covered with sharp tubercles along edge and parallel ribs, with patelliform pappogenus at tip, enclosing nectary. Flowering VI; fruiting VII(?).

Boyalych [*Salsola arbuscula*] deserts.—*Soviet Central Asia*: Balkhash Region (not far from the Karatau Mountains). Endemic. Described from the deserts between Lake Ashchikol and the Karatau Mountains. Type in Leningrad.

Note. Only one authentic specimen is present in the collections.

68. **J. botschantzevii** Iljin sp. n. in Addenda XXVI, 722.

616 Perennial. Plants (15)25–40(50) cm high. Stems usually few, finely sulcate-ribbed, floccose-arachnoid-hairy, covered with numerous sessile glandular hairs, branched and leafy almost from base to middle or up to two-thirds; branches more or less erect, elongate and leafy only on lower side. Leaves pinnatipartite or bipinnatipartite, pinnate, or pinnatilobate, with oblong, less often linear, ovate or even triangular lobes, obtuse and coalesced with more or less broadly winged rachis, always distinctly finely sinuate, with sessile glandular hairs on both sides, sparsely arachnoid-hairy, more weakly pubescent above, basal and lowermost cauline leaves gradually narrowed into long petiole, distinctly broadened at base; middle cauline leaves sessile, semiamplexicaul, coalesced with lower part of lamina to the corresponding branch, uppermost leaves linear. Capitula solitary terminal, with many florets. Involucre cupuliform to cyathiform, usually 20–25 mm long, entirely covered with soft fluff, and scattered glandular hairs; outer involucre bracts oblong-ovate; middle bracts oblong-lanceolate, acuminate, inner long-aristate, usually purple, glandular-hairy and with short hairs on outer side and above, besides soft bristles, with prominent midrib, and two weak lateral veins. Receptacle squamose; scales acuminate, up to half of involucre. Corolla pink or pink-purple, with scattered sessile glandular hairs, 22–30 mm long, gradually narrowed over 10–13 mm, with 5–7 mm long lobes of limb. Pappus persistent, of very fine bristles, almost as thick as human hair, with distant, more or less short, barbules on all sides, strongly lustrous at base; achenes slightly yellowish, distinctly four-angled, obpyramidal, about 6 mm long, with longitudinal smooth ridges and

deep furrows, terminating into dense teeth above, almost connate with corona, with scattered sessile glandular hairs in furrows and between teeth; pappogenus somewhat thick, five-lobed, cupuliform, with roundish lobes, very finely toothed along edges, nectary large, five-dentate, teeth in turn with fine teeth, on rather short manubrium. Flowering IV–V; fruiting V–VI.

Limestone outcrops, stony thin-soiled slopes.—*Soviet Central Asia: Pamiro-Alai. General distribution:* Possible in Afghanistan. Described from Southern Tadzhikistan from the Koikitau Mountains northwest of the village of Aivadzhi. Type in Leningrad.

69. **J. winkleri** Iljin sp. n. in Addenda XXVI, 722.—*J. bucharica* var. *integrifolia* Winkl. ex O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 300.

617 Perennial. Plants (15)20–50 cm high, forming somewhat dense turf and many-headed caudex, with woolly buds in axils of upper scales, and remains of lower leaves. Stems few, erect, flocculose-arachnoid-hairy, glabrescent and with scattered sessile glandular hairs, finely ribbed-sulcate, branched up to middle or even three-fourths; branches sharply spreading upward. Basal and lower cauline leaves, sometimes also middle leaves, petiolate, petiole shorter than lamina, less often equal; sometimes upper leaves sessile, semiamplexicaul, with lower part coalesced with corresponding branch and very short-decurrent, sometimes indistinctly decurrent; all leaves green or grayish-green above due to fine arachnoid-hairy pubescence, finely rugose, with reticulate wrinkles, usually continued all over, and not very strongly depressed veins, white-tomentose or grayish white-tomentose beneath due to dense arachnoid-hairy tomentum, also with sessile glandular hairs; lower and middle leaves oblong-oval, lyrate, less often pinnatilobate, occasionally almost undivided, toothed or cristate in lower part, lobes and lobules usually finely toothed along margin; uppermost leaves strongly reduced, oblong or almost linear. Capitula solitary, with many florets. Involucre 20–25 mm long; all involucre bracts appressed, with arachnoid-hairy pubescence, membranous border, and prominent veins, especially midrib, and two pairs of lateral veins on each side; outer bracts oblong-ovate, acute, like middle bracts, dark green below tip; middle bracts oblong-lanceolate, acuminate, inner acuminate, less often aristate, purple above, outer surface pubescent with sessile glandular hairs. Receptacle squamose; scales acuminate, smooth, one-fourth as long as involucre. Corolla pink or pink-purple, with scattered sessile glandular hairs, 23–30 mm long, gradually narrowed over 9–13 mm, with 5–7 mm long lobes of limb. Pappus persistent, half to two-thirds as long or less often almost as long as achene, pappus bristles barbate-plumose, with dense, two-rowed

barbules, innermost bristles four or five, broad and short-barbate, shorter than thickness of bristles; pappogenus broadly lobate, fleshy, cupuliform, red on inner side, enclosing cyathiform nectary on short manubrium; achenes about 5 mm long, thick, sharply four-angled, obpyramidal, light gray, on edges with numerous, large, compact, parallel ridges, with narrowed and deep canals, terminating into teeth above, connate with teeth of corona, latter as well as bottom of canals covered with sessile glandular hairs. Flowering V–VI; fruiting VI.

Clayey, pebbled adyrs, and conglomerates, also sands and clayey plains of the Fergana Valley.—*Central Asia*: Syr-Darya. Endemic. Described from the Margelan District, eastern slope of conglomerate ridges near the village of Assake. Type in Leningrad.

70. *J. tadshikistanica* Iljin sp. n. in Addenda XXVI, 723.

- 618 Perennial. Plants 20–50 cm high, sometimes developing dense many-headed caudices, with woolly fluff in the axils of scaly leaves. Stem entirely covered with arachnoid-hairy pubescence, with scattered sessile glandular hairs especially along furrows, branched in lower half and with long, leafless erect branches in upper half, arising at an acute angle. Leaves usually crowded in lower half of stem, basal and lower cauline leaves long-petiolate, all leaves lyrate or lyrate-lobate, less often mixed with pinnatipartite and pinnatilobate leaves, occasionally with almost undivided leaves, but nevertheless laminas toothed in lower half, lobes ovate or oblong, obtuse, grayish beneath due to arachnoid-hairy tomentum, with numerous glandular hairs under tomentum, with depressed midrib and lateral veins above, strongly finely rugose, with sessile glandular hairs deep in pits between wrinkles, weakly arachnoid-hairy, smooth, not crimped along margin; middle cauline leaves sessile, usually fused with corresponding branch in lower part and often very short and narrowly decurrent; uppermost leaves strongly reduced, oblong or oblong-spatulate, undivided and entire or somewhat finely crenate, usually narrowed toward base. Capitula solitary, with many florets. Involucre cupuliform, 20–25 mm long, entirely arachnoid-hairy pubescent with fine crisped hairs, outer involucre bracts oblong-ovate, short-acuminate; middle bracts oblong-lanceolate, gradually acuminate, with membranous border, truncate in lower part especially outer bracts, ciliolate in upper part; all bracts three-veined, innermost narrow-lanceolate, gradually attenuate in long awn, with membranous purple frill, with scattered glandular hairs on outer side, besides pubescence, and with scarcely visible bristles above. Corolla pink or pink-purple, usually 22–24 mm long, gradually narrowed over 8–10 mm, with 5–7 mm long lobes of limb, and with numerous sessile glandular hairs. Pappus persistent, pappus bristles less often short-barbate, barbules either shorter

or one and one-half to two times as long as thickness of bristles, semiappressed to axis; pappogenus broadly cupuliform, whitish on outer side, reddish on inner, enclosing five-lobed nectary. Flowering V–VI(?).

Stony and gravelly slopes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the Vakhsh Valley, from the Buryutau Mountains. Type in Leningrad.

Series 3. Apodae Iljin.—Plants without stem or almost stemless.

71. **J. impressinervis** Iljin in *Izv. Tadzh. Bazy Akad. Nauk SSSR*, 1, 1 (1933) 65.

Perennial. Plants low, about 10 cm high, caespitose. Stem simple, arachnoid-hairy. Basal leaves numerous, oblong-oval or almost oval, subacute, somewhat convolute, entire, subglabrous in lower part, dull green above, finely arachnoid-hairy, glabrescent, with depressed veins, grayish tomentose beneath, gradually narrowed into petiole; cauline leaves four to six, smaller, uppermost leaves linear, sessile. Capitula with about 17 mm long and 10 mm wide involucre. Involucre flocculose-arachnoid-hairy; outer and middle bracts oblong and lanceolate, acute, dark green in middle and above; inner bracts linear-lanceolate, acuminate, purple. Corolla pink, almost pendulous, gradually narrowed over 7–8 mm, with 4–5 mm long lobes of limb. Pappus persistent(?), snow-white, with unequal bristles, short-barbate, with sparse barbules, slightly exceeding thickness of bristles. Flowering V.

Montane habitats.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Kulyab, from the Takhta-Kuvat Mountains near the Tashiktash Pass. Type in Dushanbe; cotype in Leningrad.

72. **J. apoda** Iljin in *Izv. Tadzh. Bazy Akad. Nauk SSSR*, 1, 1 (1933) 66.

Perennial. Plants stemless or with scarcely visible stem, caespitose, semishrub with numerous woody caudices, underground over large part, densely covered with remains of old leaves as narrow scales. Leaves densely rosulate at tip of caudices, usually 2–4 cm across, oblong or oblanceolate, obtuse, gradually narrowed into short petiole, entire or less often weakly toothed, with depressed midrib above, grayish-green, almost concolorous, finely pubescent or subglabrous, usually 1–2 cm long. Capitula subsessile, solitary terminal on caudices. Involucre 20–25 mm long and about 10 mm wide; outer and middle bracts grayish-green, lanceolate or oblong, acuminate, distinctly attenuate above, inner bracts very prominent, acuminate, purple, later pale ferruginous. Corolla pink, 25–30 mm long, pendulous, gradually narrowed over long distance with about 5 mm long lobes of limb. Pappus deciduous, barbate-plumose, about 20 mm long, pappus bristles connate into ring, having common

base with rather large nectary enclosed by fleshy pappogenus; achene four-angled, about 4 mm long and 2 mm thick, glabrous, smooth, with toothed border above, spinulose, and with hemispherical pappophorus at tip. Flowering VI(?)–VII; fruiting VII. (Plate XLVIII, Fig. 2.)

On limestones.—*Soviet Central Asia*: Pamiro-Alai Region (only in the Babatag Range). Endemic. Described from Bish-Archa Peak. Type in Leningrad.

Note. *J. caespitosa* Winkl. was not formally described by Winkler, but was annotated in the herbarium with a question about its affinity to the genus *Jurinea*. M. Iljin (1925) described and illustrated (Fig. 10) this species in a review of Turkistanian members of the genus *Jurinea* Cass. However, the herbarium specimen and the description based on the incomplete specimen do not satisfactorily demonstrate its specific status. Therefore, having not referred *J. caespitosa* Winkl. to the synonyms of our species, which is distinguished by a caespitose habit, we assign the name *J. apoda* Iljin to the Babatag, Koiktau and Kodzha-Kazian specimens.

Section 8. *Olgae* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 390.—Capitula narrowly cyathiform, numerous; florets bisexual; corolla of peripheral florets distinctly pendulous or gradually narrowed toward base; anther yellowish; filaments scarcely tuberculate. Achenes oblong, with toothed margin. Pappus deciduous, pappus bristles connate at base into ring, enclosing five-toothed nectary; only in *J. xeranthemoides* Iljin, ring is connate with membranous base, where it forms patelliform pappogenus, with a nectary in the center.

1. Pappus comprising serrate bristles, inner bristles longest, broad, flat, exerted from involucre and resembling inner series of involucre bracts of *Xeranthemum* ... 76. **J. xeranthemoides** Iljin
- + All pappus bristles barbate, longest four hairs do not differ in their nature from others 2.
2. Outer involucre bracts recurved 3.
- + All involucre bracts appressed 73. **J. olgae** Rgl. and Schm.
3. Plants whitish-grayish due to arachnoid-hairy pubescence; stem eglandular; outer involucre bracts recurved, whitish arachnoid-hairy, gradually narrowed upward, without constriction, others appressed, purple along border and in upper half; corolla pink or pink-purple 74. **J. ferganica** Iljin
- + Plants bright green, glabrous or with scarcely visible arachnoid-hairy pubescence below in early stages. Stem with more or less densely scattered sessile glandular hairs. Outer involucre bracts small, usually green, with constriction above, involucre, dark purple in remaining part, like corolla 75. **J. kuraminensis** Iljin

Series 1. Olgaeoides Iljin.—All pappus bristles similar; pappogenus not developed.

73. *J. olgae* Rgl. and Schm. in A.P. Fedtsch. Putesh. v Turk. III, No. 18 (1881) 51; Tr. Peterb. Bot. Sada, VIII, 2, 512; O. and B. Fedtsch. Perech. Rast. Turk. IV, 295; M.M. Iljin in Tr. Turk. Nauchn. Obsch. 2, 15.—*Exs.*: H.F.A.M. No. 494.

621 Perennial. Herbaceous plant, often semishrub, 15–40(45) cm high, with strong fibrous tap root, many-headed. Stem woody below, strongly branched up to middle, with tomentose fluff in leaf axils in woody part, simple in upper half, together with leaves grayish, grayish-green (f. *arachnoidea* Iljin) due to weak arachnoid-hairy pubescence or glabrous and green (f. *glabra* Iljin), without glands or less often with scattered sessile glandular hairs, angular-sulcate. Leaves sessile, linear; lowermost leaves subsequently often withering, almost flat, narrowly involute only at extreme margin, up to 10 cm long, others involute up to midrib, green or arachnoid-hairy-grayish on both sides, or strongly arachnoid-hairy beneath; with depressed midrib above, punctate-alveolate due to deep-seated glandular hairs, midrib prominent beneath, with scattered sessile glandular hairs, tip rather short cartilaginous above, gradually reduced upward, usually not reaching up to capitula. Capitula numerous, solitary terminal on stem. Involucre poculiform, about 2–2.5 mm long or slightly shorter, finely arachnoid-hairy, usually on lower side, or without arachnoid-hairy pubescence; involucre bracts imbricate, in many rows; outer bracts short, some obtuse, other bracts lanceolate, with prominent midrib and two lateral veins, reddish in upper half, gradually acuminate, membranous-cuspidate along margin, with or almost without sessile glandular hairs, but then with scarcely visible, short, stiff hairs, especially along margin, or with both types together; inner bracts usually attenuate into aristate cusp, covered with short hairs. Receptacle short squamose; florets few, peripheral florets pendulous, pink or pinkish-purple, 20–25 mm long, narrowed over 7–10(12) mm, with 5–6(7) mm long lobes of limb, slightly unequal, with scattered sessile glandular hairs; basal appendages of anthers about 3 mm long, setaceous, divided below; filaments yellowish, tuberculate. Pappus easily shedding entirely, longer than achene, barbate, with many bristles, snow-white; bristles connate into ring at base, recurved on maturation, barbules in middle part of bristles one and one-half to two times as long as thickness of bristles; achenes 6–8 mm long and 2–3 mm thick, oblong, obpyramidal, four-angled, brownish, glabrous, with toothed slightly deflexed corona above, with a row of sharp two- or three-toothed tubercles below, with dome-shaped pappophorus at apex, terminating into nectary exerted from pappus ring. Flowering IV–VII; fruiting VII(end)–IX. (Plate XL, Figs. 9, 10.)

Adyrs, varicolored rocks, gypsums, red sand-stones, conglomerates, rocks in foothill zone, stony, gravelly mountain slopes in the zone of steppes and mountain xerophytes up to 3,000 m.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai Region. Endemic. Described from the Zeravshan Valley not far from Bakhud. Type in Leningrad.

Note. An extremely polymorphic species. The form with arachnoid tomentum (f. *arachnoidea* Iljin) is predominant; however, distinctly green, glabrous or subglabrous forms (f. *glabra* Iljin) are also not rare. Sometimes the latter predominate in some localities, for example, in the vicinity of the village of Urgut. Almost all the plant organs vary, especially the vegetative parts.

74. **J. ferganica** (Iljin) Iljin comb. n.—*J. olgae* var. *ferganica* Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 16.—Exs.: GRF No. 2778.

622 Perennial. Plants 25–40 cm high, with long fibrous tap root. Stem as also leaves grayish-green due to fine arachnoid-hairy pubescence, angular-ribbed, somewhat spreadingly branched in lower half, more or less geniculately at nodes, eglandular, whitish-brown or dirty purple at base and leafless, with dense tomentose fluff in axils of scales. Leaves sessile, linear, strongly involute up to midrib, entire, with strongly appressed sessile glandular hairs above, sparsely arachnoid-hairy, grayish beneath due to dense arachnoid-hairy cover, subobtusate with small cartilaginous tubercle at apex, more or less recurved; lower leaves about 5 cm long or slightly longer, gradually reduced upward and completely absent in uppermost part of stem. Capitula numerous. Involucre narrowly cupuliform, usually about 20 mm long, less often slightly longer or smaller; outer involucre bracts short, slightly thick, greenish, not carinate, arachnoid-hairy, very short-cuspidate, decurved; other bracts significantly larger than outer, entirely appressed, acuminate, with prominent midrib and also two lateral veins, usually not arachnoid, with numerous, fine, sessile glandular hairs and scarcely visible appressed hairs on outer side; innermost bracts aristate, exceeding all other bracts. Receptacle scales short, yellowish. Corolla pink, about 22–25 mm long, gradually narrowed over 7–8 mm length, with 5–7 mm long lobes of limb, scattered glandular hairs below, corolla of peripheral florets recurved and pendulous; apical appendages of anthers acuminate, almost linear, membranous, about 3 mm long, undivided, fimbriate only below; filaments very finely tuberculate. Pappus deciduous, pappus bristles barbate, barbules in middle part of bristles usually three to four times as long as thickness of bristles, reduced above and below, bristles connate into ring; achenes four-angled, about 7 mm long and 3–4 mm in thick, brown, with smooth dome-shaped pappophorus at apex, terminating with small five-angled

membranous nectary. Flowering IV–VIII; fruiting VI–IX. (Plate XLVII, Fig. 2.)

Rocks, screes, gravelly and shaly mountain slopes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from northern slope of the Alai Range, Shakhimardan Basin, near the village of Pulgan. Type in Leningrad.

75. *J. kuraminensis* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 291.

623 Perennial. Plants 20–35 cm high, with strongly fibrous tap root, many-stemmed, bright green, glabrous, subglabrous, or weakly arachnoid-hairy. Stems especially in lower part angular-sulcate, divaricately branched, somewhat geniculate at nodes, with scattered sessile glandular hairs. Leaves sessile, linear-filiform, almost cylindrical, revolute up to midrib, with subacute cartilaginous apex, undivided and entire, both sides green, punctate-alveolate above, with sessile glandular hairs beneath; lower leaves 5–8 cm long, lowermost almost flat, gradually reduced and almost disappearing upward. Capitula numerous, solitary terminal on stems. Involucre poculiform, not arachnoid-hairy, or arachnoid-hairy only at base, generally dark purple; outer involucral bracts short, greenish-yellow, purple along margin, with dark green, slightly extended and recurved apex; middle and inner bracts entirely dark purple, lanceolate, acuminate, with brownish-cusp, prominent midrib, and two less prominent lateral veins, densely covered with sessile glandular hairs, short ciliate along border and at apex, innermost bracts most prominent, with thin, brownish, stiff-hairy awn, resembling transition to bristle. Receptacle squamose; scales white, pointed, smooth, one-fourth to one-third as long as involucre. Florets less numerous, peripheral florets semipendulous; corolla purple, 17–19(20) mm long, covered with sessile glandular hairs, gradually narrowed over 5–8 mm length, with 3–4(5) mm long lobes of limb; basal appendages of anthers membranous-setaceous, divided below. Pappus deciduous, barbate, about 10 mm long (excluding four long bristles); all bristles connate into ring, enclosing nectary. Achenes (6)7–8 mm long, oblong-linear, glabrous, brownish-olive, with toothed corona and row of teeth below it, with gradually conical pappophorus at apex terminating with nectary. Flowering VI–VII; fruiting VIII–IX. (Plate XLVII, Fig. 3.)

Gravelly and stony slopes in grass-wormwood steppe of subalpine zone.—*Soviet Central Asia*: Tien Shan (Kuramin Range). Endemic. Described from the Kuramin Range. Type in Leningrad.

Series 2. Biformes Iljin.—Pappus bristles of two types: outer as in preceding series, and few inner bristles broad, flat, and prominent as in *Xeranthemum*.

76. *J. xeranthemoides* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 11–12 (1924) 11; Tr. Turk. Nauchn. Obshch. 2, 9.

Perennial. Plants 15–40 cm high, many-stemmed, whitish to grayish-green, with strong fibrous tap root. Stem angular-sulcate, divaricately branched in lower half. Leaves sessile, linear, almost subulate, convolute up to midrib undivided and entire, weakly arachnoid-hairy above, with sessile glandular hairs in alveolae, more densely arachnoid-hairy beneath, with short weakly cartilaginous cusp; lower leaves 5–8 cm long, withering at anthesis, gradually reduced upward and absent below capitula. Capitula numerous, solitary terminal on stems, narrowly cylindrical during flowering, later very narrowly pöculiform. Involucre 20–25 mm long, with appressed bracts; outer bracts very short, greenish, arachnoid-hairy; 624 middle bracts narrowly lanceolate, acuminate, green in middle, broadly membranous along margin; inner bracts prominent, narrower, gradually narrowed into awn, purple, like middle bracts with prominent midrib, and two lateral veins at base, almost entire in upper part, scarcely toothed in lower part, without arachnoid-hairy pubescence outside, with numerous sessile glandular hairs. Receptacle squamose; scales yellowish, smooth, acuminate, one-fifth to one-fourth as long as involucre, less numerous. Corolla pink-purple, about 20 mm long, narrowed over 5–6 mm length, with 4–5 mm long lobes of limb, somewhat unequal, with lower lobe slightly longer in pendulous peripheral florets; basal appendages of anthers 4–5 mm long, membranous, undivided above, setaceous below; filaments very finely tuberculate. Pappus not shedding easily, pappus bristles toothed, of which 4 bristles prominent, thicker, flat, somewhat carinate, also toothed, resembling inner row of involucral bracts of genus *Xeranthemum*; all bristles connate into ring with continuous base, on which thickened patelliform pappogenus is developed, continued in stalked nectary at tip. Achenes 5–6 mm long, flattened, four-angled, narrowly obpyramidal, brownish or olive colored, glabrous, smooth, corona toothed with dome-shaped pappophorus inside. Flowering V–IX; fruiting IX–X. (Plate XLVII, Fig. 1.)

On adyrs.—*Soviet Central Asia*: Pamiro-Alai (Fergana Valley). Endemic. Described from the Fergana Valley, between the village of Uch-Kurgan and the Arpalyk Mountains. Type in Leningrad.

Section 9. Insculptae Iljin sect. nova in Addenda XXVI, 723.—Leaves in all species always differently divided, decurrent usually as teeth, rows of appendages or toothed wing; pappus, with rare exception, entirely deciduous, with pappogenus and nectary (exceptions *J. asperifolia* Iljin, *J. serratuloides* Iljin, *J. hamulosa* Rubtz., and *J. lithophila* Rubtz.); achenes variable in shape, usually with dome-shaped or mitriform nectary, smooth below edges or with band of teeth below corona.



1. Pappus entirely deciduous with pappogenus and nectary; achenes with pappophorus 2.
- + Pappus persistent; pappophorus absent 11.
2. Stem strongly flocculose-arachnoid-hairy; leaves not decurrent, pinnatisect, with obtuse segments, green above, gray arachnoid-hairy beneath; involucre bracts flocculose-arachnoid hairy and strongly uncately recurved (southwestern Tadzhikistan)..... 91. **J. baissunensis** Iljin
- + All other species of section with decurrent leaves (however, see, *J. atropurpurea* Winkl.)..... 3.
- 626 3. Plants stronger, with 40–60 mm wide capitula (including florets); outer and middle involucre bracts strongly uncately or arcuately recurved..... 4.
- + Capitula much smaller 5.
4. Basal and lower cauline leaves usually bipinnatisect, usually green on both sides; outer involucre bracts arcuately recurved and finely spinescent, covered with short bristles from base of recurved part; pappus about 10 mm long, with barbate bristles, barbs exceeding thickness of bristles; achenes smooth, without teeth along ribs (northern ranges of Pamiro-Alai) 77. **J. maxima** Winkl.
- + Basal and lower cauline leaves pinnatisect, usually bipinnatisect, but with entire terminal lobe; outer involucre bracts with thin arachnoid-hairy pubescence in recurved part and very short bristles only at tip; pappus 12–15 mm long, with serrate bristles, always shorter than their thickness; achenes with few excurrent teeth below corona along ribs (southern foothills of Pamiro-Alai) 78. **J. bipinnatifida** Winkl.
5. Corolla blackish-purple 6.
- + Corolla pink-purple 7.
6. Leaves pinnatipartite, with remote lobes, somewhat hard, almost not decurrent; outer and middle involucre bracts sharply recurved and also somewhat hard; pappus bristles short-barbate (Babatag and adjoining adyrs)..... 89. **J. atropurpurea** Winkl.
- + Leaves lyrate, thin, distinctly decurrent with row of oblong appendages; outer involucre bracts thin, scarcely recurved; pappus bristles plumose-barbate (Western Pamir)..... 82. **J. propinqua** Iljin
7. Cauline leaves decurrent with row of isolated oblong appendages 8.
- + Cauline leaves entirely decurrent or with sparsely toothed wing at some places..... 9.
8. Stem erect; outer and middle involucre bracts long, erect, contorted, as in *J. tortisquamea* Iljin; pappus bristles short-barbate;

- achenes glabrous, smooth, with a band of spines only below corona (Gissar Range, Tupalang) 79. **J. pjataieviae** Iljin
- + Stem bent and leafless above; cauline leaves finely pinnatisect; outer involucre bracts somewhat divergent, semiappressed, all other bracts appressed; achenes glabrous and smooth (Gissar, Zevar) ..
..... 80. **J. serpenticaulis** Iljin
- 627 9. Leaves weakly sinuate, smooth; outer and middle involucre bracts shortly recurved; pappus bristles plumose; achenes with sessile glandular hairs (Dzhungarian Alatau).... 85. **J. semenovii** Winkl.
- + Leaves not sinuate, rough; involucre bracts appressed or outer bracts lax; pappus bristles barbate, achenes eglandular..... 10.
10. All leaves linear, undivided and entire; all involucre bracts appressed; achenes glabrous, smooth, with longitudinal striations (Gissar Range, Kshtut)..... 83. **J. helichrysisfolia** M. Pop.
- + All leaves, except uppermost, oblong, pinnatilobate or pinnately
- toothed; outermost involucre bracts slightly divergent; achenes glabrous and smooth, with longitudinal striations (Nuratau Range, Lyangar) 84. **J. zakirovii** Iljin
11. Cauline leaves sessile and decurrent as row of longitudinal appendages; pappus bristles short-barbate; achenes glabrous and smooth 12.
- + Pappus bristles plumose 13.
12. Leaves lyrate with large, attenuate terminal lobes (Shakhrisyabs) 81. **J. asperifolia** Iljin
- + Leaves pinnately divided (Denau) 90. **J. sangardensis** Iljin
13. Plants bright and light green; leaves somewhat hard and rough, pinnatisect to pinnately toothed; all involucre bracts appressed (Saur Range) 88. **J. serratuloides** Iljin
- + Plants with linear undivided and entire leaves, less often with isolated teeth; outer and middle involucre bracts uncate (Dzhungarian Alatau)..... 14.
14. Plants arachnoid hairy-tomentose 86. **J. hamulosa** Rubtz.
- + Plants glabrous 87. **J. lithophila** Rubtz.

Series 1. Appendiculatae Iljin.—Leaves decurrent as row of isolated appendages.

77. **J. maxima** Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 336; O. and B. Fedtsch. Perech. Rast. Turk. IV, 302 ex p.; Iljin in Tr. Turk. Nauchn. Obshch. 2, 24.

Perennial. Plants 25–80 cm high; root strong, short, developing dark thread-like adventitious roots. Stems few, erect, somewhat thick, simple, ribbed-sulcate, covered with sessile glandular hairs and crisped many-

celled hairs, flocculose-arachnoid hairy above, especially below capitulum. Basal and lower cauline leaves petiolate, with lobes decurrent along petiole, up to 25 cm long, others sessile, very short-excurrent with row of fimbriate appendages; all leaves usually bipinnatisect right up to apex, with oblong-linear pinnae or only spatulate or toothed, green on both sides and covered with crisped many-celled hairs, less often grayish beneath due to fine arachnoid hairy pubescence, with scattered sessile glandular hairs, somewhat rugose above, with strongly depressed veins (raised beneath); uppermost leaves small, simple, absent in upper half of stem. Capitula solitary, multiflorate, up to 60 cm wide. Involucre hemispherical, 20–25 mm long, lower part floccose-arachnoid-hairy, often glabrescent; outer rows of involucral bracts distinctly arcuately recurved, dark green from base of recurved part, terminating into long and thin spiny cusp, somewhat thick, usually punctate-alveolate, always covered with short bristles throughout, yellowish in basal decumbent part, without bristles, with almost inconspicuous or poorly developed midrib; other bracts appressed, acuminate, membranous along margin, with prominent veins, somewhat ciliate along margin, always distinctly or less visibly covered on outer side with short semiappressed bristles; receptacle densely squamose with long, thin acuminate scales. Corolla purple, with sparsely scattered sessile glandular hairs, 22–25 mm long, narrowed over 10–14 mm length and with 5–8 mm long lobes of limb; apical appendages of anthers 3 mm long, finely attenuate; basal appendages about 2.5 mm long, setaceous-caudate, bifid; filaments glabrous but not entirely smooth; styles glabrous; stigma about 2 mm long, divided up to base into divergent branches, papillate, with tuft of basal bristles. Pappus shedding only when extremely mature, snow-white, usually about 10 mm long, two bristles exceeding others, one and one-half to two times longer, bristles connate into ring forming membranous base, with cupuliform pappogenus, with cyathiform, five-angled and five-toothed nectary in center, with furrows equal or one and one-half to two times exceeding thickness of bristles; achenes obpyramidal, sharply four-angled, 6–7 mm long, whitish, glabrous, smooth, uniformly toothed above along margin. Flowering IV–VI; fruiting VII–VIII.

Alpine steppes.—*Soviet Central Asia*: Pamiro-Alai (Zeravshan and Gissar ranges). Endemic. Described from the Zeravshan Valley, near Kshtut. Type in Leningrad.

78. **J. bipinnatifida** Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 322; O. and B. Fedtsch. Perech. Rast. Turk. IV, 302, ex p.; Iljin in Tr. Turk. Nauchn. Obshch. II, 25.

Perennial. Plants 25–80 cm high; root short, non-fibrous, producing strong, filiform, adventitious roots. Stems few, erect, simple or occasionally

629 with solitary branches, cylindrical, distinctly ribbed-sulcate, densely covered with sessile glandular hairs, lower part covered with flexuous, many-celled, granose appressed hairs, finely arachnoid-hairy above, especially below capitulum, or only weakly flocculose-arachnoid-hairy, leafless above or with solitary filiform leaves. Basal leaves up to 25–40 cm long, petiolate like lowermost cauline leaves, with lowermost segments of lamina distinctly divergent, oblong to almost linear, entire or toothed, lamina pinnatisect in middle part, almost undivided, pinnatipartite, pinnatilobate, or even deeply toothed in upper part, with large, almost undivided terminal lobe; cauline leaves less numerous, sessile, with excurrent row of parallel, long, linear appendages, strongly reduced upward, finely divided; all leaves green and rugose above, with scattered, granose, somewhat thick hairs, sessile glandular hairs, and somewhat depressed veins, very narrowly revolute, usually with thin arachnoid-hairy coating beneath and with similar granose hairs, along prominent veins, having dense, large, lustrous, sessile glandular hairs. Capitula hemispherical, up to 40–60 cm wide, solitary, with many florets. Involucre about 25 mm long; outer bracts strongly recurved, partially sinuate; recurved part herbaceous, green, somewhat thick, slightly corrugated, finely arachnoid-hairy from its base, only modified in lowermost part into short prickles, covered with very short bristles; middle and strongly exerted inner bracts narrowly lanceolate; all bracts appressed, attenuate into long cusp, with distinctly prominent veins, sessile glandular hairs and short, scarcely visible hairs. Receptacle densely squamose; scales long, smooth, acuminate. Corolla purple, densely covered with sessile glandular hairs, 25–28 mm long, narrowed over 13–16 mm, with 5–6 mm long lobes of limb; apical appendages of anthers about 3 mm long, abruptly attenuate into thin cusp; basal appendages caudate-setaceous, 2–3 mm long; style glabrous; stigma divided up to base into two divergent branches with short tuft of basal bristles. Pappus deciduous, 12–15 mm long, snow-white, many-rowed and with unequal bristles, bristles always serrate, with serrations shorter than thickness of bristle, connate into ring, surrounding nectary; achenes oblong-obpyramidal, four-angled, whitish, 6–8 mm long, glabrous, with longitudinal, parallel, not strongly prominent, ribs, with few teeth along ribs below toothed corona, pappophorus obtusely conical, inside corona. Flowering IV–V; fruiting V–VII.

Varicolored rocks, red sandstones, pistachio plantations on adyrs up to 1,500 m in foothills.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described on the basis of a single specimen from a place near the source of the Chiglin in Tadzhikistan. Type in Leningrad.

79. **J. pjataieviae** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1961) 348.—**lc.**: Ibid, Fig. 3.

Perennial. Plants 40–80 cm high, many-stemmed. Stems usually branched, with few long upward spreading branches, finely sulcate, green, weakly arachnoid-hairy, especially below capitulum. Basal leaves petiolate, pinnatipartite or less often pinnatisect, with larger oblong-oval terminal lobe and many oblong lateral lobes, reduced toward petiole, less often almost lyrate; cauline leaves sessile, short-decurrent as wing, consisting of two parallel rows of appendages-segments of leaves, with upper lobe longer and only slightly broader; all leaves green and glabrous above or with poorly visible papillae, grayish arachnoid-hairy beneath due to fine tomentum, both sides with fine, sessile glandular hairs, lobes of leaves usually entire, not rough, upper half or one-third of stem leafless, or equipped with sparse, small, filiform, deciduous apical leaves. Capitula solitary, with many florets. Involucre cupuliform, during fruiting broadly cupuliform, about 15–20 mm long; outer bracts herbaceous or with herbaceous tip, lax, contorted, but all bracts erect (similar to *J. tortisquamea*), not recurved; middle and inner bracts broadly lanceolate, membranous-scarious, glabrous, usually with five to seven parallel veins, acuminate and here very finely toothed, pubescent at apex and weakly arachnoid-hairy; all bracts appressed. Receptacle densely squamose; scales numerous, setaceous, acuminate, almost up to half as long as involucre. Corolla pink at apices of lobes and purple along margin, 18–20 mm long, narrowed over 8–10 mm, with 5–6 mm long lobes of limb; basal appendages of anthers caudate-setaceous, about 2–2.5 mm long, strongly divided, crisped. Pappus snow-white to smoky, 8–10 mm long, of numerous, barbate, unequal bristles, with barbules as long as or one and one-half times as long as thickness of bristles; achenes brown, four-angled, with unequal teeth of corona at apex, glabrous, with few rows of spinules only below corona, immature achenes 5–6 mm long. Flowering VI; fruiting VII–VIII.

Montane steppes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the valley of the Tupalang River in the Gissar Range. Type in Tashkent.

80. *J. serpenticaulis* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 384.—*lc.*: *Ibid.*, Fig. 3.

Perennial. Plants 40–60 cm high, many-stemmed taproot fibrous, with many-headed caudex bearing woolly stems at base, branched only in lower part, simple and leafless above, straight or slightly flexuous; branches upward spreading, greenish, slender, about 1 mm thick, about 2 mm thick at base, finely ribbed-sulcate, very sparsely covered with thin arachnoid-hairy pubescence, more densely arachnoid-hairy below capitulum, with sparse sessile glandular hairs. Basal and lowermost cauline leaves 10–15 cm long, gradually narrowed into petiole; cauline

631 leaves sessile, short-decurrent as wing consisting of few parallel rows of appendages, imparipinnate-pinnatisect, with attenuate, narrow-lanceolate or often linear, entire, terminal lobe, only with isolated, linear, solitary teeth on lower part, revolute, reduced toward base; all leaves with depressed veins, rugose, scabrous above due to acute cartilaginous papillae, punctate-alveolate, with sessile glandular hairs, weakly arachnoid-hairy, glabrescent, sparsely arachnoid-hairy beneath, with sessile glandular hairs and prominent veins; uppermost leaves almost filiform. Capitula solitary terminal on stem and branches, with many florets. Involucre cylindrical at anthesis, 8–10 mm long, on roundish base, broadened to 15–18(20) mm at fruiting, almost cupuliform, arachnoid-hairy below; outer bracts attenuate into herbaceous-green apex, more or less contorted and erect, other bracts entirely appressed, lanceolate, acuminate, purple along margin and tip, with membranous margin and usually seven prominent veins, very short-ciliate (serrate), on outer side densely covered with scarcely visible decumbent and isolated sessile glandular hairs; innermost bracts acuminate, broadly membranous along margin, recurved, otherwise like middle bracts. Receptacle squamose; scales smooth, acuminate from middle. Corolla pink-purple, bordered with darker purple margin, with sessile glandular hairs, about 20 mm long, narrowed over 9–10 mm, and 5–6 mm long lobes of limb; apical appendages of anthers 2–2.25 mm long, abruptly attenuate upward into thin incurved tip; basal appendages setaceous-caudate, 2.5–3 mm long; filaments thick, more or less smooth; style glabrous; stigma 2.5–3 mm long, divided almost up to base, densely covered with divergent small acute papillae, with short, erect setae at base. Pappus deciduous, with fused base, enclosing obtusely five-toothed nectary, smoky, 8–10 mm long (excluding two long bristles), bristles barbate, as long as or one and one-half times as long as thickness of bristles, two long bristles quite prominent, thicker, serrate, all bristles in immature condition not connate, deciduous, later connate into ring; achenes immature, brownish, obpyramidal, four-angled, glabrous, smooth, with toothed upper edge, about 5–5.5 mm long, with smooth dome-shaped pappophorus at tip, with column in center penetrating pappus base bearing five-toothed obtuse nectary.

On limestone slopes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from the southern slopes of the Gissar Range, from the vicinity of the village of Zavar. Type in Tashkent.

81. **J. asperifolia** Iljin in Tr. Turk. Nauchn. Obsch. 2 (1925) 25.—**Ic.**: *Ibid.*, Plate VI.

632 Perennial. Plants 30–80 cm high. Stems few, erect, simple or less often with solitary branches, cylindrical, finely ribbed, sulcate, with

scattered, fine, sessile glandular hairs and granose, long, somewhat thick hairs, finely arachnoid-hairy above, especially densely arachnoid-hairy below capitula. Basal leaves short-petiolate, like lower and middle cauline leaves; cauline leaves sessile, lyrate, short-decurrent with row of parallel fimbriate segments, terminal lobe rather large, oblong-lanceolate, gradually acuminate and decurrent up to base lateral segments, that are sparse, oblong-oval or oblong-linear, absent in upper one-third of stem; uppermost leaves bracteal, almost undivided, linear; all leaves weakly rugose and scabrous above due to scattered, somewhat stiff, granose, long hairs, with fine sessile glandular hairs, arachnoid-hairy beneath, with similar granose hairs along veins, and numerous sessile glandular hairs. Capitula solitary, with many florets. Involucre cupuliform, 22–28 mm long; outer involucre bracts usually flocculose-arachnoid-hairy, dark green in upper part, arcuately recurved, finely spinescent, with very short bristles in outer part under arachnoid-hairy coating; other bracts appressed, with prominent veins having purple tinge, covered with very short appressed bristles; innermost bracts aristate, membranous along margin, scarcely ciliate. Receptacle squamose; scales relatively long, acuminate. Corolla pinkish-purple, often with sessile glandular hairs 20–25 mm long, gradually narrowed over 10–15 mm, and with 4–6 mm long lobes of limb; apical appendages of anthers about 3 mm long, abruptly attenuate into thin apex; basal appendages setaceous, about 3 mm long, filaments smooth, distinctly thickened; style glabrous; stigma about 3 mm long, divided up to base, finely papillate with tuft of short bristles. Pappus always dirty-smoky, short-barbate, with barbules slightly exceeding or two times as long as thickness of bristles, on an average, about 10 mm long (excluding two long hairs); achenes (not completely mature) 5–6 mm long, oblong-obpyramidal, four-angled, pale, smooth, with toothed corona at apex, and row of additional teeth below it. Flowering VI–VII; fruiting VII.

Limestone rocks and screes; shale screes.—*Soviet Central Asia*: Pamiro-Alai (northwest). Endemic. Described from the Shakhak Pass in the Shakhrisyabs Region (southern Uzbekistan). Type in Leningrad.

82. **J. propinqua** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V (1924) 10; Iljin in Tr. Turk. Nauchn. Obsch. 2, 26.

Perennial. Plants about 50 cm high; rhizome short, producing strong filiform adventitious roots, less often with tap root. Stems few, simple, finely sulcate, weakly flocculose-arachnoid-hairy, covered with granose, short, crisped hairs, leafy only below. Leaves lyrate, with large oblong subobtuse or slightly subacute terminal lobe, and many lateral lobes or small lobules, gradually reduced toward base, usually subobtuse. Basal leaves short-petiolate; cauline leaves sessile, somewhat decurrent as lobes

or teeth; all leaves scabrous above due to scattered, short, mitriform, somewhat stiff hairs, dark green, grayish beneath due to similar, but soft and dense, thicker hairs, dense and longer along veins. Capitula solitary, with many florets, 2.5–3 cm wide. Involucre cupuliform, 1.5–2 cm long, usually four-rowed, more or less dark purple; outer bracts irregularly recurved, usually weakly arachnoid-hairy, often dark green, others appressed, narrowly lanceolate, finely acuminate, innermost bracts long-aristate, acuminate, with 3–5 prominent veins, covered with short bristles, ciliate. Receptacle densely squamose; scales smooth, acuminate, almost one-third to half as long as involucre. Corolla dark purple, glabrous, less often with isolated sessile glandular hairs, about 18–20 mm long, narrowed over 7–8 mm, with 4–5 mm long lobes of limb; apical appendages of anthers about 3 mm long, abruptly finely acuminate at apex, basal appendages caudate-setaceous, about 3 mm long; filaments finely tuberculate; stigma about 3 mm long, with finely papillate divergent branches, basally with short tuft of erect bristles; style glabrous. Pappus deciduous(?), snow-white, 8–10 mm long (excluding bristles), many-rowed, bristles unequal, plumose-barbate, with barbules several times exceeding thickness of bristles; pappus bristles weakly connate into ring; achenes immature, with toothed corona, glabrous, toothed in upper half, teeth in few rows, glabrous elsewhere. Flowering V–VI. (Plate XLIX, Fig. 2.)

High-mountain steppes of western Pamir.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Shungan in the Garmchasma River Valley. Type in Leningrad.

Series 2. Integroalatae Iljin.—Leaves decurrent on undivided wing; pappus barbate.

83. **J. helichrysofolia** M. Pop. in Tr. Uzb. Gos. Univ., Nov. Ser. 27, Biol., 14 (1941) 105, Fig. 4; Addenda XXVI, 724.

Perennial. Plants 20–40 cm high, with strongly fibrous root, bearing many-headed vertical rhizomes, aerial parts covered with fine tomentum. Stems few, erect, simple, yellowish-greenish; cylindrical, finely sulcate-barbate, covered with scattered, short, crisped hairs and fine sessile glandular hairs, not arachnoid-hairy or only below capitulum. Basal leaves and leaves on vegetative shoots gradually narrowed into long, basally broadened petiole, up to 10–12 cm long and up to 5 mm wide, somewhat revolute; cauline leaves sessile, narrowly decurrent, up to middle of stem; all leaves linear, undivided and entire, semiappressed, cuspidate
634 with brown cartilaginous cusp, grayish-green, with depressed midrib above, strongly rugose, punctate-alveolate, scabrous due to short cartilaginous papillae, weakly flocculose-pubescent, revolute, usually up

to midrib, with sessile glandular hairs in pits, more strongly arachnoid-hairy beneath and also with glandular hairs; uppermost leaves strongly reduced, filiform. Capitula solitary with many florets. Involucre cupuliform, about 20 mm long, imbricate, usually four-rowed, appressed; outer bracts oblong, yellowish, dark green above, short-cuspidate, with few prominent veins; middle bracts lanceolate, with prominent veins, especially midrib, with longer cusp, dirty purple in upper half; innermost bracts usually involute, long-aristate; all bracts covered on outer side with sessile glandular hairs and isolated arachnoid hairs, small-toothed, sometimes outer bracts with stalked glandular hairs in lower part, corolla similar (without pendulous peripheral florets), pink-purple, with scattered, fine, sessile glandular hairs, 17–18 mm long, narrowed over 5–6 mm, with 4–5 mm long lobes of limb; apical appendages of anthers about 3 mm long, abruptly attenuate into cusp; basal appendages setiform, 2.5–3 mm long, divided below; style glabrous; stigma divided almost up to middle, covered with subacute papillae, with erect short bristles below branching. Pappus snow-white, barbate (like true *Jurinea*); achenes immature, glabrous, obpyramidal, four-angled, with toothed corona above, and with distinct longitudinal folds.

Soviet Central Asia: Pamiro-Alai. Endemic. Described from the spurs of the Gissar Range in the Kshtut Region, on the left bank of the Negnot River. Type in Tashkent.

Note. M.G. Popov gives a short description of this species only in the Russian language. Besides, the accompanying figure gives only a general impression. I have provided a more detailed description and consider it proper to retain M.G. Popov as the authority for this good species. The author placed it near *J. olgae* Rgl. and Schm., with which I do not agree.

84. *J. zakirovii* Iljin sp. n. in Addenda XXVI, 723.

Perennial. Plants up to 50 cm high; rhizomes few, vertical, densely covered with scales of remains of petioles, with woolly buds in axes. Stems few, erect, sometimes ascending at base, with few elongate branches, cylindrical, sulcate-ribbed, covered with fine sessile glandular hairs and scattered, short, crisped, white hairs, arachnoid-hairy below capitula, leafless in upper half or one-third. Basal leaves and leaves on young branches 10–15 cm long, narrowed into basally broadened petiole, oblong, pinnatilobate or pinnatidentate, with oblique, opposite, remote, 635 obliquely rising lobes and teeth and acuminate, gradually acuminate terminal lobe with cartilaginous cusp, very narrowly convolute; cauline leaves sessile, distinctly decurrent, entire or rarely with one to two pairs of triangular teeth; all leaves dull green on both sides, with depressed midrib above, scabrous due to stiff, short, crisped hairs, strongly rugose,

with fine sessile glandular hairs, lower surface with prominent midrib and distinctly craspedodromous venation, longer, crisped, scattered hairs and dense sessile glandular hairs, otherwise similar to basal leaves. Capitula solitary, with many florets. Involucre cupuliform, 15–20 mm long, basally appressed, yellowish-green, four-rowed; outer and middle row bracts oblong-lanceolate, with green recurved apices, cuspidate; inner bracts narrowly lanceolate, gradually acuminate, innermost gradually attenuate into long, aristate purple cusps; all bracts ciliate with numerous, fine, sessile glandular hairs on outer surface interspersed with papillae. Receptacle squamose; scales acuminate, smooth, one-fourth as long as involucre. Corolla pink, 16–18 mm long, narrowed over 5–6 mm, with 4–5 mm long lobes of limb, densely covered with fine sessile glandular hairs; apical appendages of anthers white, about 3.5 mm long, abruptly attenuate into fine cusp, basal appendages setose, 2.5–3 mm long; filaments finely tuberculate; style glabrous; stigma at base with short, erect bristles, its branches almost as long as fused part, covered with fine papillae. Pappus deciduous, with bristles connate into ring, slightly yellowish due to unequal barbate bristles, two inner bristles considerably longer than others; achenes obpyramidal, four-angled, 5 mm long, glabrous and smooth, with longitudinal, poorly developed striations and uniformly toothed corona above, along margin enclosing conical pappophorus, with nectary in center on elevation passing through ring. Flowering V; fruiting V–VII(?).

Soviet Central Asia: Pamiro-Alai. Endemic. Described from Yangokla near Lyangara in Nuratau. Type in Tashkent.

Series 3. Montanae Iljin.—Leaves short-decurrent with entire wing; pappus plumose.

85. *J. semenovii* Winkl. in Tr. Peterb. Bot. Sada, XI (1889) 170; O. and B. Fedtsch. Perech. Rast. Turk. IV, 297; Iljin in Tr. Turk. Nauchn. Obsch. 2, 15.—*J. tianschanica* auct. non Rgl. and Schm.: O. and B. Fedtsch. op. cit.—*Saussurea semenovii* Herd. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 142.

636 Perennial. Plants 40–50 cm high. Stems solitary or few, covered with remains of old leaves at base, with large woolly buds in their axils, branched in lower half, with long, arcuately divergent branches; branches cylindrical, ribbed-sulcate, weakly and sparsely arachnoid, more densely above, particularly below capitulum, with scattered sessile glandular hairs. Leaves pinnatipartite, with three or four pairs of oblong, distant lobes, usually obliquely rising above, cuspidate; uppermost and lower lobes reduced to large teeth, with upper lobe more attenuate, rugose above, with sessile glandular hairs in pits and depressed arachnoid-

hairy midrib, more strongly arachnoid-hairy beneath, with scattered sessile glandular hairs, green, convolute; basal and lowermost cauline leaves gradually narrowed into petiole, others sessile and slightly decurrent, becoming smaller but undivided upward. Capitula solitary. Involucre broadly puculiform, 20–25 mm long, somewhat arachnoid-hairy, usually green; outer bracts with recurved, dark green tip, acute or subobtusely, others densely covered with sessile glandular hairs, appressed; middle bracts oblong, with short brownish apical spine, prominent midrib, and 1–2 lateral veins; innermost bracts attenuate into cuspidate tip, brownish purple, very short-ciliate. Receptacle densely squamose; scales broad, acuminate. Florets numerous; corolla pink-purple, with numerous glandular hairs, 20–23 mm long, gradually narrowed over 7–8 mm, with 4–5 mm long lobes of limb; apical appendages of anthers 3.5–4.5 mm long, gradually and finely acuminate, with slightly incurved tips, basal appendages membranous, divided up to middle, 2.5–3.5 mm long; anthers glabrous; filaments strongly tuberculate; style glabrous; stigma surrounded at base with short, obliquely erect hairs, stigma branches about 3 mm long, covered with dense papillae on outer side, arising slightly above its base. Pappus deciduous, many-rowed, about 15 mm long (including long bristles), plumose, with two very conspicuous bristles, connate at base into ring, shedding entirely on separation from achene, ring contiguous with membranous bottom, with pentagonal, cyathiform membranous-fimbriate nectary. Achenes oblong, four-angled, smooth, pale, with scattered glandular hairs, regularly toothed, 6 mm long corona above, enclosing narrowly conical whitish pappophorus, from which pappus detaches easily. Flowering VIII.

Sands, stony places.—*Soviet Central Asia*: Dzhungaria-Tarbagatai (Dzhungarian Alatau), Balkhash Region. *General distribution*: Possibly growing in Sinkiang. Described from the lower reaches of the Ili and Chingilda rivers. Type in Leningrad.

86. **J. hamulosa** Rubtz. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VIII, 5 (1940) 64.

637 Perennial. Plants 40–60 cm high, with few stems. Stems cylindrical, sulcate, whitish due to glabrescent more or less dense tomentum, covering sessile glandular hairs, branched above base; branches upward spreading, up to middle or above, long. Basal and lowermost cauline leaves petiolate, withering before anthesis, with woolly buds in their axils, others sessile; lower leaves usually somewhat decurrent, middle and upper not decurrent; all leaves linear, strongly revolute, often up to midrib, undivided and entire, less often lower leaves with isolated teeth, cuspidate, glabrous or subglabrous, lustrous, rugose and punctate-alveolate above, with arachnoid-hairy coating only, strongly along midrib, grayish-

white beneath due to sparse arachnoid-hairy pubescence, with numerous sessile glandular hairs, obliquely spreading upward, reduced upward to short setaceous. Capitula solitary with many florets. Involucre poculiform, 20–23 mm long, arachnoid-hairy; lower and often middle involucre bracts dark green, narrow-brownish along margin, somewhat thick, recurved; middle bracts broadly oblong, greenish, with prominent midrib and two less raised lateral veins, short-acuminate and cuspidate at apex, membranous-fimbriate along margin, yellowish, with scattered glandular hairs, ciliate; inner bracts gradually narrowed into tuberculate spine, broadly membranous-fimbriate, ciliate along border, with sessile glandular hairs and appressed short hairs on inner side, more dense at tip. Corolla pink-purple, 20–22 mm long, narrowed over 6–7 mm, with 3–4 mm long lobes of limb, with scattered sessile glandular hairs, less often with mixture of stalked hairs; apical appendages of anthers about 3.5 mm long, gradually attenuate into thin, slightly incurved awn at tip; basal appendages setaceous, divided, 3–3.5 mm long; filaments tuberculate; style glabrous; stigma divided up to two-thirds, branches papillate. Pappus snow-white, persistent, with plumose, many-rowed bristles, two of them longer than others, inner bristles weakly connate into ring, outer bristles shorter, persistent; achenes oblong, 6–7 mm long, four-angled, almost smooth, glabrous, glandular-hairy, with toothed corona at tip, enclosing membranous obtuse-angular nectary. Flowering VIII–IX; fruiting IX.

Rocks.—*Soviet Central Asia*: Dzhungaria-Tarbagatai. Endemic. Described from the Dyuvantau Mountains along the southern slopes of the Dzhungarian Alatau. Type in Alma-Ata; cotype in Leningrad.

87. **J. lithophila** Rubtz. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VIII (1940) 64.

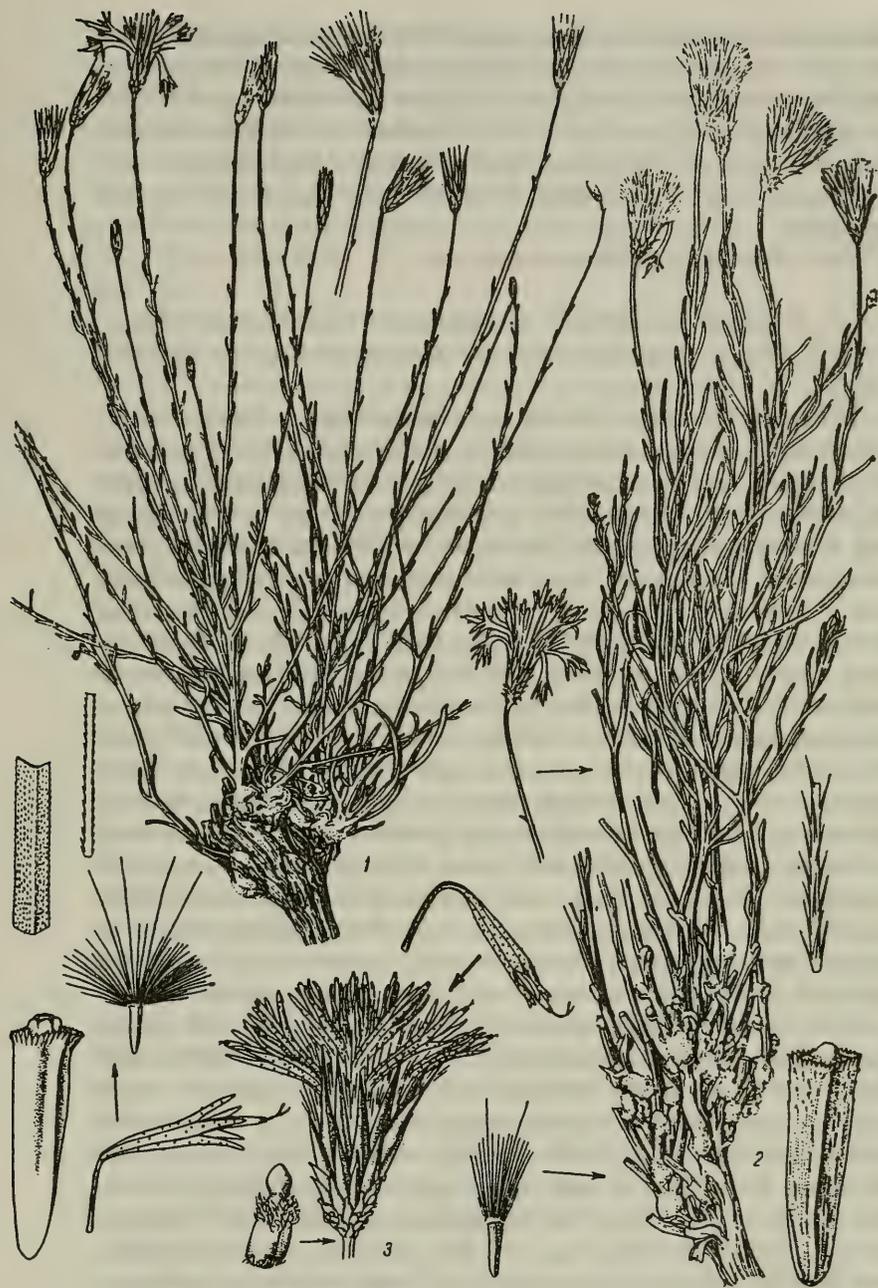
638 Perennial. Plants 40–60 cm high. Stems branched with long, upward spreading branches slightly above base in lower half, dark dirty purple below, green above, glabrous or with isolated arachnoid hairs and sessile glandular hairs, ribbed-sulcate, cylindrical. Basal and lowermost cauline leaves gradually narrowed in petiole, broadened near base, bearing woolly axillary buds, oblong, with sparse lobules or teeth in lower part of lamina, withering early; other leaves linear, convolute, usually up to midrib, cuspidate, sometimes with solitary teeth in lower part, sessile, distinctly short-decurrent, green, glabrous or usually with isolated arachnoid hairs, rugose and punctate-alveolate above, somewhat arachnoid-hairy beneath, with numerous sessile glandular hairs, obliquely rising, slightly convolute, reduced upward, absent below capitula. Capitula solitary. Involucre 20–25 mm long, stalked; outer and partly middle involucre bracts oblong-ovate or oblong, green, with dark green, somewhat thick and slightly

arachnoid-hairy tip, recurved, with scarcely visible brownish cusp, other bracts appressed; middle bracts ovate, attenuate with short brown cusp, pale green, with prominent midrib and two less prominent lateral veins, covered with scattered sessile glandular hairs, margin membranous, ciliate; inner bracts oblong-linear, prominent, acuminate, broadly membranous, ciliolate along margin in upper part, with short crisped whitish hairs on outer side and hairy tip. Receptacle alveolate, alveoli surrounded by basally connate scales. Corolla pink-purple, about 20 mm long, gradually narrowed over 7–8 mm, with 3.5–4 mm long lobes of limb; apical appendages of anthers 3–3.5 mm long, oblong, gradually attenuate above, incurved, basal appendages about 3 mm long, setaceous, divided; style glabrous; stigma 2.5–3 mm long, divided up to half into two recurved, papillate branches, pubescent at base; filaments verrucose. Pappus immature, persistent, plumose, of unequal bristles, of which two very conspicuous; achenes quite immature, densely spinulose in upper part, coronate, with pappophorus at apex, enclosing nectary. Flowering VIII–IX.

Rocks.—*Soviet Central Asia*: Dzhungaria-Tarbagatai (Dzhungarian Alatau). Endemic. Described from the Dyuvantau Mountains on the southern slope of the Dzhungarian Alatau. Type in Alma-Ata; cotype in Leningrad.

88. **J. serratuloides** Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 27.

640 Perennial. Plants 25–40 cm high, with thick root and short caudices covered by scales of old leaves and woolly pubescence. Stems few, simple or less often with one or two branches, glabrous, green, many-leaved, leafless only below very tip. Leaves oblong or oblong-lanceolate, pinnatisect or pinnatipartite, with oblong-linear, entire or often weakly toothed, revolute, green and glabrous on both sides, slightly scabrous above, with sessile glandular hairs beneath; basal and lowermost cauline leaves petiolate, somewhat broadened at base; cauline leaves sessile and short-decurrent, uppermost reduced, auriculate. Capitula solitary. Involucre narrowly cupuliform, 15–20 mm long and 10–15 mm wide, glabrous, yellowish-green, often with purple tinge above; involucre bracts lanceolate, gradually narrowed, especially in middle, with finely scabrous-serrate and slightly deflexed, 3–5 mm long cusp; innermost bracts gradually attenuate and with very short bristles. Receptacle covered with short, yellowish, scales, one-fifth to one-sixth as long as involucre and connate into membranes. Corolla pink-purple, about 20 mm long, narrowed over 8–9 mm, with 4–5 mm long lobes of limb, glandular. Pappus persistent, 7–10 mm long, pappus bristles plumose; achenes oblong, usually 6–7 mm long, smooth, somewhat flat to four-angled,



light brown, toothed above along edges, with two-tiered pappophorus at tip; lower tier patellate, occupying almost entire area, with cupuliform and five-toothed nectary in the center of upper tier. Flowering VII–VIII.

On montane steppe slopes.—*Soviet Central Asia*: Balkhash Region (Zaisan). Endemic. Described from the Saur Mountains near the confluence of the Oi-Karachai River with the Aba River. Type in Leningrad.

Note. Known only from one location.

89. ***J. atripurpurea*** Winkl. ex Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 26.—*J. arachnoidea* var. *atropurpurea* Winkl. ex Iljin ibid (1925).

Perennial. Plants up to 80 cm high; tap root strong, woody fibrous, with cord-like strong adventitious roots. Stems erect, cylindrical, finely ribbed-sulcate and arachnoid-hairy, flocculose-arachnoid-hairy in upper half, with golden, scattered sessile glandular hairs, simple or with isolated long branches, in upper half always unbranched and leafless. Leaves pinnatisect or pinnatifid, less often almost entire or irregularly toothed, usually with equally broad and subobtusate lobes, terminal lobe often strongly attenuate, lateral lobes remote; basal (up to 25 cm long) and lower cauline leaves gradually narrowed into narrow-winged petiole, with woolly axillary buds; other cauline leaves sessile, often somewhat decurrent, uppermost linear or filiform; all leaves greenish or dull green and weakly rugose above, glabrous, somewhat hispidulous, or finely arachnoid-hairy, grayish beneath due to more or less arachnoid-hairy pubescence, with light-colored sessile glandular hairs and prominent yellowish veins. Capitula with many florets, solitary. Involucre cupuliform, 15–20 mm long; outer involucre bracts somewhat thick in upper half, herbaceous, short-acuminate, finely arachnoid-hairy or floccose-arachnoid-hairy, sharply uncately decurved; middle bracts appressed, purple with prominent veins, and attenuate, arachnoid-hairy, recurved tip; inner bracts appressed, acuminate, straight, dark purple, not arachnoid-hairy, ciliolate, densely covered with scarcely visible small bristles above, sometimes dotlike in size. Receptacle squamose; scales smooth. Corolla almost blackish-purple, subglabrous or with sessile scattered glandular hairs, 17–20 mm long, narrowed over 7–9 mm with 3.5–5 mm long lobes of limb; apical appendages of anthers purple, subacute, 2.5–3 mm long; basal appendages 2–3 mm long; filaments glabrous; stigma 3.5–4 mm long, with short papillae, and short spreading basal bristles; style glabrous or with bristles only at extreme tip. Pappus 7–8 mm long, snow-white, later turning yellowish, of unequal many-rowed bristles, of which two much longer than others, short-barbate, with barbules less often equal, and usually two times as long as thickness

of bristles, all bristles somewhat connate into broad ring with narrow opening, easily detaching from achene at maturity; achenes 5–5.5 mm long, yellowish brown, four-angled, oblong-obpyramidal, often slightly deformed, with apical corona of brownish hairs, with girdle of colorless hairs in upper half, later turning brown, with whitish, smooth, conical pappophorus at tip, with short stalk, terminating in cyathiform, dark, somewhat five-toothed nectary with membranous border, enclosed by ring. Flowering III–V; fruiting IV—second half of VI. (Plate XLIX, Fig. 1.)

Varicolored rocks in lower hills of southern Tadzhikistan, up to 1,000 m; zone of pistachio and bean caper [*Zygophyllum*] woodlands.—*Soviet Central Asia*: Pamiro-Alai (Babatag, Khodzha-Kazian, Gardaniushtli Range, Gazi-Mailik and others). Endemic. Confirmed from the vicinity of Iomid in the Gazi-Mailik Mountains between the Vakhsh and the Kafirnigan rivers. In view of the poor preservation of the original specimens and lack of a description, I would propose to consider the plants of Varitvseva and Nepli from the Tardani-Ushtli Range, No. 501, collected in 1947, as the type specimens.

90. *J. sangardensis* Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 25.—*Ic.*: Ibid. VII.

Perennial. Plants about 50 cm high. Stem simple, finely sulcate-striate, flocculose-arachnoid-hairy, with sessile glandular hairs. Basal and lower cauline leaves petiolate, oblong-oval, pinnate, with linearly attenuate, entire, subacute segments; middle cauline leaves sessile, decurrent with row of fimbriate appendages; uppermost leaves reduced, all leaves green and slightly scabrous above, finely arachnoid-hairy and grayish beneath. Capitula large, solitary. Involucre up to 20 mm long, with appressed bracts having prominent veins, glabrous or subglabrous; middle and inner bracts gradually acuminate and with scarcely visible
642 appressed bristles on outer side. Pappus dirty-yellowish, persistent, pappus bristles densely barbate; achenes glabrous, smooth. Yellowish, with few longitudinal folds, without teeth, with somewhat hard, toothed corona above along edges, about 6 mm long, corona enclosing fleshy, later hardening, thick, broad cupuliform pappogenus, outer surface ivory-colored, inner beet red, with nectary at base in center. Fruiting V–VI.

Foothills.—*Soviet Central Asia*: Pamiro-Alai (Denau). Endemic. Described from Denau, Sangardak District. Type in Leningrad.

Series 4. Baissunenses Iljin.—Leaves not decurrent.

91. *J. baissunensis* Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 26.—*Ic.*: Ibid. IX.

Perennial. Plants 30–75 cm high; tap root, densely fibrous. Stem solitary or few, somewhat thick, fistular or in upper part filled with spongy tissue, finely barbate, cylindrical, usually simple, less often with solitary long branches, densely covered with flocculose-arachnoid-hairy erasable pubescence and fine glandular hairs throughout, leafy only in lower half, with remains of petioles of old leaves at base and here flocculose-woolly-tomentose. Basal leaves numerous, narrowed into relatively long, somewhat flat petiole, with broad oblong lamina, pinnatisect in linear or oblong subobtusate lobes, in lower part with few subobtusate teeth or less often with lobes, gradually reduced toward petiole; leaves narrowed above in oblong attenuate obtuse tip; finely rugose, subglabrous, often with few depressed veins, and greenish above, grayish beneath due to arachnoid-hairy coating and with scattered sessile glandular hairs; cauline leaves reduced upward, initially short-petiolate, later sessile, isolated leaves very short above, narrow-linear. Capitula solitary, large. Involucre cupuliform, 20–30 mm wide and about 20–30 mm long, comprising numerous bracts; outer and middle bracts densely flocculose arachnoid-hairy, somewhat thick and uncately recurved in upper half; inner bracts erect, subglabrous or with small appressed bristles, with five to seven prominent veins (especially midrib), finely acute, finely ciliate-toothed. Receptacle densely covered with smooth membranous, acuminate scales, almost up to half as long as involucre or slightly shorter. Corolla purple, with scattered glandular hairs, 24–28 mm long, narrowed over 12–15 mm, with 6–7 mm long middle broader part and 5–7 mm long limb, lobes of limb shortly and uncately incurved; apical appendages of anthers about 3 mm long, basal 2 mm long, contorted at tip. Pappus about 10 mm long, colorless or somewhat yellowish, comprising numerous unequal, serrate-barbate bristles connate
643 into ring, inner bristles much longer than others, with cupuliform dome in center, punctured at base through which pappophorus is exerted; mature achenes oblong-obpyramidal or obovoid, more or less four-angled, toothed along margin, with circular row of teeth below, whitish, smooth, glabrous, 5–6(7) mm long, with conical pappophorus at apex, terminating in nectary. Flowering V; fruiting VI–VIII.

On red grounds of foothills or montane steppes.—*Soviet Central Asia*: Pamiro-Alai (Kugitang, between Kugitang, Baisun and Babatag ranges). Endemic. Described from Baisun. Type in Leningrad.

Section 10. Derderia (Jaub. and Spach) Boiss. Fl. or. III (1875) 578.—*Derderia* Jaub. and Spach Ill. Pl. or I (1842–1843) 129.—*Cordifoliae* DC. Prodr. VI (1837) 674.—*Platycephalae* Benth. in Benth. and Hook. Gen. Pl. II, 1 (1873) 474 p. p.; Pflanzenfam. IV, 5 (1873) 321 p. p.—Corolla long, gradually narrowed towards base. Pappus

20–35 mm long, innermost pappus bristles with dense brush or barbules, all bristles plumose, pappus persistent or not entirely persistent (bristles somewhat connate into ring, detaching on extraction). Pappogenus always developed, pappophorus present only in some Northwest Asian species (with deciduous pappus), pappogenus and pappophorus developing simultaneously. Achenes always oblong, glabrous, with more or less sessile glandular hairs, smooth, with light longitudinal striation, folds, or streaked. Cauline leaves sessile, semiamplexicaul and auriculate, or only auriculate (exception *J. auscheriana* DC. and partly *J. karabugasica* Iljin). Tall, branched plants, leafy up to capitula.

This section mainly grows in Southwest Asia (*J. multicaulis* DC., *J. cataonica* Boiss. and Hausskn., *J. macrocephala* DC. etc.); five species found in the USSR.

1. All leaves undivided and entire, oblong-oval and oval; basal and lower cauline leaves petiolate, other leaves sessile, but not auriculate and not decurrent (southern Caucasia) 92. **J. auscheriana** DC.
 + Central Asian plants 2.
2. Leaves without auricles; cauline leaves, especially upper, pendant, pinnatisect or sinuate-toothed (Karabugaz) 96. **J. karabugasica** Iljin
 + Leaves always auriculate 3.
3. Involucre glabrous (Kara-Kum) 94. **J. transhyrcanica** Iljin
 + Involucre always arachnoid-hairy 4.
- 644 4. Tall, strongly branched plants, grayish-green due to crisped arachnoid-hairy pubescence, sometimes almost glabrous; involucre turbinate, with appressed bracts, outer bracts always, middle bracts sometimes, somewhat recurved (Kara-Kums) 93. **J. derderioides** Winkl.
 + Plants white-tomentose, not more than 25–30 cm high. Involucre large, cupuliform; bracts spinose, recurved, flocculose, except innermost row, which is less recurved and uncate (Karatau) 95. **J. eximia** Tek.

Series 1. Oblongifoliae Iljin.—Leaves undivided without auricles.

92. **J. auscheriana** DC. Prodr. VI (1837) 674; Boiss. Fl. or. III, 578; Grossh. Fl. Kavk. IV, 171; Sosn. Obz. Kavk. Predst. (1926) 198.—*J. oblongifolia* Boiss. and Hausskn. in Boiss. l.c.—*Derderia cheirifolia* Jaub. and Spach. Ill. pl. or. (1844–1846) tab. 180.—**lc.**: Jaub. and Spach Ibid.

Perennial. Plants 25–50 cm high; roots bearing short caudex. Stems solitary or few, strong, erect, ribbed-sulcate, densely covered with crisped

hairs and weakly arachnoid-hairy, with sessile scattered glandular hairs, poorly branched; branches upward-spreading. All leaves undivided and entire; basal leaves gradually narrowed into petiole; petiole withering early; lowermost cauline leaves short-petiolate, others sessile, narrowed toward base and upward, acute or short-cuspidate, somewhat thick and hard, revolute, upper surface very scabrous due to cartilaginous papillae and finely rugose above, weakly arachnoid-hairy-glabrescent, with scattered glandular hairs, grayish beneath due to arachnoid-hairy pubescence and densely glandular due to sessile glandular hairs, with prominent midrib. Capitula large, solitary, with many florets. Involucre cupuliform, 25–30 mm long, with somewhat divergent outer and middle bracts; all bracts linear-subulate, with three prominent veins, prominent midrib and less prominent lateral veins, ciliate, densely covered with crisped hairs and scattered sessile glandular hairs; outer bracts spinescent; inner bracts usually purple, narrowly lanceolate, finely aristate. Receptacles densely squamose; scales yellowish, smooth, acuminate, usually one-third as long as involucre. Corolla pink-purple, 28–35 mm long, gradually narrowed over 10–15 mm, with 6–8 mm long lobes of limb and scattered sessile glandular hairs; apical appendages of anthers 4.5–5 mm long, gradually attenuate in deltoid tip; basal appendages 3.5–4 mm long, membranous, flexuous, setaceous toward end, somewhat divided below; stigma 2.5–3 mm long. Pappus deciduous, dirty yellow, 23–24 mm long, pappus bristles plumose, unequal, but without two to four prominent bristles, with plumes six to seven times as long as thickness of bristles, all bristles weakly connate into ring, with scaly base, on short conical structure, terminating in nectary, enclosed in scaly circle; achenes glabrous, oblong, with unequal-toothed corona at apex, pappophorus represented by scarcely visible smooth elevation, and alveolus in center. Flowering VI–VII; fruiting VII–VIII.

On desert slopes.—*Caucasus*: Southern Transcaucasia. *General distribution*: Asia Minor, Iran. Described from Iran on the basis of Aucher's collections, No. 3204. Cotype in Leningrad.

Series 2. Auriculatae Iljin.—Leaves sinuate-toothed, auriculate.

93. *J. derderioides* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 524; O. and B. Fedtsch. Perech. Rast. Turk. IV, 303; Iljin in Tr. Turk. Nauchn. Obshch. 2, 17; Fl. Turkm. VII, 234.

Perennial. Plants 30–60 cm high, creamish, entirely covered with crisped arachnoid hairs. Stem branched from base, modified into long and slender rhizomes. Leaves numerous, right up to capitula, weakly rugose-foveate due to sunken glandular hairs, sessile and semiamplexical, auriculate, ovate, oblong-ovate or almost round, sparsely sinuate-toothed,

often with long teeth, usually withering before anthesis. Capitula almost cupuliform, solitary. Involucre grayish due to fine tomentum, 20–25 mm long and 13–18 mm wide; outer involucre bracts oblong-ovate, acute, slightly recurved, others oblong-lanceolate to lanceolate, erect, appressed. Receptacle pubescent, bristles very much shorter than involucre. Corolla light pink, often yellowish on drying, glandular-hairy, 27–30 mm long, gradually narrowed over 12–16 mm, with 3.5–4.5 mm long lobes of limb. Pappus persistent, 13–15(20) mm long, dirty yellowish, pappus bristles barbate, plumose, with more or less distant barbules; achenes oblong, yellowish, 6.5–8 mm long and 2–3 mm thick, smooth, longitudinally striate with sessile glandular hairs and frequent long teeth at apex, with smooth and conical pappophorus and nectary. Flowering V–VI; fruiting VI–VIII.

Saline sands, salt pans among sands, foot of sand hills and hummocky sands.—*Soviet Central Asia*: Aralo-Caspian Region, Kyzyl-Kum (western); Kara-Kum. Endemic. Described from the Mary Region. Type in Leningrad.

94. *J. transhyrcanica* Iljin in Tr. Turk. Nauchn. Obsch. 2 (1925) 17.

Plants up to 40–50 cm high. Stems strongly branched, leafy, finely sulcate, glabrous, with numerous sessile glandular hairs. Lower leaves oblong-lanceolate, 7–10 cm long, gradually narrowed into petiole, erect, acuminate, with remote, triangular, cuspidate teeth, later withering and dropping off; middle and upper leaves reduced upward, oblong (about 5 cm long) to oval (uppermost leaves 1.0–1.5 cm long); all leaves short-acuminate, also sparsely short-toothed, especially in lower half, sessile, with short auricles, somewhat hard, with numerous sessile glandular hairs in depressions on both sides, leaves usually somewhat pendant or almost horizontal, almost reaching capitula. Capitula solitary, numerous. Involucre cupuliform, comprising numerous imbricate bracts, more or less appressed, only very tips of outer bracts slightly recurved and green, like other bracts in remaining part, yellowish, almost coriaceous, acuminate, glabrous, only along margin very short and frequently scabrous-ciliate, with prominent midrib on dorsal surface. Receptacle squamose; scales frequent, short, several times shorter than involucre, flat, smooth. Corolla longer than pappus, narrowed over 10 mm, covered with scattered glandular hairs. Pappus persistent, bristles numerous, unequal, not connate into ring, plumose, innermost three or four bristles longer than others and modified into tuft at tip with still longer barbules, more densely and compactly arranged upward; achenes about 7 mm long, obovoid, yellowish, glabrous and smooth, ribbed, with large, broadly cupuliform, thick, apical pappogenus, and nectary in center. Flowering V–VI; fruiting VII–IX.

Known only in the Turkmenian SSR, in Kara-Kums.—*Soviet Central Asia*: Kara-Kums. Only two specimens are known: 1) near Daz-Kuyu well, 1912, No. 281, collected by D.P. Gedevanov and D.A. Dranitsin; and 2) 4 km due southeast of Kara-Tegelek, 1953, No. 20, collected by I. Rustamov.

95. *J. eximia* Tek. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 6 (1938) 123.—*lc.*: Ibid. 125.

Perennial. Tap root woody, with compact fibrous pith and detaching layer of outer bark, bearing short caudices near soil surface, densely covered with compact rosettes of basal leaves, with dense, white, soft tomentum in their axils. Stems herbaceous, solid, branched, 15–45 cm high, with longitudinal furrows, densely leafy up to capitula, covered with dense, erasing grayish-whitish arachnoid-hairy tomentum. Basal leaves oval-lanceolate, long-petiolate, 5–13 cm long; cauline leaves also oval-lanceolate, sessile, auriculate, semiamplexicaul, more or less decurrent, reduced toward apex, with erasing grayish white pubescence on both sides. Capitula fairly numerous. Involucre 2.5–3 cm long and 2 cm wide, globose-ovoid, imbricate-scaly, grayish-pubescent, often with pale purple tinge; bracts linearly lanceolate, arcuately recurved, 647 subulately-pointed. Corolla dark pink, with sessile glandular hairs, 30–35 mm long, narrowed over 18–20 mm, with 5–6 mm long lobes of limb. Pappus 18–20 mm long, with plumose-barbate bristles, connate into ring at base, barbules remote, longer than thickness of bristles; three to five inner bristles with dense barbules above; immature achenes about 3 mm long, glabrous, dark brown, longitudinally barbate. Flowering VII; fruiting VIII.

Stony habitats in mountains.—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from Kara-Dzhatyk area not far from the village of Uch-Uzen. Type in Leningrad.

Series 3. Pendulifoliae Iljin.—Leaves not auriculate; cauline leaves pendent.

96. *J. karabugasica* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 1 (1937) 54; Fl. Turk. VII, 232.—*lc.*: op. cit. (1937) Fig. 2.

Perennial. Plants 40–50 cm high, grayish due to flocculose-arachnoid-hairy pubescence. Stems numerous, flocculose-woolly at base, branched almost up to middle, branches elongate, leafy up to capitula. Basal leaves petiolate, gradually broadening toward base, withering before anthesis, only their petiolar remains persisting near stem base, pinnatisect, with distant short segments; all cauline leaves sessile, concolorous, strongly broadened at base, pinnatisect, with short lanceolate or linear segments,

acuminate, remote; leaves often runcinate, sinuate-toothed, with few usually recurved lobes. Capitula solitary, initially with cylindrical, later campanulate, involucre; involucre 20–30 mm long and 10–13 mm wide, gray due to flocculose-arachnoid-hairy pubescence, with appressed bracts; outermost bracts slightly recurved; inner bracts gradually pointed, yellowish; outer and middle bracts slightly carinate, short- and dark-cuspidate, oblong-ovate to linear. Receptacle squamose; scales very much shorter than involucre. Corolla pale pink, 28–33 mm long, gradually narrowed towards base, with about 4 mm long lobes of limb. Pappus persistent, about 25 mm long, pappus hairs plumose; achenes 5–6 mm long, glabrous with equidentate corona enclosing thick, yellowish, deeply lobate pappophorus, with a large, high, poculiform, dark yellow nectary in center.

Stony habitats.—*Soviet Central Asia*: Kara-Kum (western). Endemic. Described from Karabugazgol. Type in Leningrad.

648 *Section 11. Stechmannia* Boiss. Fl. or. III (1875) 569 (s. str.).—*Stechmannia* DC. Prodr. VI (1837) 553.—*Stenocephala* Benth. in Benth. and Hook. Gen. pl. II, 1 (1873) 473 p. p.; Pflanzenfam. IV, 5 (1897) 321 p. p.—Plants with woody branches, caespitose, with unilaterally decurrent entire leaves, involucre bracts always spinose; pappus deciduous, pappus bristles always plumose, connate into ring with narrow opening, broad scaly base, with pappogenus enclosing nectary; achenes oblong, glabrous, smooth, with dome shaped, five-angled or lobate apical pappophorus. Plants mainly from Southwest Asia; so far four species have been recorded in the USSR, all in Kopetdag.

Note. The section is described on the basis of Kopetdag species and some Southwest Asian species, which belong in this section in its narrow sense; these are *J. stachelinae* DC., *J. dumulosa* Boiss., *J. ramosissima* DC., *J. eriobasis* DC.

Type of section: *J. pungens* Boiss.

1. Entire plant uniformly grayish arachnoid-hairy 2.
- + Plants glabrous, only sometimes with densely tomentose, decurrent, narrow wings 3.
2. Stem strongly bent at nodes; involucre bracts strongly divaricate and with thickened base 97. **J. antonovii** Winkl.
- + Stem erect, slightly bent at nodes, spines of involucre bracts thin 98. **J. kultiasovii** Iljin
3. Dense woolly globules developed in leaf axils, decurrent on stem as wings; spines of involucre bracts strongly divergent (Malye [Lesser] Balkhans) 99. **J. lydiae** Iljin
- + Woolly globules not present in leaf axils; involucre bracts modified as divergent spines (central Kopetdag) 100. **J. ludmilae** Iljin

97. *J. antonovii* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1890) 145; O. and B. Fedtsch. Perech. Rast. Turk. IV, 295; Iljin in Tr. Turk. Nauchn. Obshch. 2, 14; Fl. Turkm. VII, 228.—*lc.*: Winkl. op. cit. t. III, f. 4.—*Exs.*: *P. Sintensis*. Iter transcasp.-persic. 1900–1901, No. 1947.

Perennial. Semishrub, 8–25 cm high, divaricately branched from base. Root strong, often branched, strongly fibrous. Stems densely covered with remains of hard, relatively long, sharply divergent petioles of fallen leaves, broader at base, and woolly in axils, arachnoid-hairy pubescent, more or less branched, nodose, usually appearing three-angled due to decurrent petioles. Leaves oblong-linear, undivided, with distant, sparse, subobtuse, small teeth or margin almost entire, involute, with very short cartilaginous tip; lower and middle leaves 4–10 cm long and 2–8 mm wide, gradually narrowed in more or less long petiole, carinate below, with broadened base; upper leaves shorter, narrower, sessile. Capitula solitary, often aggregated, with 15–25 florets, five to seven florets only in less developed forms. Involucre cylindrical, 20–30 mm long and 5–7 mm wide (including 15–25 mm long divaricate bracts), grayish-green due to fine pubescence; outer and middle involucral bracts attenuate from relatively broad base into divaricate, long, narrow, stiff structures, terminating into brownish, almost glabrous spine; inner bracts narrow oblong-linear, flat, gradually acuminate, membranous, with scattered sessile glandular hairs and fine pubescence on outer side, dirty purple in upper part. Receptacle squamose; scales short, glabrous and smooth, acuminate, usually 3–5 mm long. Corolla prominent, pink, very densely covered with sessile glandular hairs, especially in upper part, 25–35 mm long, gradually narrowed at 10–12 mm, with 4–7 mm long lobes of limb; apical appendages of anthers 6–8 mm long, whitish-pinkish, gradually acuminate, very deeply divided above, basal appendages setaceous, colorless, 4–6 mm long; slightly divided only at tip. Pappus deciduous, 15–22 mm long, ferruginous either entirely or only in lower part, comprising long-barbate unequal bristles, with barbules 3–4 times as long as thickness of bristles, almost as long, or even shorter, connate into ring with narrowed base; achenes oblong, 5–6 mm long, glabrous, smooth, with small and many-toothed corona enclosing hemispherical pappophorus with membranous, five-lobed, stalked, nectary in center, protruding through opening in pappus. Flowering V–VII; fruiting VII–X.

Clayey and gravelly mountain slopes, in steppe and semisteppe zone.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from the vicinity of Germab in Kopetdag. Type in Leningrad.

Note. This species varies in plant size, length of corolla, pappus and especially its bristles, which are mostly barbate, with the barbules three to four times as long as the thickness of the bristle, straight and

obliquely directed upward relative to the bristles, which are sometimes more scattered, of almost the same length, but arcuately recurved, and less often the serrate-barbate bristles are as long as or shorter than the thickness of the bristles. The specimens collected by M.V. Androsov and L.M. Buby from the Kurtsu Region near Ashkhabad on June 27, 1912, No. 2431, are particularly noteworthy. They have entire leaves that are more appressed to the stem and serrate pappus bristles (f. *serratisetosa* Iljin f. n.).

98. **J. kultiassovii** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 352; Fl. Turkm. VII, 226, Plate 36.

Perennial. Plants 25–30 cm high, with many-headed caudex, and strongly fibrous roots; many-stemmed, grayish. Stems more or less erect, simple or only with isolated short branches, angular, gradually and weakly bent at nodes arachnoid hairy-flocculose-pubescent, dirty purple in lower part, leafy up to tip, densely squamose with stiff scales, the remains of old petioles near base. Cauline leaves numerous, obliquely directed upward, narrowly lanceolate or narrowly oblong, undivided and entire, acuminate, one-veined, narrowly involute, narrowed toward base, grayish on both sides due to sparse arachnoid-hairy pubescence and with sessile glandular hairs, often poorly visible due to pubescence, 4–8 cm long, 3–6 mm wide; lower leaves distinctly petiolate; middle and upper leaves sessile, not enclosing capitulum. Capitula solitary, about 4–5 cm long (including florets). Involucre narrowly cylindrical, about 2.75–3 cm long and 1 cm wide, grayish due to arachnoid-hairy pubescence, with numerous imbricate bracts, terminating into glabrous, rusty-brown awns, shorter in outer bracts, similar to large number of middle bracts, gradually attenuate outward, with straight awns, from outer to inner bracts, elongated up to 4–5 mm. Receptacle squamose; scales somewhat stiff, very wide, 2.5–3 mm long, irregularly divided, sometimes up to middle or even below. Florets significantly longer than involucre, 12–20 in capitulum. Corolla pink, 30–35 mm long, gradually narrowed in middle, with 5–6 mm long lobes of limb, exerted, whitish; apical appendages of anthers scatteredly pubescent, similar to basal appendages, 5–6 mm long. Pappus entirely deciduous, 12–15 mm long, pinkish-rusty, bristles barbata-plumose, with barbules four to five times as long as thickness of bristles, connate into ring, forming continuous membranous base, bearing small nectary; achene immature, four-angled, glabrous, smooth, with short-columnar, five-angled pappophorus. Flowering VI.

On mountain screes.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from the vicinity of the village of Sharlak. Type in Ashkhabad.

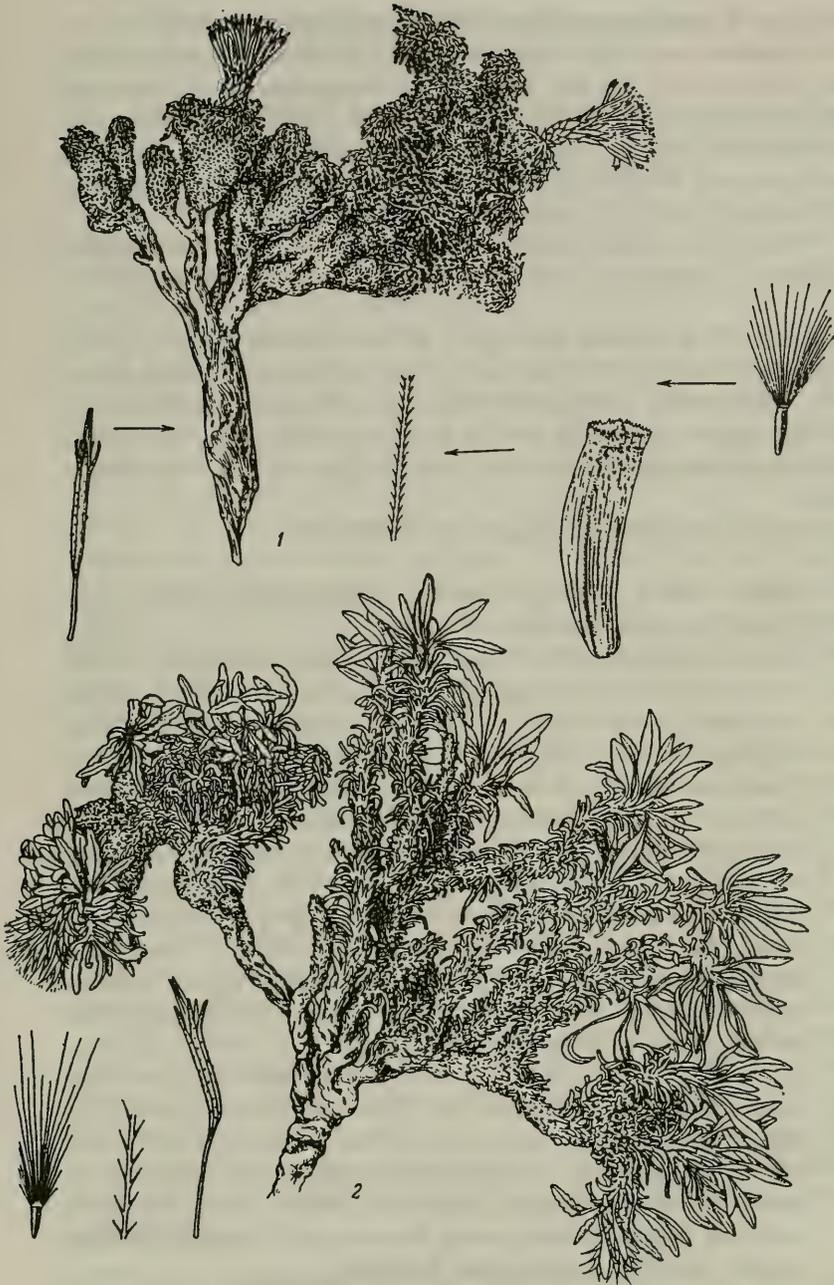
99. **J. lydiae** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 390, Fig. 1; Fl. Turkm. VII, 229.

Perennial. Light green semishrub, (6)8–15 cm high, floccose with long fibrous woody root, forming branched caudex. Stems numerous, simple, branched above, angular, glabrous or often with dense and soft flocculose angles, especially in lower part. Leaves numerous, oblong, subobtuse, glabrous on both sides, with prominent midrib beneath, decurrent and gradually narrowed into three-angled petiole; lower leaves falling before anthesis, middle (6)8–10 cm long, upper reduced and subtending capitulum. Capitula numerous, 4–4.5 cm long. Involucre cylindrical at anthesis, 22–30 mm long and 18–23 mm wide, 7–10 mm wide without divaricate involucre spines; involucre bracts numerous, 651 imbricate, outer and middle bracts gradually narrowed, attenuate from broad yellow base, somewhat thick, greenish, glabrous on outer side, puberulent on inner side, terminating in smooth rusty spine, distinctly arcuately recurved; innermost bracts erect, narrow, linear, gradually acuminate, purple above, glabrous on both sides, often ciliolate only along border. Receptacle squamose; scales smooth, acuminate, one-eighth to one-seventh as long as involucre. Corolla pink, densely glandular, usually 32–35 mm long, with 13–16 mm long tube and 6–7 mm long lobes of limb. Pappus deciduous, all pappus bristles plumose, connate into ring, extended in scaly base with five-partite globose pappogenus and whitish scaly nectary falling entirely with them; achenes oblong, glabrous, smooth, immature achenes about 5 mm long, with toothed corona above along edges, and with smooth dome-shaped pappophorus inside. Flowering VI–VII; fruiting VII.

Wormwood and saltwort waste lands.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Lesser Balkhans. Type in Leningrad.

100. **J. ludmilae** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 392, Fig. 2; Fl. Turkm. VII, 226.

Semishrub with long, fibrous, tap root, connecting rhizome covered with old petioles. Stems of current year numerous, 5–8 cm long, hemispherical, unbranched or less often with solitary branches in lower part, green, ribbed, like entire plant almost glabrous, with slightly arachnoid hairy-coating at base. Leaves linear, entire or with few teeth, strongly convolute, subobtuse, with prominent midrib beneath, usually 30–50 mm long, slightly broader at base, arcuately recurved, without distinct tuft of hairs in axil. Capitula numerous. Involucre about 20 mm long, infundibuliform due to strongly divergent imbricate, linear, erect, unequal bracts, somewhat broadened from base itself; attenuate into somewhat stiff, thin, dirty purple spine. Florets in capitulum about 20;



corolla pink, with scattered sessile glandular hairs, usually 27–30 mm long, gradually narrowed toward base, with 10–12 mm long narrow basal part, lobes of limb 5–6 mm long. Pappus ferruginous, 15–20 mm long; bristles barbata-plumose, deciduous, all bristles connate into ring with extended scaly base bearing cyathiform, longitudinally five-fid pappogen, with columnar whitish nectary at apex; achenes glabrous, immature, longitudinally striate. Flowering VI–VII; fruiting VII.

Gravelly mountain screes.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Chuli. Type in Leningrad.

652 *Section 12. Nanae* Iljin sect. n. in Addenda XXVI, 725.—Semishrubs, usually short, stemless or with short stem, mountainous or alpine plants, with undivided or finely divided leaves, predominantly rosulate; pappus serrate and barbata, always shedding easily; pappogenus like pappophorus always developed; achenes glabrous, often with smooth ridges.

Type of section: *J. abramovii* Rgl. and Herd.

1. Plants stemless, forming dense turf; capitula always sessile 2.
- + Stems somewhat developed 3.
2. Leaves pinnatipartite, with short lobes, gray-arachnoid-hairy on both sides; involucre bracts appressed, only sometimes their tips slightly recurved; pappus barbata; achenes with scarcely visible, smooth longitudinal ridges (Kugitang) 102. **J. tapetodes** Iljin
- + Leaves undivided and entire, short-petiolate, oval or oblong-oval, greenish above, white tomentose beneath; involucre bracts arcuately recurved; pappus bristles serrate; achenes glabrous, smooth (Kopetdag) 104. **J. antoninae** Iljin
3. Plants with pinnatisect leaves, with thin, gray-arachnoid-hairy, sometimes linear segments; stems with solitary leaves and pendulous capitula; involucre bracts appressed or slightly recurved at tip; pappus bristles barbata; achenes glabrous with longitudinal smooth ridges (mountainous Zeravshan)
..... 101. **J. abramovii** Rgl. and Herd.
- + Leaves undivided and entire, less often with solitary teeth 4.
4. Stems almost leafless, sometimes reaching 25 cm in height; leaves lanceolate or oblong, or with solitary teeth, grayish-green above, white-tomentose beneath; outer and middle involucre bracts recurved, pappus bristles serrate; achenes small, with longitudinal smooth striations (southwestern Kopetdag)
..... 103. **J. bobrovii** Iljin
- + Leaves linear, hard, entire, green on both sides; involucre bracts almost equal, somewhat lax, finely acuminate; pappus bristles

barbate; achenes larger, about 4 mm long, with smooth longitudinal ridges, and isolated teeth above 105. **J. knorringiana** Iljin

101. **J. abramovii** Rgl. and Herd. in Izv. Obschch. Lyubit Estestv. Antroip. i Etn. XXXIV, 2 (1882) 53; O. and B. Fedtsch. Perech. Rast. Turk. IV, 303; Iljin in Tr. Turk. Nauchn. Obschch. 2, 27.

654 Perennial. Plants short-stemmed, 3–20 cm high, with dark brown root branched above, bearing numerous, more or less elongate caudices, densely covered with scaly, yellowish-brown remains of old leaves, sparsely arachnoid-hairy-tomentose, often almost glabrescent. Stems and leaves grayish-green or whitish due to arachnoid-hairy pubescence, few with dense sessile glandular hairs. Leaves basal and cauline; cauline leaves sparse, usually absent in upper part; leaves oblong or even linear, pinnatisect into narrow linear or oblong, obtuse segments, sometimes almost pinnatilobate, with more or less short lobes, involute almost up to midrib. Capitula solitary, somewhat pendulous. Involucre cupuliform, about 1.5–2 cm long, with few rows of imbricate, lax bracts, usually dirty-purple, arachnoid-hairy pubescent in lower part, flat, with indistinct veins and sessile glandular hairs; outer bracts shorter, oblong-ovate, usually with somewhat recurved apex, subacute, others oblong-lanceolate, acuminate, in lower part with sparse and irregular small teeth, like inner bracts aristate, somewhat hairy in upper part, usually along margin; upper bracts scabrous. Receptacle with very short, about 1–2 mm long, smooth scales. Corolla pink or pink-purple, with numerous sessile glandular hairs, 18–25 mm long, narrowed over 7–12 mm, with 6.5–9 mm long tube and 4–5 mm long limb, bent in peripheral florets, as a result corolla slightly pendulous, corolla of central florets erect; apical appendages of anthers whitish, about 3 mm long, basal appendages colorless, 2–3 mm long, divided up to base. Pappus deciduous, 12–20 mm long, snow-white, bristles barbate, with barbules two to four times as long as thickness of bristles; bristles connate into ring, with extended scaly base, bearing cyathiform scaly pappogenus with white, membranous, sinuate nectary; achenes up to 7 mm long, oblong, four-angled, smooth, grayish-brown, with longitudinal ridges; with membranous and sinuate corona along edges, enclosing whitish conical pappophorus. Flowering VII–VIII; fruiting VIII–IX. (Plate L, Fig. 2.)

Stony slopes, screes, and lake banks.—*Soviet Central Asia*: Pamiro-Alai (western). Endemic. Described from Lake Kuli-Kalan. Type in Leningrad.

102. **J. tapetodes** Iljin in Izv. Bot. Inst. Akad. Nauk SSSR, XXX (1932) 344; Fl. Turkm. VII, 219.

Perennial. Plants forming dense turf with many-headed caudex, short, 2–5 cm high, stemless; caudices very densely covered with remains of

old leaves. Leaves in dense rosette; usually 10–15 mm (5–25 mm) long, on sparse, slightly elongate branches, sometimes up to 40 mm long, sessile, with two to four pairs of short, linear to slightly lobate obtuse lobes, grayish due to very dense arachnoid-hairy tomentum on both sides, with scattered sunken glandular hairs, somewhat thick due to strongly
 655 revolute margins almost up to midrib, depressed above, subtending capitulum. Capitula sessile or on short peduncles. Involucre almost cylindrical, slightly broadened above, 1.5–2.25 cm long and 0.7–1.0 cm wide, with somewhat lax bracts; outer and usually middle bracts ovate or oblong-ovate, greenish-gray due to relatively dense, very short, white hairs, with short cusp, usually recurved, other bracts lanceolately linear; upper bracts acuminate, like inner bracts prominent, narrower, attenuate into long recurved cusp, dirty-purple, densely covered on outer side with very short appressed hairs and scattered sessile glandular hairs. Receptacle densely covered with short 1–2 mm long scales. Florets exceeding involucre; corolla pink-purple, with sessile glandular hairs, sometimes mixed with very short-stalked glandular hairs, 20–23 mm long, gradually narrowed over 9–10 mm, with 4–5 mm long limb; apical appendages of anthers whitish, with scattered hairs about 4 mm long, basal appendages colorless, setaceous, 3–4 mm long and slightly divided below longitudinally. Pappus shedding easily, up to 15 mm long, snow-white, bristles barbate, barbules one and one-half to two (three) times as long as thickness of bristles, up to four times long only in four longer bristles, all bristles connate into ring with extended base, bearing a pink, fleshy, lobate structure surrounding cyathiform nectary with five-lobate yellowish membranous margin; achenes mature, 6–8 mm long, almost smooth or with scarcely visible longitudinal helices, rugose above, often modified into spiny tubercles along thickened edges, yellowish, especially below corona. Corona distinctly toothed along edges and terminal on achenes with conical whitish pappophorus. Flowering VI–VIII; fruiting VII–VIII. (Plate XL, Figs. 13–16; Plate XLVIII, Fig. 1.)

Gravelly and stony plateau and slopes, a rocks in subalpine zone.—
Soviet Central Asia: Pamiro-Alai (Kugitang). Endemic. Described from the vicinity of the village of Kugitang from the collections of E.G. Bobrov. Type in Leningrad.

103. **J. bobrovii** Iljin sp. nov. in Addenda XXVI, 725.

Perennial. Semishrub with prostrate woody branches, bearing numerous dense rosettes of leaves at top. Stems 15–25 cm high, striate, flocculose-arachnoid-hairy, erect, simple, leafy in lower part. Basal and rosette leaves lanceolate or oblong, entire, or with isolated teeth, subacute, narrowed toward base; cauline leaves narrower, sessile; all leaves grayish green above due to fine arachnoid-hairy tomentum, rugose and with

sessile glandular hairs in alveoli, white-tomentose beneath with prominent midrib. Capitula solitary. Involucre cupuliform, arachnoid-hairy in lower part; outer involucral bracts acuminate with arcuate tips; middle bracts less recurved; inner bracts erect, long, and scaly-tipped; all bracts with prominent veins and small teeth. Corolla 14–15 mm long, abruptly narrowed over 4–5 mm, with 4–5 mm long lobes of limb, covered with scattered sessile glandular hairs. Pappus entirely deciduous, bristles connate into ring, scabrous, pappogenus on extended base in ring as lobed cup, whitish on outer side, red inside, with pappophorus in center; achenes 2–2.25 mm long, with smooth longitudinal striations, and equal-toothed membranous corona, enclosing broad cupuliform pappophorus with smooth margins.

Mountain slopes.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from the western slopes of Khosar-Dag in Kopetdag, from the collections of E.G. Bobrov. Type in Leningrad.

104. *J. antoninae* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 56. *lc.*: *Ibid.* p. 57.

Perennial, short semishrub forming dense turf. Root thick, woody, producing numerous densely appressed woody branches, terminating with rosette of leaves 2–4 cm across. Leaves oval or oblong-oval, spatulate, gradually narrowed into petiole, one-veined, undivided and entire, less often with isolated teeth, white-tomentose beneath, arachnoid-hairy above, grayish-green, lamina 4–15 mm long and 3–6 mm wide. Stems of current year short if developed, 0.5–3 cm high, simple, with oblong leaves, one-headed. Involucre 10–13 mm long, cupuliform at fruiting, arachnoid-hairy, with lanceolate bracts; inner bracts almost linear, acuminate; all bracts appressed; outer and middle bracts somewhat recurved only at tip. Receptacle densely squamose; scales, half as long as involucre. Pappus deciduous, snow-white or yellowish, pappus bristles scabrous-barbate, with barbules slightly shorter than thickness of bristles, sparse; all bristles connate into ring with extended base, enclosing small five-toothed nectary; achenes mature, 3–3.5 mm long, up to 1 mm thick above, glabrous, smooth, toothed along edges, with fine pappophorus at tip as tubercle. Fruiting VI–VII.

Stony slopes of mountains.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from the Bakharden Region of Kopetdag from the Tyazi-Tailanly Mountains, a short distance from the village of Tyazi-Tailan. Type in Leningrad.

105. *J. knorringiana* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 384.—*lc.*: *Ibid.* Fig. 2.

Perennial. A short semishrub, about 10 cm high. Stems few, originating from apices of previous year's stems, densely covered with

657 scaly remains of old leaves, erect, simple, slightly angular-ribbed, sulcate, with scattered, somewhat stiff, short hairs, more or less densely covered with sessile glandular hairs, weakly arachnoid-hairy at some places. Leaves few, usually about 5 cm long, undivided and entire, sometimes revolute up to midrib, short-acuminate; basal and rosette leaves narrowed toward base and again broadened at the attachment; cauline leaves sessile, broadened at base and decurrent with short and narrow, entire wing; all leaves bright green on both sides, slightly rugose above, with sparse, scattered, sessile glandular hairs and dense, stiff, almost cartilaginous few-celled short hairs, often capitate, at some places with weakly arachnoid-hairy, glabrescent pubescence, glabrous beneath, but with numerous sessile glandular hairs and prominent, distinctly whitish midrib. Capitula solitary terminal on stem, with fewer florets. Involucre cupuliform, up to 20 mm long and up to 8–12 mm wide, five-rowed; outer bracts relatively lax, linearly-lanceolate, finely acuminate; inner bracts finely acuminate, outer flocculose-arachnoid-hairy, others short appressed, with small teeth at some places. Receptacle densely squamose; scales smooth, pointed, one-fourth to one-third as long as involucre. Pappus deciduous, snow-white, 8–9 mm long (excluding bristles), short-barbate, with barbules as long as or slightly exceeding thickness of bristles. Achenes about 4 mm long, four-angled, obpyramidal, with toothed corona above, and longitudinal ridges, with rows of teeth along ridges in upper half, brownish, with smooth dome-shaped pappophorus at tip, enclosing five-toothed nectary on long stalk exerted from opening at pappus base.

Soviet Central Asia: Tien Shan (Karatau). Endemic. Described from Zhan-Kurgan-Sai north of the village of Atabaevka. Type in Leningrad.

Section 13. Molles Korsh. in Bull. Acad. Sc. Pétersb. I, 2 (1894) 123, pro stirpe.—Capitula large or medium, with many florets; florets bisexual; pappus readily and entirely shedding, pappus bristles connate into ring at base, short-barbate or almost scabrous, base of pappus extended into scale, pappogonus with nectary detaching together with pappus; besides pappogonus, conical or dome-shaped pappophorus always present; nectary on short manubrium or sessile; achenes distinctly scabrous due to discontinuous alveolate, parallel ribs on edges, alveoli alternating with fine erect acute teeth and scattered numerous sessile glandular hairs, four peripheral thicker ribs distinctly cartilaginous. Plants woolly-arachnoid-hairy at base. A fairly large number of species of this section are found in Europe and Northwest Asia, which are difficult to distinguish among themselves.

Type of section: *J. arachnoidea* Bge.

- 658 1. Plants yellowish-green, with long and slender branches, densely glandular; outer and middle involucre bracts imbricate, reduced, green, roundish below, with dark green apex and short cusp, arcuate at apex; achenes entirely covered with glandular hairs masking its markings (Olty) 117. **J. demetrii** Iljin
- + Plants with different set of characters; achenes with distinct alveolate-tuberculate and vallate structure, also always glandular hairy, but not masking its markings 2.
2. Involucre arachnoid hairy-tomentose; all involucre bracts appressed, only triangular and dark green tips of reduced outer and middle involucre bracts exerted from tomentum 3.
- + Involucre different, often also arachnoid hairy-tomentose; bracts appressed or without tomentum; triangular tips of outer and middle bracts never exerted from tomentum, but as linear tips 4.
3. Leaves almost always with smooth margins, not sinuate (south-eastern European Part and Ciscaucasia) 106. **J. arachnoidea** Bge.
- + Leaves always sinuate (chalky deposits of eastern Ukraine) 107. **J. talievii** Klok.
4. Plants of Crimea; leaves always sinuate (exceptions rare) 114. **J. sordida** Stev.
- + Leaves of different type, may be flat and sinuate, but never Crimean plants 5.
5. Plants strong, branched from base; branches spreading upward, strongly winged; leaves large, erect (alpine plant of the 'Glavnyi' [Main] Caucasus Range) 116. **J. exuberans** (Trautv.) Sosn.
- + Plants with different set of characters 6.
6. Plants of Transcaucasia 115. **J. blanda** (MB.) C.A.M.
- + Plants of the European Part of the USSR and extreme western Kazakhstan 7.
7. Leaves not sinuate (exceptions quite rare) 8.
- + Leaves always sinuate. Involucre always arachnoid-hairy tomentose; lower and middle bracts distinctly finely recurved (chalk deposits) 11.
8. Middle involucre bracts from their ovate-oblong, somewhat swollen, pale base sharply narrowed to relatively long and narrow apex, loosely appressed or even gradually recurved, dark green or purple, sometimes deciduous (eastern and middle parts of the European territory) 110. **J. ledebourii** Bge.
- + All involucre bracts gradually acuminate, not swollen in lower part 9.
9. Capitula large; all involucre bracts, except one or two innermost rows, gradually arcuately recurved, with long, gradually acuminate

- 659 bent part, not arachnoid-hairy tomentose; inner bracts strongly involute in upper part and long-ciliate along margin 113. **J. michelsonii** Iljin
 + Outer involucre bracts very short-acuminate or erect 10.
10. Entire plant densely arachnoid-hairy, almost whitish tomentose, grayish green and arachnoid-hairy, above, white-tomentose beneath; involucre always arachnoid hairy-tomentose, with appressed bracts; outer and middle bracts with short-recurved apices (coastal zone of western Ukraine) 111. **J. mollissima** Klök.
 + Plants weakly arachnoid-hairy, but not arachnoid hairy-tomentose; leaves green, often bright green, glabrous, or somewhat arachnoid-hairy, white-tomentose beneath; involucre bracts more or less appressed only in beginning, later lax, somewhat divergent, sometimes not arachnoid hairy-tomentose, subglabrous or weakly arachnoid-hairy, short-acuminate, with cusp slightly recurved (middle part of Ukraine) 112. **J. calcarea** Klok.
11. Achenes with four to six discontinuous ribs, approximate on edges; corona of achenes initially membranous, erect, bases of teeth fused in lower half, later cartilaginous (chalk deposits along Lower Don) 109. **J. kasakorum** Iljin
 + Achenes usually with three longitudinal alveolate-discontinuous ribs on edges, not approximate, corona distinctly toothed, cartilaginous, with few recurved teeth (chalk deposits of Don and Lower Volga) 108. **J. cretacea** Bge.

Series 1. Arachnoideae Iljin.—Achenes with sharply developed markings and scattered sessile glandular hairs not masking markings.

106. **J. arachnoidea** Bge. in *Flora*, XXIV, 1 (1841) 157; Ldb. *Fl. Ross.* II, 766 p. p.; Boiss. *Fl. or.* III, 574 p. p.; O. and B. Fedtsch. *Perech. Rast. Turk.* IV, 301 p. p.; Klok. in *Vizn. Rosl. URSR*, 565; Schchian in *Fl. Gruzii*, VIII, 447.—*J. mollis* β . *dubia* Korsh. in *Izv. Akad. Nauk*, 1, 2 (1894) 124; Grossh. *Fl. Kavk.* IV, 173; Fedtsch. in *Fler. Fl. Evrop. Ross.* 1005; Sosn. in *Zhurn. Russk. Bot. Obshch.* 11, 1–2, 196.—*J. mollis* Schmalh. *Fl.* II (1897) 110 p. p. non Rechb.; Ldb. *Fl. Ross.* II, 766 p. p.; DC. *Prodr.* 676 p. p.—*J. arachnoidea* var. *dubia* Korsh. ex Iljin in *Tr. Turk. Nauchn. Obshch.* II (1925) 21; *Fl. Yugo-Vost.* VI, 394.—*J. dubia* Iljin *Ibid* 394 (nomen nudum).—*Serratula blanda* MB. *Fl. taur.-cauc.* III (1819) 549 p. p.

Perennial. Plants 25–100 cm high; tap root branched above. Stems solitary or few, cylindrical, erect, striate, flocculose-arachnoid-hairy, like petiole arachnoid-hairy at base, simple, less often with solitary branches, 660 leafless, except in lowermost part. Almost all leaves in basal rosette;

basal leaves gradually narrowed into petiole, pinnatisect into oblong, lanceolate or less often linear, acuminate or acute segments on each side, less often undivided (f. *integrifolia* Iljin); lowermost leaves short-petiolate or almost sessile, nondecurent in thin-stemmed forms, reduced above, undivided, linear, sparse or totally absent; all leaves green above, more or less scabrous due to short papillae, rugose, covered with appressed, thin, long hairs emerging from tip of papillae, narrowly involute, grayish or grayish-whitish due to thin appressed hairs, not glandular. Capitula solitary terminal on stem large, with many florets, with florets about 4–5 cm wide. Involucre broadly cupuliform, with bend at junction, about 20 cm long, with appressed bracts, imbricate from reduced outer to distinctly exerted inner bracts; outer and middle bracts densely arachnoid-hairy-tomentose, protruding from tomentum by only dark green cuspidate tips; bracts of inner row gradually narrowed, acuminate, involute with scattered glandular hairs or scarcely visible appressed bristles, somewhat toothed or ciliate along border. Receptacle squamose; scales smooth, acuminate, approximately up to half as long as involucre. Corolla dark purple, covered with golden sessile glandular hairs, 15–20 mm long, narrowed over 6–9 mm, with 4–5 mm long lobes of limb; apical appendages of anthers 2.5–3 mm long, abruptly narrowed at apex, basal appendages subobtuse, 1.5–2.5 mm long, filaments glabrous; stigma 2–2.5 mm long, divided up to base, without tuft of basal bristles, with branches slightly divergent (but not arcuately recurved), and thereafter fused. Pappus snow-white, 8–12 mm long, pappus bristles connate into ring, entirely deciduous, scabrous-barbate, with barbules almost as long as thickness of bristles; achenes obpyramidal, four-angled, usually 4 mm long, uniformly tuberculate, cartilaginous along edges, with two rows of cartilaginous tubercles between edges, and with sessile or very short glandular hairs between them, with distinctly toothed corona, teeth usually three-toothed in turn; pappophorus dome-shaped, whitish. Flowering V–VII(VIII); fruiting: VI–VIII (Plate XL, Figs. 1–2; Plate XLV, Fig. 1.)

In feather grass-sheep's fescue and herb—sheep's fescue steppes, chalk deposits, limestone deposits, pine forests and waste lands.—*European Part*: Middle Dnieper; Volga-Don; coastal area; Lower Don; Trans-Volga Region; Lower Volga; *Caucasus*: Ciscaucasia, western Transcaucasia (rarely). Endemic. Described from Volga, below Saratov. Type in Leningrad.

107. *J. talijevii* Klok. in Bot. Zhurn. URSR, VII, 4 (1951) 50.

Perennial. Plants 30–90 cm high. Stems solitary or few, erect, simple or branched in lower half, with elongate branches, finely sulcate, more
661 or less flocculose-arachnoid-hairy. Leaves crowded in lower part; basal

leaves numerous, like lower cauline leaves, often all pinnatisect, less often undivided, usually oblong-linear or linear, sinuate-toothed, sometimes with small lobes, always sinuate, segments winged along rachis; other cauline leaves sessile, amplexicaul, somewhat decurrent; all leaves greenish, finely arachnoid-hairy, rugulose and with scattered sessile glandular hairs above, white-tomentose beneath. Capitula solitary terminal on stem and branches, large, with many florets. Involucre densely arachnoid-hairy; all involucre bracts appressed; deltoid tips of outer and middle bracts exerted from arachnoid-hairy pubescence and also appressed as in *J. arachnoidea* Bge. Corolla dark purple, with sessile glandular hairs, 12.5–17 mm long, narrowed over 4–7 mm, with 4.5–6 mm long lobes of limb. Pappus snow-white, comprising few, short (5–6 mm long), scabrous-barbate bristles, with densely arranged barbules, connate into ring terminating with small nectary and pappophorus, and shedding easily on maturation. Achenes 3.5–4 mm long, dark olive-green, with thicker, usually continuous, but somewhat sinuate, cartilaginous structures along four ribs, with two or three tuberculate-foveate ribs, scattered sessile glandular hairs along edges, and scabrous corona, with somewhat recurved teeth, and dome-shaped pappophorus in center of upper areole. Flowering V–VI; fruiting VII.

Chalk deposits.—*European Part*: Lower Don. Endemic. Described from the vicinity of Belovodsk. Type in Kiev.

Note. The species, close to *J. cretacea* Bge., is distinguished by having an involucre as in *J. arachnoidea* Bge., i.e., the bracts do not have recurved tips as in the first species, but appressed ones as in the second species.

108. *J. cretacea* Bge. in Flora, XXIV, 1 (1841) 158; Ldb. Fl. Ross. II, 763, spec. wolg.; Iljin in Fl. Yugo-Vost. VI, 394.—*J. mollis* var. *cretacea* (Bge.) Fedtsch. and Fler. Fl. Evrop. Ross. (1910) 1005.—(?) *J. litwinowii* Zing. Sb. Sved. (1885) 263.

Perennial. Plants 25–50 cm high. Stems solitary or few, simple or branched, erect, brownish-purple or greenish, ribbed, arachnoid-hairy, with scattered, fine, sessile glandular hairs; almost all leaves crowded in lower half of stem; basal leaves numerous, on short, winged, petiole, pinnatisect into oblong, linear, or almost oval segments, fused with wing of leaf rachis, mildly sinuate-toothed, often slightly narrowed at base, always sinuate, sometimes incised, acute or acuminate; cauline leaves sessile, usually broadened at base, distinctly auriculate and decurrent with entire or sinuate-toothed wing; lower and middle leaves divided, like basal leaves; upper leaves usually undivided and entire, linear, less often almost all leaves undivided (*J. litwinowii*); all leaves greenish or grayish-green above, with fine, scattered, sessile, glandular hairs, leaf

662 surface soft, not scabrous, white-tomentose beneath due to thin, long, many-celled hairs. Capitula solitary terminal on stem and branches, 1.5–3 cm wide. Involucre hemispherical, appressed at base, densely arachnoid hairy-tomentose, with outer and middle bracts exerted from tomentum; bracts acuminate, dark green or dark purple, with recurved tips; inner bracts straight, usually three-veined, aristate, ciliolate, recurved at fruiting, covered on outer surface with very short, dense, appressed bristles and sessile glandular hairs. Receptacle squamose; scales long, smooth, acuminate. Corolla pink-purple, with scattered sessile glandular hairs, 14–16 mm long, narrowed over 5–7 mm, with 4–5 mm long lobes of limb. Pappus deciduous, snow-white, 5–6 mm long, with short-barbate bristles. Achenes 3–3.5(4) mm long, dark brown or ferruginous, with thick ribs, edges usually with three longitudinal-parallel discontinuous foveate ribs bearing scattered sessile glandular hairs, teeth of corona somewhat recurved, with pappophorus in center. Flowering V–VI; fruiting VII.

Chalk beds.—*European Part*: Lower Volga; Lower Don(?). Endemic. Described from the Kamyshinskii Range, from the vicinity of the village of Belye Glinki. Type in Leningrad.

Note. S.I. Korshinsky (*Izv. Akad. Nauk*, 1, 2 (1894) 128) believed that *J. cretacea* Bge. is neither a species nor a distinct variety, but only a mixture of forms intermediate between *J. mollis* var. *dubia* and var. *typica*, and often simply a form grazed by cattle. *J. cretacea* Bge. is a good chalk species, collected by Claus from the chalk beds of the Kamyshinsk District and by me and Yu.S. Grigorjev in 1926 at the same place. I agree with Korshinsky only in that the specimen collected by D.I. Litvinov from the chalk beds of the Ilovli River in the same region is a modified, mainly pasture, form with entire leaves (*J. litwinowii* Zing.), noted by V. Zinger as the species growing together with sheep's fescue.

109. ***J. kasakorum*** Iljin sp. n. in Addenda XXVI, 725.

Perennial. Plants up to 50 cm high. Stems few or solitary, erect, simple or with few short branches, longitudinally sulcate, greenish or purple, flocculose-arachnoid-hairy, with scattered, fine, sessile glandular hairs. Leaves crowded in lower quarter or one-third of stem; basal leaves numerous, short-petiolate; cauline leaves sessile, semiamplexicaul and decurrent with toothed margin; all leaves simply pinnatisect into linear, less often oblong-linear, distant, sinuate-toothed, acuminate segments; fused with narrow-winged rachis also toothed at some places, strongly involute, always crisped along margin; upper leaves distinctly reduced, grayish-arachnoid-hairy and rugulose above, with fine sessile glandular hairs, not scabrous, sparsely white-tomentose beneath with sessile

glandular hairs under tomentum. Capitula solitary. Involucre broadly cupuliform, depressed at base, about 20 mm long; outer and middle involucre
663 involucre bracts appressed, triangularly lanceolate, strongly arachnoid-hairy, covered with sessile glandular hairs, modified apically into short callose cusp, projecting from tomentum; innermost bracts acuminate-aristate, not arachnoid-hairy, densely covered with sessile glandular hairs and very small appressed bristles, ciliate and involute. Receptacle densely squamose; scales smooth, acuminate, one-third to half as long as involucre. Corolla pink, 12–13 mm long, narrowed over 4–5 mm, with 4.5 mm long lobes of limb; apical appendages of anthers 2.5–3 mm long, abruptly narrowed at apex into short, incurved cusp. Pappus deciduous, snow-white, 6–8 mm long, with short-barbate, dense bristles, connate into short-cylindrical structure, flattened above, with short upper margin, surrounding pappophorus as cap, with small, five-toothed, nectary in center. Achenes usually 3–3.5 mm long, pale yellowish, later dark brown, thick-cartilaginous along ribs, with transverse, parallel, dense folds, sometimes discontinuously tuberculate-alveolate, edges with three or four cartilaginous, parallel more or less approximate ribs, discontinuously foveate or sinuate, discontinuously scattered, fine, sessile glandular hairs, and well-developed, erect, almost membranous, scabrous corona, connate at base, later becoming almost cartilaginous. Flowering V–VI(?); fruiting VI.

Chalk beds.—*European Part*: Lower Don, Lower Volga. Endemic. Described from the vicinity of Kletskaya Station. Type in Leningrad.

110. **J. ledebourii** Bge. in Flora, XXIV, 1 (1841) 157.—*J. pseudo-mollis* Klok. nom. nud. in Bot. Zhurn. VII, 4 (1951) 46.—*J. mollis* β . *dubia* Korsh. in Izv. Akad. Nauk, 1, 2 (1894) 124 p. p.—*J. mollis* γ . *arachnoidea* Korsh. Ibid. 125, specim. e Tula, Orel, Woron. Rjasan, Tamb. Simb. Pensa, Kazan, Ufa, etc.—*J. mollis* DC. Prodr. VI (1837) 676 (specim. sibir. Ross. merid.); Ldb. Fl. Ross. II, 2, 766 (specim. uralens.); V. Zinger, Sb. sved. (1885) 264; Schmalh. Fl. II, 110 p. p.; Fedtsch. and Fler. Fl. Evrop. Ross 1005 p. p.—*J. arachnoidea* auct.: Stank. and Tal. Opr. Vyssh. Rast. (1957) 410 (specim. tamb. tatar. baschk.)

Perennial. Plants (15)25–70(90) cm high. Stems few or solitary, usually simple, less often with solitary branches, basally sulcate and finely striate, somewhat thick, 2.5–6 mm at base, covered with fine, dense arachnoid hairs and scattered fine glandular hairs, usually in furrows; usually leafy in lower part. Basal leaves numerous, narrowed into winged petiole, covered with divergent, soft and long, hairs forming woolly coating; cauline leaves also narrowed toward base, but slightly broadened at point of attachment, often semiamplexicaul and decurrent;

664 uppermost leaves reduced and simple, usually filiform, sessile, not decurrent; basal, lower and middle cauline leaves usually pinnatisect into linear, oblong or lanceolate, less often entire or cuspidate segments, fused basally with entire wing of rachis, less often all leaves undivided and entire (f. *integrifolia* Iljin), or only lower leaves undivided and entire, sometimes only their tip three-lobed, all leaves dark and grayish-green or bright green above, slightly scabrous due to fine tubercles, with long and thin many-celled hairs at apex usually semiappressed, leaf rugulose, with scattered fine sessile glandular hairs, grayish or whitish beneath due to sparse tomentum, covering sessile glandular hairs. Capitula with many florets, usually 40–50 mm wide. Involucre broadly cupuliform, usually 20–30 mm long; outer rows of involucre bracts more or less distinctly arachnoid-hairy, except outermost two to five oblong bracts, others narrowed from ovate-oblong, somewhat raised, convex more pale base into more or less long and narrow, usually loosely appressed tip, less often gradually recurved, dark green or purple sometimes decurved, almost as in *J. mollis* (L.) Rchb., later breaking off; all bracts with sessile scattered glandular hairs, ciliate; innermost bracts acuminate, densely covered on outer side with short bristles or sessile glandular hairs, or both, with declinate margin, distinctly ciliate. Receptacle densely squamose; scales relatively long, smooth, acuminate. Corolla pink or purple, with dense sessile glandular hairs, (15)17–23 mm long, narrowed over (6)7–9 mm, with 5–89 mm long lobes of limb. Pappus with 8–12 mm long bristles, snow-white, becoming somewhat yellowish toward maturation; bristles short-barbate, dense, connate into cylindrical cover with small depression at apex enclosing nectary; on fruit maturation cover slides down from pappophorus together with pappus. Achenes dark brown or almost black, less often lighter, 4–4.5 mm thick, with three or four parallel, approximate rows of discontinuous tubercles on edges, ribs with thicker and more sparse, fine, sessile glandular hairs, with toothed corona, surrounding dome-shaped pappophorus. Flowering V–VI; fruiting VII–VIII.

Forest-steppe and steppe zone in meadows, feather grass-herb and stony steppes, rocks, limestone deposits and chalk beds on slopes.—*European Part*: Volga-Kama, Volga-Don, Trans-Volga Region. Endemic. Described from Orenburg Region, from the vicinity of the village of Spasskoye. Type in Paris.

111. *J. mollissima* Klok. in Bot. Zhurn. Ukr.RSR, VII, 4 (1951) 49.—*J. mollis* DC. Prodr. VI (1837) 676 (specim. bessarab.) non Rchb.; Ldb. Fl. Ross. II, 766 (p.p. spec. cherson.); Schmalh. Fl. II, 111 p. p.—*J. mollis* γ. *arachnoidea* Korsh. in Izv. Akad. Nauk, 1, 2 (1894) 125 (specim. odess.).

Perennial. Plants (15)20–50(70) cm high. Stems erect, solitary or few, sulcate-finely ribbed, usually whitish due to more or less dense tomentum or flocculose-arachnoid-hairy with erasing pubescence, with scattered, fine, sessile glandular hairs, usually simple, less often weakly branched. Basal leaves more or less numerous, sessile, but sometimes gradually narrowed toward base, broadened at base and somewhat amplexicaul, pinnatisect into linear or oblong, less often oblong-oval, acuminate or cuspidate, usually entire segments, often revolute, less often toothed and sinuate (f. *crispa* Iljin), basally fused with broadly winged rachis, almost equal in width; lower cauline leaves like basal, mainly sessile, semiamplexicaul and often asymmetrical, decurrent; upper leaves often undivided, uppermost narrow, reduced, sessile; all leaves grayish above due to sparse arachnoid-hairy pubescence, not scabrous, rugulose, white-tomentose beneath. Capitula with many florets, 30–50 mm wide. Involucre 15–20 mm long, broadly cupulate, densely arachnoid-hairy; outer involucre bracts oblong-lanceolate, acuminate and involute above middle, with somewhat colored tips; innermost bracts narrowly lanceolate, acuminate-aristate, erect, densely glandular on outer side, ciliate, involute. Corolla pink-purple, with sessile glandular hairs, 15–18 mm long, narrowed over 5–7 mm, lobes of limb 4–6 mm long. Pappus 8–10 mm long, snow-white, with short-barbate bristles, innermost bristles forming short-cylindrical dome, with nectary in center; on maturation, cover slides off pappophorus. Achenes 2.5–3.25 mm long, usually black or blackish-brown, with rusty, somewhat thick ribs and 2–4 parallel longitudinal, discontinuous ribs along margin and ferruginous corona; ribs at four corners of achene cartilaginous, their broad and cuspidate margin obliquely directed; fine sessile glandular hairs scattered between ribs. Flowering V–VI; fruiting VI–VII.

In maritime zone; lagoons, herb-steppe and stony slopes.—*European Part*: Black Sea Coast (from the mouth of the Danube River up to Kherson).—*General distribution*: Rumania (Dobruja). Described from Izmail Region, near the village of Budaki (town of Primorsk). Type in Kiev; isotype in Leningrad.

112. *J. calcarea* Klok. in Bot. Zhurn. Ukr.RSR, VII, 4 (1951) 47.—*J. mollis* Ldb. Fl. Ross. II (1845–1846) 767 p. p. non Rchb.; DC. Prodr. VI, 676 p. p., Schmalh. Fl. II, 110 p. p.—*J. mollis* var. *dubia* Korsh. in Izv. Akad. Nauk, 1, 2 (1894) 124 p. p.—*J. mollis* var. *arachnoidea* Korsh. Ibid, 124 p. p.

Perennial. Plants 30–100 cm high. Stems solitary or few, usually erect, simple, less often branched, with solitary long branches, usually finely ribbed-sulcate below, sometimes above middle, flocculose-arachnoid-hairy, arachnoid-woolly below, with scattered sessile glandular

666 hairs, yellowish-green. Leaves crowded in lower part, sometimes up to one-third of stem height; basal leaves more or less numerous, like lower cauline leaves, gradually narrowed toward base and woolly here, semiamplexicaul, pinnatipartite or pinnatisect into distant, oblong, oblong-oval, lanceolate or less often linear, entire, acuminate or cuspidate segments, less often segments crispate (f. *crispata* Iljin), occasionally leaves almost bipinnatisect (f. *bipinnata* Iljin), sometimes all leaves undivided or only upper leaves undivided and entire; middle cauline leaves sessile, almost always semiamplexicaul, often auriculate and decurrent; uppermost leaves sessile, smaller; all leaves rugulose, green or finely arachnoid-hairy above, lacerate, very small, somewhat hard papillae with long, many-celled, decumbent or semidecumbent hairs at tip, leaves soft or weakly scabrous, grayish beneath due to loose tomentum. Capitula solitary terminal on stem and branches, with many florets, usually 3–4 cm wide. Involucre broadly cupuliform, depressed below, 15–20 mm long, arachnoid-hairy; involucre bracts initially usually appressed, later outer bracts slightly divergent, oblong, acuminate, slightly recurved; innermost bracts oblong-lanceolate, aristate, involute and ciliate densely glandular on outer side, with very short hairs. Corolla pink-purple, densely glandular, usually 15–18 mm long, narrowed over 6–8 mm, lobes of limb 4–6 mm long. Pappus together with projecting, 10–12 mm long, dense and short-barbate bristles; innermost bristles connate, forming cover inside ring, with nectary at tip easily sliding off pappophorus on maturation. Achenes 3–4 mm long, olive green, later dark brown, with cartilaginous, lighter ribs, consisting of quite approximate structures pointed upward with small teeth; edges with parallel cartilaginous ribs, bearing scattered, fine tubercles and sessile glandular hairs in-between, with cartilaginously toothed corona above, along edges, enclosing a narrow dome-shaped pappophorus. Flowering V–VII; fruiting VI–VIII.

Steppe slopes, forest edges, and river banks.—*European Part*: Bessarbia, Upper Dnieper, Middle Dnieper, Black Sea Coast (northern part); Volga-Don (west). *General distribution*: Poland (?). Described from Kherson Region. Type in Kiev.

113. **J. michelsonii** Iljin sp. n. in Addenda XXVI, 726.

667 Perennial. Plants 50–60 cm high, with short vertical rhizome covered with brown scales. Stems usually few, erect, striate, finely sulcate, uniformly covered with soft, slightly erect, many-celled arachnoid helicoid hairs and scattered, sessile glandular hairs with long branches in lower one-third part, upward spreading. Basal and lowermost cauline leaves broadened downward, broadly amplexicaul and here more densely covered with soft hairs; cauline leaves with shorter, but also flat, and

strongly winged petioles, auriculate and decurrent; all leaves pinnatisect into linear, acuminate, somewhat involute, distant, almost opposite segments, decurrent along flat rachis, green, rugulose and weakly scabrous above, with scattered sessile glandular hairs, grayish beneath due to soft, sparse arachnoid-hairy pubescence. Capitula usually 4–5 cm wide, with many florets. Involucre broadly cupuliform, 20–25 mm long; outer and middle involucre bracts arcuately recurved, acuminate, dark violet in upper half, mixed with long arachnoid hairs; inner bracts erect, acuminate, aristate, ciliate, with short semiappressed bristles and scattered sessile glandular hairs on outer side. Corolla violet-purple, densely glandular, 15–16 cm long, narrowed over 5–6 mm length, with 5–6 mm long lobes of limb. Pappus entirely deciduous, bristles short-barbate, barbs as long as or slightly shorter than thickness of bristles. Immature achenes with alveolate tuberculate structure. Flowering V; fruiting ?.

Forest edges.—*European Part*: Upper Dniester. Endemic (?). Described from the Maksimovka-Bogdanovka District, Romanovka, from the collections of A.I. Mikhelson, June 9, 1916. Type in Leningrad.

114. **J. sordida** Stev. Taur. (1857) 227.—*J. roegneri* C. Koch in Flora, XXIV (1951) 414.—*J. mollis* DC. Prodr. VI (1837) 676 p. p. non Rchb.; Schmalh. Fl. II, 110 p. p.; Ldb. Fl. Ross. II, 767 p. p.—*J. mollis* β. *dubia* Korsh. and var. *arachnoidea* Korsh. in Bull. Acad. Sc. Pétersb. V. sér. 1, 2 (1894) 123 p. p.—*J. arachnoidea* Boiss. Fl. or. III (1875) 574 p. p. non Bge.—*J. ledebouri* Stev. op. cit. 228, non Bge.—*Carduus mollis* MB. Fl. taur.-cauc. II (1808) 272, non *Serratula blanda* MB. Ibid. (1819) 549.

Perennial. Plants 25–90 cm high. Stems erect, cylindrical, finely striate, arachnoid-hairy, usually flocculose-arachnoid-hairy, solitary or few, simple or less often with few long branches in lower half, less often leafless up to middle. Basal leaves petiolate, with winged petiole; cauline leaves usually approximate in lower part of stem, with lamina pinnatipartite or almost pinnatisect into linear or oblong-linear, acuminate lobes, occasionally undivided (f. *integrifolia*); in lower leaves often oblong, subobtuse, with short cusp, wings sinuate, very rarely nonsinuate (f. *platyphylla*), fused with winged rachis; all leaves dark green or grayish green above, more or less arachnoid-hairy, with sessile glandular hairs, except uppermost, almost filiform, small, sessile, and decurrent with simple or sinuate-toothed wing. Capitula with many florets, 2.5–4 cm wide, solitary. Involucre broadly cupuliform, 20–25 mm long, with many bracts, densely arachnoid-hairy in lower half, less often almost glabrous; outer bracts exerted from tomentum as long, acuminate, almost glabrous tips with scattered sessile glandular hairs, ciliolate along margin, initially appressed, later divergent and even recurved; inner bracts strongly



projecting, aristate, pale in upper half, somewhat purple, revolute, ciliolate, on outer side covered with sessile glandular hairs, often with mixture of scarcely visible appressed bristles or only with latter. Receptacle densely squamose; scales smooth, pointed, up to one-third to one-fourth as long as involucre. Corolla 14–20 mm long, narrowed over 5–8.5 mm, with 5–7 mm long lobes of limb, and scattered glandular hairs. Pappus 10–12 mm long, snow-white, bristles barbate, strongly connate into ring, entirely deciduous; barbules shorter than thickness of bristles, dense, pappus dropping off with nectary. Achenes brown to olive green, less often pale, 3–5 mm long, four-angled, obpyramidal, discontinuously cartilaginous along ribs, somewhat thickened, with thinner three or four cartilaginous rows of tubercles along edges, and fine sessile glandular hairs in-between; corona well developed, two- or three-toothed along edges; pappophorus dome-shaped. Flowering V; fruiting VI.

Chalk beds, limestone deposits, and marls.—*European Part*: Crimea. Endemic. Described from Crimea. Type in Helsinki.

115. **J. blanda** (MB.) C.A.M. Verz. *Cauc.* (1831) 67.—*J. arachnoidea* Sosn. and var. *caucasica* Sosn. in *Zhurn. Russk. Bot. Obshch.* 11 (1926) 196, 197; *Grossh. Fl. Kavk.* IV, 173; Schchian in *Fl. Kavk.* VIII, 447.—*J. mollis* var. *arachnoidea* Korsh. in *Izv. Akad. Nauk V, Ser. 1, 2* (1894) 124, 125.—*J. arachnoidea* Ldb. *Fl. Ross.* II (1845–1846) 766 p. p. non Bge.; *Boiss. Fl. or.* III, 575; *Perech. Rast. Turk.* IV, 301 p. p.; Iljin in *Tr. Turk. Nauchn. Obshch.* II, 24.—*J. mollis* Ldb. l.c. non Rchb.—? *J. alpkigena* C. Koch. in *Linnaea*, XXIV (1845) 414; Sosn. op. cit.—*Serratula blanda* MB. *Fl. taur.-cauc.* III (1819) 548 p. p.

Perennial. Plants 15–75 cm high. Stems solitary or few, longitudinally striate, arachnoid-hairy, often floccose, erect, simple, less often branched in lowermost part, with long branches, leafy only in lower part. Leaves rosulate, petiolate, like cauline leaves usually pinnatipartite or divided; middle cauline leaves sessile or more or less decurrent; uppermost leaves reduced, simple, undivided and entire, often crisped (f. *crispata* Iljin), less often all leaves undivided and entire (f. *integrifolia* Iljin), green, glabrous or weakly arachnoid-hairy, and smooth or scabrous above, grayish or white-tomentose beneath. Capitula solitary, with many florets, medium or large. Involucre usually purple, especially in upper part, sometimes pale green; involucral bracts appressed, but often outer bracts recurved; inner bracts longer, erect, gradually acuminate, all bracts small-toothed-ciliate. Pappus entirely deciduous, short-barbate, almost serrate-barbate, all pappus bristles connate into ring, enclosing more or less cylindrical pappogenus with five-toothed, membranous, sessile, nectary at apex. Achenes 3–4 mm, less often 5 mm long, four-angled, with parallel, discontinuous tuberculate-foveate

ridges, sometimes indistinct and always covered with more or less sessile or short-stalked glandular hairs; corona toothed above along edges, sometimes not developed. Flowering (IV)V–VII; fruiting VI–VIII.

Mountain and subalpine meadows, rocks, especially limestone deposits, steppes.—*Caucasia*: Western, eastern and southern Transcaucasia. *General distribution*: Asia Minor and Iran. Described from Caucasus. Type in Leningrad.

Note. M. Bieberstein, while describing his species under the name *Serratula blanda* MB., reported that this species is distributed throughout the Caucasus, as well as in Southern Russia and Ukraine; this species appears in the second volume of his Flora as *Carduus mollis* and is reported only from Crimea, but in Volume III the author includes this name among the synonyms of *Serratula blanda*. In the herbarium of Bieberstein, plants from the Caucasus, Crimea, Southern Russia, and Ukraine are present on the same sheet under both names. Since the Crimean plants are all similar, it is best to adopt Steven's name, *J. sordida* Stev., for them, which agrees well with the original specimens; the Caucasian plants should be called *J. blanda* (MB.) C.A.M., as reported by Bieberstein for the entire Caucasian region. As regards the Ukrainian and Central Russian plants, the former, evidently, would be *J. mollissima* Klok., and the latter *J. ledebourii* Bge. *J. blanda* (M.B.) C.A.M. is an aggregate of elementary species whose borders cannot be defined at this time.

116. **J. exuberans** (Trautv.) Sosn. in Zhurn. Russk. Bot. Obshch. 11 (1926) 197; Grossh. Fl. Kavk. IV, 173; Schchian in Fl. Gruzii, VIII, 448.—*J. arachnoidea* var. *exuberans* Trautv. in Tr. Peterb. Bot. Sada, V, 1 (1877) 449.

Perennial. Plants very robust, at least 60–70 cm high. Stems erect, somewhat thick, with long branches in lower part, arachnoid-hairy and weakly scabrous like upper leaf surface due to fine papillae; branches spreading upward. Basal and lower cauline leaves gradually narrowed into long winged petiole, erect, 15–25 cm long, less often undivided, usually pinnatipartite, sometimes with linear or lanceolate lobes only in lower part of lamina, lobes directed upward, acute and cuspidate, distant, entire; middle cauline leaves sessile and long-decurrent, with lamina like basal leaves; uppermost leaves linear, almost filiform, undivided and entire, usually bent; all leaves green, somewhat rugose above, gray arachnoid-hairy beneath. Capitula solitary. Outer and middle involucrel bracts recurved, arachnoid-hairy, like inner bracts veined; innermost
671 bracts erect, with scarcely visible appressed bristles on outer side. Receptacle squamose, scales slightly less than half as long as involucrel bracts, smooth, acute. Corolla pink-purple, 12–15 mm long, narrowed

at 3–4 mm, with 5–6 mm long limb. Pappus entirely deciduous, 6–8 long, pappus bristles connate into ring forming cylindrical pappogenus at base, with sessile membranous nectary at truncate apex. Achenes 4–5 mm long, with longitudinal transversely alveolate ribs along edges, with toothed corona above, enclosing dome-shaped pappophorus along edges. Flowering VI(?); fruiting VII.

Alpine zone.—*Caucasus*: Eastern Transcaucasia. Endemic. Described from Atsuntzy from the Khidotan foothills between Khevsuria and Tushetia. Type in Leningrad.

Note. This species was collected only by Radde. Other specimens in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR and the Botanical Institute of Georgia under this name do not belong to it. The specimen collected by Shelkownik from the Abakura Pass, mentioned by D.I. Sosnowsky, could not be seen; apparently, it is present in Armenia.

Series 2. Anatolicae Iljin.—Markings on achenes less sharp and strongly masked by dense glandular hairs, sessile as well as short-stalked.

117. *J. demetrii* Iljin sp. n. in Addenda XXVI, 727.

Perennial. Plants 25–60 cm high, yellowish-green, slender. Stems covered with large, brownish, scaly remains of bases of old leaves, producing long, slender branches from base, angular-striate, with numerous sessile glandular hairs, finely and sparsely arachnoid-hairy. Leaves crowded in lower half of stem; basal and lower cauline leaves on relatively short, winged, petioles, semiamplexicaul like middle leaves, pinnatisect, sessile at base, auriculate and slightly decurrent, segments distant, linear, cuspidate, with brownish, cartilaginous, short, cusp, entire, sometimes involute up to midrib, often arcuately directed upward; upper leaves undivided and entire, almost filiform; all leaves green above, often greenish due to fine, sparse, arachnoid-hairy pubescence, rugulose, scabrous due to cartilaginous tubercles, with sessile glandular hairs in alveolae, and depressed midrib, whitish-grayish beneath due to more dense pubescence, with prominent midrib. Capitula solitary, usually medium, with many florets. Involucre cupuliform, 12–18(20) mm long, slightly arachnoid-hairy only at base, outer rows of bracts recurved, dark green and dark purple-green on outer side, with short, brownish, cartilaginous cusp, erect, and easily breaking off; inner bracts linearly lanceolate, gradually acuminate, purple, brownish above, very distinctly toothed, covered with numerous sessile glandular hairs. Corolla 13–18 mm long, purple, glandular and arachnoid-hairy at some places, gradually narrowed over 5–9 mm, with 5–6 mm long lobes of limb. Pappus deciduous, 10–12 mm long, snow-white, pappus bristles scabrous-barbate

somewhat flat, connate into ring, barbules distinctly shorter than thickness of bristles, very compact in two rows, with pappogenus inside ring on membranous base, with nectary above; achenes 2.5–3 mm long, with toothed corona, longitudinally ribbed along edges, with alternating alveolae and tubercles, sparsely covered with lustrous, sessile or short-stalked, glandular hairs with dome-shaped pappophorus in center. Flowering VI; fruiting VI–VII.

On rocks.—*Caucasus*: Southern Transcaucasia(?). *General distribution*: Asia Minor. Described from the former Karsk Region from a location between Bardu and Promezhutochnyi. Type in Leningrad.

Note. This species differs quite sharply from all other species of this section growing in the USSR in the structure of the achenes as well as in general morphology.

Section 14. Jurinea.—Sect. *Platycephalae* Benth. and Hook. Gen. pl. III (1873) 473; subsect. 2. *Lyratae* Sosn. in Zhurn. Russk. Bot. Obshch. 11 (1926) 195.—§ 3. *Pinnatae* Boiss. (p. p.) Fl. or. III (1875) 572 p. p.—Subsect. *Alatae* Sosn. op. cit. 198.—§ 33. *Decurrentes* DC. Prodr. VI (1937) 675.—Large thistle-like plants with lyrate basal leaves. Pappus of serrate or very short-barbate bristles connate at base into ring, shedding entirely together with pappogenus and nectary. Achenes small, with conical or dome-shaped pappophorus.

Type species: Type of section.

1. Stem strongly winged 118. **J. alata** (Desf.) Cass.
+ Stem not winged 2.
2. Involucral bracts narrow, linear, lax, like in *J. cyanoides*, not prickly and not recurved; achene four-angled, obpyramidal, light brown, with whitish ribs, corona, and hilum ... 121. **J. ruprechtii** Boiss.
+ Involucral bracts two to three times broader, prickly, outer bracts sharply recurved, like in thistles (*C. nutans*); achene different 3.
3. Achenes strongly compressed, two-angled, but four-ribbed, smooth, with dark transverse spots, hilum lateral
..... 120. **J. grossheimii** Sosn.
+ Achenes four-angled, obpyramidal, blackish-brown, with somewhat undulate surface and white-cartilaginous markings of edges
..... 119. **J. spectabilis** Fisch. and Mey.

673 *Series 1. Pterocladae* Iljin—Stem winged.

118. **J. alata** (Desf.) Cass. in Dict. sc. nat. XXIV (1826) 288; DC. Prodr. VI, 675; Ldb. Fl. Ross. II, 2, 762; Boiss. Fl. orient. III, 576;

Grossh. Fl. Kavk. IV, 171; Schchian in Fl. Gruzii, VIII, 448.—*Serratula alata* Desf. Catal. Paris, ed. II (1815) 108.

Perennial. Plants 25–75 cm high. Tap root non-fibrous. Stems solitary from base, less often strongly branched above middle, with long strongly divergent branches, ribbed-sulcate, somewhat arachnoid-hairy, but green, with scattered sessile glandular hairs. Basal leaves petiolate, with more or less winged petiole; lower cauline leaves also petiolate, with broad, entire or often large-toothed wing, strongly decurrent; other leaves sessile, semiamplexicaul and decurrent, stems and branches almost leafless in upper part, with filiform apical leaves; all leaves, except uppermost, gradually acuminate, undivided and mostly entire, lyrate, with large, oval or oblong-oval, large-toothed, obtuse or cuspidate terminal lobe, and usually three to five roundish and obtuse lateral lobes; all leaves green above, greenish-whitish beneath due to fine pubescence. Capitula numerous, with many florets. Involucre hemispherical, arachnoid hairy-pubescent in lower part, six- to eight-rowed, outer rows of bracts narrowly oblong, with recurved herbaceous tips, subobtuse in outer row, others acuminate; inner rows straight, narrowly lanceolate, acuminate; bracts of inner row usually long-aristate, membranous along apical margin; all bracts with three to five (seven) prominent veins (except outer row), densely covered with glandular hairs, and often also with scarcely visible bristles, usually along veins, margins ciliolate, sometimes only in lower part. Receptacle more or less distinctly alveolate, densely covered with long, smooth, acuminate scales, at least up to half as long as involucre. Corolla pink-purple, with sessile glandular hairs, 12–17 mm long, on 5.5–7 mm long stalk, with 3.5–5 mm long lobes; apical appendages of anthers 2.5–3 mm long, gradually acuminate, basal appendages setaceous, 2–3 mm long, usually undivided filaments glabrous. Pappus deciduous, snow-white, 6–7 mm long (excluding two to four prominent bristles), pappus bristles short-barbate, inner row bristles shorter-barbate, flattened, barbules arranged on one side along edge, all bristles connate into ring with extended membranous base, enclosing a glass-shaped nectary with five longitudinal lobes, easily shedding entirely. Achenes usually 4 mm long, obpyramidal, regularly four-angled, blackish-brown, lustrous, deeply rugose, with small-toothed, usually whitish corona at apex and with white ribs, often with two or three-toothed appressed scales only in upper part and along ribs, surrounding smooth dome-shaped pappophorus above. Flowering VI–VIII; fruiting VII–IX.

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Stony xerophytic mountain slopes, limestone deposits, reaching alpine zone.—*Caucasus*: Ciscaucasia. Endemic. Described from Terskaya Region. Type in Paris.

Series 2. Apteræ Iljin—Stem wingless.

119. *J. spectabilis* Fisch. and Mey. in Bull. Soc. Nat. Mosc. VI (1833) 252; Fisch. and Mey. Ind. sem. horti. Petropol. IV, 39; DC. Prodr. VI, 678; Ldb. Fl. Ross. II, 764; Boiss. Fl. or. III, 573; Grossh. Fl. Kavk. IV, 172; Sosn. in Zhurn. Russk. Bot. Obshch. XI, 195.

Perennial. Plants 15–40 cm high, possibly taller, with tap roots. Stems solitary or few, thick, fistular, ribbed-sulcate, green or dirty purple, more or less arachnoid-hairy, densely covered with sessile glandular hairs, branched from base or commonly in upper two-thirds with upward spreading branches, and remains of old leaves at base. Basal leaves numerous, gradually narrowed into flat petiole, basally broadened; cauline leaves short-petiolate, both sinuate-imparipinnate, divided, almost lyrate above; lateral lobes numerous, oblong or oblong-oval, broadly sessile and somewhat narrowed at base, usually sparsely sinuate-toothed, subobtuse, subacute, or cuspidate, opposite or obliquely opposite, fused with winged rachis; terminal lobe often larger, broadly ovate or oblong-ovate, less often undivided, usually deeply divided, sinuate-toothed, fused with lateral lobes; upper cauline leaves lanceolate, toothed, uppermost leaves linear, almost undivided; all leaves strongly rugose above, glabrous, with scattered sessile glandular hairs in alveoli, arachnoid hairy-pubescent along depressed veins, densely white-tomentose beneath, and with dense glandular hairs under tomentum, in shade-loving forms (f. *umbrosa* Iljin) somewhat grayish and distinctly glandular beneath. Capitula 3–6 cm long, solitary, axillary almost from stem base. Involucre 20–30 mm long; outer involucre bracts divaricate and distinctly recurved, acuminate, prickly, arachnoid-hairy, outer bracts single-furrowed (on inner side); innermost bracts also acuminate, erect, with prominent vein, usually with appressed, short, usually purple bristles, sometimes with scattered sessile glandular hairs. Receptacle indistinctly alveolate, alveole surrounded by relatively short more or less basally connate, acuminate, smooth, scales. Corolla pink-purple, covered with sessile glandular hairs, 18–21 mm long, narrowed at 10 mm; apical appendages of anthers 3–3.5 mm long, acuminate, basal appendages usually setaceous, 2–3 mm long; filaments finely tuberculate (magnification $\times 56$); stigma 2–2.5 mm long, divided up to base, with short tuft of bristles at base, modified into papillae above. Pappus colorless, detaching with difficulty, 10–15 mm long, fragile, pappus bristles bent, unequal, and connate into ring. Achenes oblong-obpyramidal, four-angled, blackish-brown or grayish-brown, with whitish cartilaginous markings, especially along ribs, and with whitish rostellum, with weakly undulate surface, glabrous, forming toothed border along edges, with conical pappophorus, 3–4 mm long. Flowering and fruiting V–VII.

High mountain zone, mostly on rocks.—*Caucasus*: Southern and

eastern Transcaucasia. *General distribution*: Iran(?). Described from vicinity of Shusha. Type in Leningrad.

Note. In describing *J. coelestis* Sosn., D.I. Sosnowsky suggested a hybrid (*J. depressa* × *J. spectabilis*) origin for this species. The material examined does not give such an impression, although in its morphology (achenes, pappus, and corolla) it shows a transition from the genus *Jurinella* Jaub. and Spach. to the genus *Jurinea* Cass. A true corona has still not developed; only the upper edges form the toothed border. Formally this species should be assigned to the genus *Jurinea* Cass.

120. ***J. grossheimii*** Sosn. in Grossh. Fl. Kavk. IV (1934) 172.—*J. spectabilis* var. *monocephala* Trautv. in herb.

Perennial. Plants 25–50 cm high or more. Stems erect, cylindrical, branched in upper half, less often simple, sulcate, arachnoid-hairy, with scattered sessile glandular hairs. Basal leaves rosulate, usually lyrate divided or incised, with roundish or broadly ovate, undivided, large-toothed, terminal lobe, with cuspidate teeth or usually divided into three lobes, lateral lobes oblong or obovate, toothed, reduced toward petiole; lamina gradually narrowed into short or longer petiole broadened at base; middle leaves reduced or almost undivided and entire, oblong-lobate, with apical cusp, only uppermost leaves linear, undivided; all leaves green and rugulose above, with sessile glandular hairs in depressions, white-tomentose beneath or densely glandular under tomentum. Capitula few or solitary in single-stemmed plants (f. *monocephala* Iljin), 2.5–4 cm wide, with many florets. Involucre arachnoid-hairy at base or entirely glabrous; outer bracts narrowly lanceolate, green, gradually acuminate, decurved, prickly, innermost bracts erect, long, finely acuminate, purple. Corolla pink-purple, with scattered sessile glandular hairs, 17–20 mm long, narrowed in middle, with 6–7 mm long lobes of limb. Pappus divaricate; pappus bristles fragile, scabrous, connate into ring, exceeding achene several times, two-tiered pappogenus with upper dark purple, discoid part and lower lighter part developed at base of ring, lower part terminating in membranous nectary. Achenes strongly compressed, four-angular, oblong-triangular, 4–5 mm long, glabrous, smooth, dark brown, with few dark transverse striations, and light-colored, equal small-toothed corona at apex, surrounding whitish, flat, dome-shaped lower part of pappophorus with truncate apex, hilum lateral. Flowering and fruiting VI–VIII.

Stony slopes.—*Caucasus*: Eastern Transcaucasia. Endemic? Described from Karabakh, in the vicinity of Shusha Region. Type in Tbilisi.

Note. Grossheim expressed doubt in the *Flora Kavkaza* [Flora of the Caucasus] about the separate status of this species. In his opinion,

this is only a form of *J. spectabilis* Fisch. and Mey. However, these species are similar only in their growth habit, but are quite different in their involucre bracts and the shape of the achenes.

121. ***J. ruprechtii*** Boiss. Fl. or. III (1875) 573; Grossh. Fl. Kavk. IV, 172; Sosn. in Zhurn. Russk. Bot. Obshch. XI, 195.

Perennial. Plants 15–75 cm high. Stem more or less erect, cylindrical, sulcate-finely ribbed, appressed finely arachnoid-hairy, covered with numerous scattered sessile glandular hairs, branched from base; branches elongate and abruptly rising upward. Leaves in basal rosette numerous, usually undivided until development of stem, oval, long-petiolate, later withering, other leaves in rosette lyrate, short-petiolate with large, ovate or roundish, usually entire, terminal lobe and oblong or oval, also usually entire, distant lateral lobes reduced below; cauline leaves not decurrent, lower short-petiolate, incised like basal, upper leaves sessile, narrowed toward base, oblong-obspatulate or less often oblong-oval, usually entire, all leaves green but sparsely arachnoid-hairy above, covered with scattered sessile glandular hairs, white-tomentose beneath, also covered with sessile glandular hairs. Capitula numerous, solitary, less often two or three, terminal on stem and branches, with many florets. Involucre cupuliform, 20–25 mm long, usually six-rowed; involucre bracts linear-narrowly lanceolate, gradually acuminate; outer bracts finely arachnoid-hairy, herbaceous-green in recurved half, usually squarrose; all bracts sharply recurved after fruiting; innermost row of bracts erect, broader, with distinct veins, scarcely toothed along upper margin; all bracts covered with scattered sessile glandular hairs. Receptacle squamose; scales relatively short, smooth, connate almost up to one-third or half of their length and surrounding each alveole. Corolla pink-purple, densely glandular, 12–13 mm long, with 4–5 mm long stalk, and about 2 mm long lobes of limb; apical appendages of anthers acuminate, 2.5 mm long, somewhat divergent; basal appendages sinuate-caudate; filaments glabrous; stigma with short tuft of bristles at base, finely papillate on outer side, about 2 mm long. Pappus about 10(12) mm long, three or four pappus bristles longer and thicker, somewhat fragile, all scabrous, connate into ring, detaching with difficulty. Achene about 3 mm long, obpyramidal, four-angled, lustrous, blackish-brown, whitish-cartilaginous along ribs and corona, weakly cylindrical, often with distinct small teeth along ribs below corona. Corona with all equal small teeth, and with flat dome-shaped pappophorus at apex. Flowering V–VII; fruiting VI–VIII.

In alpine and subalpine zone on limestone and chalk beds.—*Caucasus*: Dagestan. Endemic. Described from the region of Avarskeye Koisu. Type in Leningrad.

Section 15. **Chaetocarpae** (Korsch.) Iljin comb. n.—*Chaetocarpae* Korsh. in Izv. Akad. Nauk, 1, 2 (1894) 126 pro stirpe.—Sect. *Pinnatae* Boiss. Fl. or. III (1875) 572 p. p.—Achenes always with parallel longitudinal ribs on edges, tuberculate, discontinuous and modified into teeth in upper part up to base of toothed corona, usually covered with sessile glandular hairs. Pappus usually barbate, less often scabrous or plumose, deciduous in almost half the species, with pappogenus and nectary; achenes in such cases with pappophorus; weakly connate into ringlet in other half of species, deciduous, some bristles remain attached in such cases, pappophorus not developed, and stem always poorly developed. Leaves usually pinnatipartite, pinnate or lyrate, often decurrent.

Type of section: *J. chaetocarpa* Ldb.

1. Pappus entirely shedding in immature achenes 2.
- + Pappus not deciduous, bristles connate 14.
2. Plants stemless or with short stem; lower leaves as long as or exceeding capitula, sometimes slightly below them; leaves always white-tomentose beneath, usually divided 3.
- + Stem always distinctly exceeding basal leaves 5.
3. All involucre bracts appressed (Isfaram River Valley) 138. **J. densisquamea** Iljin
- + Outer involucre bracts recurved 4.
4. Plants stemless or with scarcely developed stem; outer involucre bracts long and arcuately bent (alpine and subalpine regions of Tien Shan and Pamiro-Alai Region) 136. **J. algida** Iljin
- + Plants always with short developed stem; outer involucre bracts short and arcuately bent (Darvaz) 137. **J. darwasica** Iljin
5. Leaves decurrent 6.
- + Leaves not decurrent 8.
6. Leaves undivided and entire, graminaceous (Kyzyl-Dzhar Region of eastern Fergana) 141. **J. poacea** Iljin
- + Leaves not undivided and not entire 7.
7. Leaves large, oblong-oval or oval, lyrate, long-decurrent; outer involucre bracts recurved; achenes more or less smooth and not glandular 142. **J. baldshuanica** Winkl.
- + Leaves narrow, oblong to linear, occasionally undivided, usually sparsely narrow-lobate or toothed; lower cauline leaves short-decurrent. Outer and middle involucre bracts short-uncately recurved. Achenes densely glandular (vicinity of Issyk-Kul') 132. **J. tianschanica** Rgl. and Schn.
8. All involucre bracts appressed 9.
- + Outer involucre bracts recurved 12.

9. Pappus bristles plumose; outer and middle involucrel bracts imbricate, gradually reduced downward..... 130. **J. lipskyi** Iljin
 + Pappus bristles barbata..... 10.
10. Semishrubs; leaves cord-like, pappus bristles short-barbate and very dense..... 11.
 + Leaves flat, pinnatisect, strongly arachnoid-hairy, leaf segments somewhat sinuate; pappus bristles sparsely barbata (from Muyunkums to almost Ust-Urt)..... 126. **J. multiloba** Iljin
11. Morphologically similar to *J. suffruticosa*. Leaves simple, undivided (eastern Karatau)..... 145. **J. czilikinoana** Iljin
 + Leaves with distant long segments (chalk beds of Aktyubinsk Region)..... 146. **J. fedtschenkoana** Iljin
12. Stem almost leafless, with capitula inclined on one side; leaves filiform; involucrel bracts lax, with fine, slightly recurved, cusp; achenes very densely covered with sessile glandular hairs. 'Bolshie' [Greater] Balkhans 144. **J. spissa** Iljin
 + Stem uniformly leafy, flat; achenes sparsely covered with fine glandular hairs 13.
13. Basal and lower cauline leaves lyrate-divided, others undivided and entire, all leaves very hard; outer and middle involucrel bracts arcuately recurved; achenes covered with longitudinal rows of tubercles ('Malaya' [Lesser] Almaatinka).....
 134. **J. almaatensis** Iljin
 + All leaves pinnatisect, especially white arachnoid-hairy beneath, soft; outer and middle involucrel bracts with long, arcuate, cusps; achenes entirely covered with erect, somewhat stiff, appressed, long, bristles arising from tubercles (Zaisan).....
 122. **J. chaetocarpa** Ldb.
14. Outer involucrel bracts arcuately recurved 15.
 + All involucrel bracts appressed or somewhat lax 18.
15. Stem flat, usually solitary, short; leaves obtusely pinnatilobate, not sinuate; achenes toothed only above, farinose-glandular (Dzhungarian Alatau)..... 127. **J. dshungaria** (Rubtz.) Iljin
 679 + Stem more or less branched, at least in lower part; often flexuous
 16.
16. Leaves sparsely pinnatilobate, with broad, triangular, obtuse or subobtuse lobes, incised, large toothed, with obtuse basal auricles, not sinuate; achenes also farinose (Balkhash Region).....
 124. **J. suidunensis** (Winkl.) Korsh.
 + Leaves pinnatisect, sinuate 17.
17. Outer involucrel bracts arcuately bent (Ust-Urt and northern Turkmenia)..... 123. **J. persimilis** Iljin
 + Outer involucrel bracts filiform, initially appressed, at anthesis and

- especially at fruiting recurved to sides, sometimes also decurved (foothills of Dzhungarian Alatau).....
- 125. **J. margalensis** Iljin
18. Pappus bristles plumose; capitula small, 10–12 mm long and 8–10 mm wide, achenes densely glandular (steppes of Balkhash Region)
- 131. **J. adenocarpa** Schrenk
- + Pappus bristles barbate or scabrous-barbate
- 19.
19. Stem simple, significantly exceeding leaf rosette; leaves undivided, pinnatisect, or less often lyrate
- 135. **J. lanipes** Rupr.
- + Plants different in appearance, without scapelike stem
- 20.
20. Leaves longer than or almost as long as stem
- 21.
- + Stem always longer than basal leaves
- 22.
21. Plants forming pad of sessile capitula on soil, with oblong, pinnatifid or pinnatifid leaves in between; rhizomes vertical, short and approximate, arising from tap root (Tien Shan, near the mouth of Kyzyl-su)
- 140. **J. grumosa** Iljin
- + Stem 8–20 cm high, simple, as long as, slightly longer or slightly shorter than leaves; leaves oblong-oval or oblong-lanceolate, gradually narrowed into petiole (Pamir)
- 139. **J. nivea** Winkl.
22. Strongly branched semishrub, with spatulate, undivided, or toothed or oblong spatulate lobes; leaves petiolate, whitish due to continuous floccose pubescence (chalk beds of western Kazakhstan)
- 143. **J. kirghisorum** Janisch
- + Herbaceous plants, sometimes with developed caudex
- 23.
23. Tall plants with undivided oblong-lanceolate leaves, acuminate and gradually narrowed into petiole (mountain meadows of Tien Shan)
- 133. **J. foliosa** (Iljin) Iljin
- + Leaves pinnatisect
- 24.
- 680 24. Stem strongly branched, with long branches; capitula relatively small; involucre 10–15 mm long; corolla 10–15 mm long (sands of Muyunkuma)
- 129. **J. krascheninnikovii** Iljin
- + Stem simple or with few short branches; capitula cylindrical or cyathiform at anthesis, later almost cupuliform; involucre 18–20 mm long; corolla 15–18 mm long (Sultan-Uiz-Dag)
- 128. **J. longicorollaris** Iljin

122. **J. chaetocarpa** Ldb. Fl. Ross. II, 2 (1845–1846) 756; Boiss. Fl. or. III, 577 excl. spec. alt.; Kryl. Fl. Zap. Sib. XI, 2933; Korsh. in Izv. Akad. Nauk 1, 2, 127; O. and B. Fedtsch. Rast. Turk. IV, 302, spec. semipal.; Iljin in Tr. Turk. Nauchn. Obsch. II, 21.—*Serratula chaetocarpa* Ldb. Fl. alt. IV (1833) 42.—*J. chaetocarpa* var. *typica* Herder in Bull. Soc. Nat. Mosc. XL (1867) 167.—**lc.**: Ldb. Ic. pl. fl. Ross. V, tab. 490.

Perennial. Plants 20–30 cm high, grayish due to arachnoid-hairy pubescence. Stems usually few, simple or somewhat branched, with few leaves. Leaves mainly crowded at base, pinnatisect into oblong-oval or often oblong, subobtuse, and entire lobes or lobes with few short teeth, usually involute and sinuate, grayish on both sides, especially beneath, due to fine arachnoid-hairy pubescence, petiolate; cauline leaves few, smaller, linear, usually undivided, sessile; only lowermost leaves like basal. Capitula solitary, relatively large. Involucre 18–20 mm long and 13–20 mm wide, cupuliform, somewhat concave at base, green; involucre bracts lanceolate; outer and middle bracts floccose-arachnoid-hairy, aristate and deflexed from middle; inner bracts glabrous, erect, acuminate. Receptacle densely squamose; scales one-fifth to one-third as long as involucre. Corolla pink-purple, with about 16–17 mm long lobes of limb. Pappus deciduous when mature, snow-white, 7.5–10 mm long, bristles barbate, with barbules slightly longer than thickness of bristles. Achenes 4.5–6 mm long and about 1.5–2 mm thick, densely covered with appressed, fine, fiber-like hairs above, modified into tubercles, with patellate, somewhat thick, pappophorus and nectary at apex. Flowering V–VI; fruiting VII. (Plate LI, Fig. 3.)

Sandy-stony steppes, stony slopes, and saline desert steppes.—*Soviet Central Asia*: Balkhash Region. *General distribution*: Western Mongolia, Sinkiang. Described from the Zaisan Region. Type in Leningrad.

123. **J. persimilis** Iljin in Bot. Mat. Gerb. Bot. Sada, V (1924) 164; in Tr. Turk. Nauchn. Obshch. II, 22; Fl. Turkm. VII, 225.

681 Perennial. Plants 10–30(40) cm high, floccose-arachnoid-hairy. Stem simple or with few branches, less often strongly branched with long branches (f. *ramosa* Iljin), but usually leafy in lower part. Leaves grayish-green or even whitish due to tomentum, usually concolorous or somewhat dark green above, pinnatisect into linear or oblong-linear, subobtuse lobes, distinctly narrowly sinuate, occasionally almost undivided (f. *indivisa* Iljin); basal and lower cauline leaves petiolate, upper sessile, linear, usually toothed or even undivided along margin. Capitula solitary. Involucre cupuliform, sometimes, especially at anthesis, narrowly cupuliform, 15–20 mm long and 10–18 mm wide. roundish at base or with slight curve, floccose-arachnoid-hairy with lanceolate and linearly lanceolate, acuminate bracts; outer and middle bracts with recurved apices; inner bracts appressed. Receptacle densely squamose; scales short, one-fifth to one-fourth as long as involucre. Corolla pinkish-purple, 15–19 mm long, narrowed over 5–7 mm, with 3.5–5 mm long lobes of limb. Pappus persistent, 7–10 mm long, snow-white, barbate, barbules dense, almost as long as thickness of bristles. Achenes 4.5–6 mm long, less often up to 7 mm (f. *macrachenia* Iljin), obpyramidal, with

longitudinal row of tubercles, connate below, on upper side modified into acute tubercles, with petallate pappogenus at apex, and long nectary in center. Flowering V–VI; fruiting VI. (Plate LI, Fig. 1.)

On chalks, limestones, sandstones, less often sandy steppes, loessy and gravelly loams.—*Soviet Central Asia*: Aralo-Caspian Region (Ust-Urt); Kara-Kum (far west). Described from the Karatau Mountains on the Mangyshlak Peninsula, the city of Aktau and Akmysh. Type in Leningrad.

Note. In the south the species reaches Krasnovodsk. At the northern border of Ust-Urt and Lake Sam and Asmantai it produces forms intermediate to *J. multiloba* Iljin. This species is also known from the northern shores of the Aral Sea.

124. *J. suidunensis* (Winkl.) Korsh. in Bull. Acad. Sc. Pétersb. V, 1 (1894) 128; O. and B. Fedtsch. Perech. Rast. Turk. IV, 301; Iljin in Tr. Turk. Nauchn. Obshch. II, 23.—*J. pollichii* var. *suidunensis* Winkl. in herb. and in Korsh. op. cit.

Perennial. Plants 25–70 cm high. Stem branched, mainly in lower half, with long branches, floccose-arachnoid-hairy, leafy, predominantly in lower half. Leaves pinnatilobate or pinnatipartite, with broadly triangular or oblong, obtuse or subacute lobes, finely arachnoid hairy-pubescent above, grayish beneath due to fine tomentum; basal and lower cauline leaves gradually narrowed into petiole; upper leaves undivided, sessile, usually with obtuse auricles. Capitula solitary. Involucre 17–25 mm long and 15–20 mm wide, mildly bent at base, floccose-arachnoid-hairy in lower part at some places, glabrous in upper half, with light purple tinge; involucre bracts lanceolate, acuminate, outer bracts recurved, inner finely acuminate, straight. Receptacle densely squamose; scales one-fourth to one-third as long as involucre. Capitula pinkish-purple, covered with glandular hairs, 15–19 mm long, narrowed over 5.5–7 mm, with 4–5.5 mm long lobes of limb. Pappus persistent, snow-white, 8–10 mm long, barbate, barbules as long as thickness of bristles. Achenes 5–6 mm long, covered with discontinuous parallel ribs, modified into acute tubercles above; with toothed edges at tip; pappophorus two-tiered; lower tier of small membranous ring fused with base of pappus bristles, and upper tier petallately thickened, enclosing nectary. Flowering V; fruiting VI.

Hummocky sands, saxaul [*Haloxylon ammodendron*] forests.—*Soviet Central Asia*: Balkhash Region (eastern part). *General distribution*: Sinkiang. Described from Suidun in Kuldzha Region. Type in Leningrad.

125. *J. margalensis* Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 22, Plate IV.

Perennial. Plants up to 40 cm high, floccose-arachnoid-hairy. Stem erect, usually branched, less often simple, leafless in upper half. Basal leaves numerous, like lower cauline leaves, petiolate, pinnatisect into oblong or oblong-linear, subobtuse sinuate lobes, middle leaves sessile, uppermost undivided, linear-filiform, all leaves thin, sparsely tomentose beneath, green above, floccose-arachnoid-hairy at some places. Capitula solitary. Involucre cupuliform, depressed at base, 12–15 mm long at fruiting and up to 20 mm wide, glabrous, green, only slightly floccose-arachnoid-hairy at base; involucre bracts lanceolate or linearly lanceolate, acuminate; outer and middle bracts with recurved apices; inner bracts appressed. Receptacle densely squamose; scales relatively short, up to one-third as long as involucre or slightly longer, but not reaching its half. Corolla pink-purple, 14–15 mm long, narrowed over 5–6 mm, with 3–4 mm long lobes of limb. Pappus persistent, snow-white, 10–12 mm long, barbate, with barbules two to three times as long as thickness of bristles. Achenes 5–6 mm long, oblong, obpyramidal, with slightly projecting discontinuous ridges, modified at apex into acute tubercles, covered with fine sessile glandular hairs, and with border of toothed corona above along edges, with two-tiered pappophorus inside; outer tier lobate, small-toothed, compactly fused, and fleshy, olive-brown, inner tier appressed to entirely membranous pappus base; nectary very large, columnar, membranous, twisted at apex, surrounded by the fleshy part of pappophorus. Flowering V–VI; fruiting VII–VIII.

Sandy steppes, stony semideserts.—*Soviet Central Asia*: Balkhash Region. Endemic. Described from the Margaly area near the Ili River. Type in Leningrad.

Note. The species was named *J. nargalensis* Iljin mistakenly in place of *J. margalensis*, as this species is named after the Margaly area.

126. **J. multiloba** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 11–12 (1924) 2; in Tr. Turk. Nauchn. Obsch. 2, 22.

683 Perennial. Plants 15–40 cm high, with branched, floccose-arachnoid-hairy stems. Leaves oblong, pinnatisect, grayish arachnoid-hairy on both sides, especially beneath; segments oblong, with uniformly broad rachis, and like latter, slightly involute and somewhat sinuate; basal leaves numerous, more or less petiolate; upper cauline leaves sessile. Capitula on long peduncles, with involucre at anthesis up to 15–20 mm long and 10–17 mm wide. Involucre bracts floccose-arachnoid-hairy, less often glabrous, and, besides, very distinctly appressed-hairy; outer bracts ovate or oblong-ovate, middle and inner bracts linear, all middle bracts acuminate. Corolla pink-purple, 14–16 mm long, narrowed over 5 mm and with 4 mm long lobes of limb. Pappus entirely persistent, snow-white, barbate, with barbules almost as long as thickness of bristles.

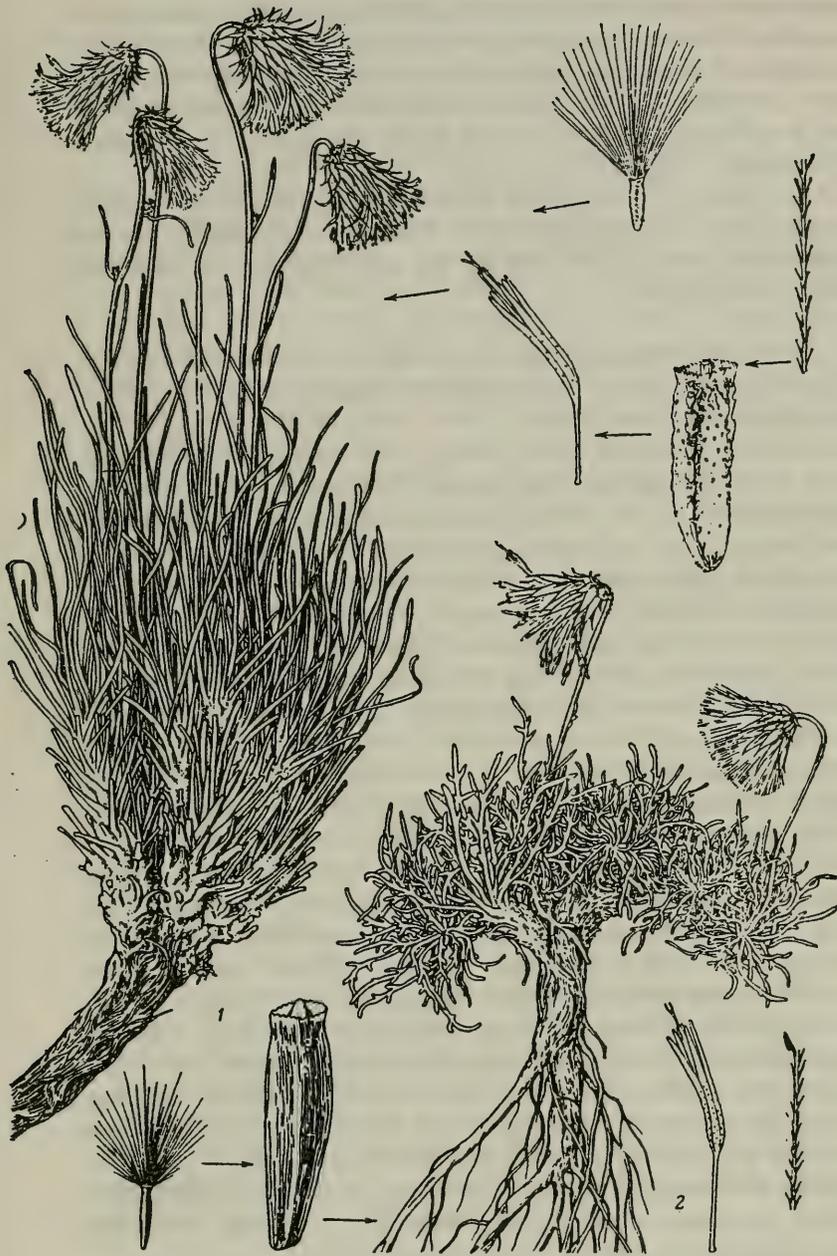
Achenes 5–6 mm long and 1.5–2 mm thick, with small-toothed border, edges tuberculate, modified in upper part into short appressed spinules, on lower side connate into discontinuous ridges, with fleshy, broadly cupuliform pappophorus at apex enclosing nectary.

On chalk slopes, limestone deposits, sands, sandy and wormwood-covered steppes.—*Soviet Central Asia*: Aralo-Caspian Region, Balkhash Region; Tien Shan (western); Kyzyl-Kum (Sultan-Uiz-Dag). Endemic. Described from Bil-Aran Mountain, a short distance from the northern coast of the Aral Sea. Type in Leningrad.

Subsp. **aulieatensis** Iljin comb. n.—*J. multiloba* var. *aulieatensis* Iljin in Bot. Mat. Gerb. Bot. Sada, V, 11–12 (1927) 3; Iljin in Tr. Turk. Nauchn. Obshch. II, 22.—Mainly grows in the Dzhabul Region, preferring stony and gravelly places; differs by the achenes that have distinctly white-cartilaginous peripheral ribs, with dome-shaped pappophorus at the tip ending with a nectary, an entirely deciduous pappus, and the pappus hairs that are connate into ring (an sp. nov.?).

127. **J. dshungarica** (Rubtz.) Iljin comb. n. hoc loco.—*J. chaetocarpa* Ldb. subsp. *dshungarica* Rubtz. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VIII, 4–9 (1940) 65.

684 Perennial. Plants usually 10–25 cm high, with rather dense caudex covered with fine scales of remains of petiole bases, with woolly globules in axils. Stem solitary, erect, simple, floccose-arachnoid-hairy, striate covered with scattered sessile glandular hairs. Basal leaves petiolate, with larger terminal lobe; lateral lobes three to seven, ovate, roundish or oblong, obtuse, usually entire, simple and sessile, absent in upper one-third part; all leaves grayish-green above with fine arachnoid-hairy coating, weakly rugose, with scattered, fine, sessile glandular hairs, white-tomentose beneath. Capitula with many florets, 15–20 mm wide. Involucre broadly cupuliform, about 15 mm long; outer and usually middle involucre bracts green or pale green, usually floccose-arachnoid-hairy with sparse sessile glandular hairs, one- to three-veined, slightly bent at tip; inner bracts oblong-linear, gradually acuminate, bright purple, usually with three veins, finely ciliate and involute, on outer side arachnoid-hairy pubescent and with scattered sessile glandular hairs, 14–16 mm long, narrowed over 5.5–7 mm, with 4–6 mm long lobes of limb. Pappus about 10–12 mm long, persistent; pappus bristles weakly connate into ringlet, readily shedding, barbate, with barbules slightly longer than thickness of bristles, usually approximate, becoming longer toward upper side, two to three times as long as thickness of bristles, structure at base of pappus with five-toothed, small, membranous nectary and membranous border separating from flat-dome-shaped pappophorus.



Achenes about 5 mm long, grayish or grayish-olive, matty, with corona along upper edge having approximate teeth on pale ribs discontinuous in upper part, and with short cusps, edges with scarcely projecting, parallel, discontinuous ribs, entirely covered with fine sessile glandular hairs, less often light-colored, usually matty, almost farinose. Flowering V–VI; fruiting VI–VIII.

Loess loams on the slopes of the Dzhungarian Alatau.—*Soviet Central Asia*: Dzhungarian Alatau. Endemic. Described from the Borokhudzhir River Valley from the Ku area. Holotype in Alma-Ata; isotype in Leningrad.

128. **J. longicorollaris** (Iljin) Iljin comb. n.—*J. multiloba* Iljin var. *longicorolla* Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 22.—*J. chaetocarpa* auct. fl. As. Med.

Perennial. Plants 10–25(30) cm high. Stems solitary or usually few, simple or short-branched, longitudinally striate, distinctly floccose-arachnoid-hairy. Leaves oblong; basal leaves numerous, with petioles shorter than lamina, and woolly globules in axil, like lower and middle cauline leaves, pinnatisect or pinnatipartite, less often lobate or almost undivided, with oblong, oval or oblong-ovate segments and lobes, almost obtuse, less often subacute, segments obtusely-toothed, usually slightly sinuate, fused with narrow wing of rachis; uppermost leaves sessile, toothed or almost entire; all leaves soft due to pubescence grayish-green above due to arachnoid-hairy pubescence, whitish beneath due to more dense arachnoid-hairy tomentum. Capitula terminal on main stem and 686 branches, solitary, with many florets, (10)12–15 mm wide. Involucre entirely arachnoid-hairy, floccose-arachnoid-hairy in lower part, poculiform at anthesis, 18–20 mm long; all bracts appressed, usually three-veined, with short cusp, later slightly recurved; innermost bracts oblong-lanceolate, prominent, gradually almost acuminate aristate, with sessile glandular hairs on inner side. Corolla 15–18 mm long, light pink, with sessile glandular hairs, gradually narrowed over 5–6 mm, with 3.5–4 mm long lobes of limb; apical appendages of anthers 3–3.5 mm long. Pappus persistent, snow-white, together with two prominent, 10–12 mm long, bristles; bristles short-barbate, barbules sparse, readily shedding. Achenes ferruginous, 5–6 mm long, with low, toothed-prickly, corona above along edges, with poculiform thickened pappophorus inside, enclosing membranous five-lobed nectary on short stalk; achenes with tubercles along edge, modified into spinules above, gradually obliterated below. Flowering V; fruiting V–VI. (Plate LI, Fig. 2.)

Stony mountain slopes, rocks, pebbly deserts.—*Soviet Central Asia*: Kyzyl-Kum (Karakalpakia). Endemic of the Sultan-Uiz-Dag Range. Described from the Sultan-Uiz-Dag Range.

Note. It is impossible to retain as the type the now fragmentary specimen from the collections of M.G. Popov from which this species was described as var. *longicorolla* Iljin, and I am selecting Muravlyanskii's specimen as the holotype.

129. **J. krascheninnikovii** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 11–12 (1924) 165, in Tr. Turk. Nauchn. Obshch. I, 23.

Perennial. Plants 15–45 cm high, entirely grayish-green due to sparse arachnoid-hairy tomentum, especially leaves beneath, forming dense turf of short caudices, woolly-tomentose in axils of old petioles. Stems few, branched. Leaves oblong, pinnatisect, with oblong or linear segments, narrowly involute and usually finely sinuate, almost as wide as middle undivided part; basal leaves numerous, like lower cauline leaves petiolate; upper leaves sessile, linear, undivided, gradually disappearing above. Capitula numerous, smaller, solitary, about 20 mm long including florets. Involucre narrowly cupuliform, 10–15 mm long and 5–12 mm long bracts, slightly floccose-arachnoid-hairy, roundish below. Receptacle densely squamose; scales one-third to two-fifths as long as involucre. Corolla small, pink-purple, covered with glandular hairs, 10–15 mm long, narrowed over 3.5–6 mm; with 2.5–4 mm long lobes of limb. Pappus persistent, snow-white, 8–10 mm long, barbate, with dense barbules almost as long as thickness of bristles. Achenes 6–7 mm long, oblong, not glandular, with elongate discontinuous ridges, modified above into spinulose tubercles, with broadly cupuliform pappophorus above corona, with oblong, narrow, five-toothed nectary in center, compactly surrounding fleshy clavate part. Flowering VI–VII; fruiting VI–IX.

687 Sandy steppes, alluvial sands, sandstone outcrops.—*Soviet Central Asia*: Balkhash Region, Aralo-Caspian Region (Far East). Endemic. Described from the lower reaches of the Sarysu River in Muyunkum. Type in Leningrad.

Note. I described var. *arenicola* Iljin (= *J. arenicola* Iljin l.c.) from the Muyunkum sands, growing on hummocky sands, as a sharply marked variety. It could be recognized as an entirely separate, young species, distinguished by having a more dense tomentum, especially on the involucre, more elongate and loosely disposed caudices, and more distant leaf segments, the leaves sometimes being almost undivided. It was described from the vicinity of Dzheras-Kuduk. The pappus and pappophorus are like those of the type specimen, but the achenes are about 1.5 mm thick, with glandular hairs.

130. **J. lipskyi** Iljin in Tr. Turk. Nauchn. Obshch. 2 (1925) 23, Pláté V.

Perennial. Plants up to 50 cm high, with erect, long-branched or almost unbranched, weakly floccose-arachnoid-hairy stems. Basal leaves

numerous, like lower cauline leaves petiolate, pinnatisect into oblong, somewhat sinuate, somewhat narrowly involute, and usually subobtusate lobes; middle leaves less divided, upper leaves linear or almost filiform, undivided; all leaves somewhat hard, finely gray-tomentose beneath, green, and glabrous or weakly arachnoid-hairy pubescent. Capitula solitary. Involucre cupuliform, with florets 12–16 mm long and 12–17 mm wide, depressed at base, almost glabrous or slightly arachnoid-hairy below, with appressed, lanceolate and linearly lanceolate acuminate bracts. Receptacle covered with long bristles up to half as long as involucre or slightly longer. Corolla pink-purple 15–27 mm long, narrowed over 4.5–5.5 mm, with 4–5 mm long lobes of limb, with sessile glandular hairs. Pappus entirely deciduous, up to 10 mm long, snow-white, plumose, with barbules three to four times as long as thickness of bristles, bristles connate at base into ring. Achenes 6–7 mm long, gray, oblong-obpyramidal, with parallel, elongate, discontinuous ridges, modified above into two or three acute spinulose tips, with sessile glandular hairs in between ridges and at tips of spinules; corona cuspidate, slightly recurved above along edges, with flat pappophorus inside, modified into narrowly conical tip, with columnar nectary, terminating in fine, membranous, five-toothed apical lobe. Flowering V–VI; fruiting VII.

Wormwood or feather-grass steppes.—*Soviet Central Asia*: Balkhash Region, Dzhungaria-Tarbagatai (Dzhungarian Alatau); Tien Shan (Tekes). Endemic. Described from the vicinity of Kopal. Type in Leningrad.

131. **J. adenocarpa** Schrenk, Enum. pl. nov. I (1841) 46; Ldb. Fl. Ross. II, 2, 765; Boiss. Fl. or. III, 578; Korsh. Izv. Akad. Nauk. 1, 2, 127.—*J. chaetocarpa* var. *adenocarpa* Herd. in Bull. Soc. Nat. Mosc. XL, 167; O. and B. Fedtsch. Perech. Rast. Turk. IV, 303; Iljin in Tr. Turk. Nauchn. Obsch. II, 23.

688 Perennial. Plants 15–40 cm high, weakly grayish-green, with densely crowded and woolly-tomentose caudices at base, many-stemmed. Stem branched, floccose-arachnoid-hairy. Leaves pinnatipartite or pinnatisect, petiolate, with oblong or linear, subobtusate segments, often narrowly sinuate, floccose-arachnoid-hairy on both sides, especially beneath; basal leaves numerous; upper cauline leaves sessile, linear, undivided, acuminate. Capitula more or less numerous, small, solitary. Involucre weakly floccose-arachnoid-hairy, 10–12 mm long and 8–12 mm wide, cupuliform, roundish at base, involucre bracts broadly lanceolate to linearly lanceolate, all appressed, green; innermost bracts weakly purple along margin. Receptacle densely covered with bristles, one-third to two-fifths as long as involucre. Corolla pink-purple, covered with glandular hairs, short, 10–14 mm long, narrowed over 3.5–6 mm, with

short, 2–3 mm long limb. Pappus persistent, snow-white, 8–10 mm long, barbate-plumose or plumose, with barbules three to six times as long as thickness of bristles. Achenes 4.5–6.5 mm long, oblong, with dense sessile glandular hairs, longitudinal discontinuous ridges and apically appressed cusps, modified into sharp spiniform tubercles above. Flowering V–VIII; fruiting VII–IX.

Hummocky sands, approaching sandy steppes, less often on gravelly slopes.—*Soviet Central Asia*: Balkhash Region, Dzhungaria-Tarbagatai (Dzhungarian Alatau, rare). Endemic. Described from Balkhash Region, Ayaguz Region, near Arganaty Mountains.

Note. S.A. Nikitin collected sharply differing specimens of this species under two numbers from the lower reaches of the Ili River on hummocky sands in the Randa-Tugai area. I have referred them to var. *latifolia* Iljin var. nov.

132. *J. tianschanica* Rgl. and Schm. in Tr. Peterb. Bot. Sada, VI (1880) 322; Trautv. *ibid.*, VIII, 2, 513; O. and B. Fedtsch. *Perech. Rast. Turk.* IV, 301; Iljin in Tr. Turk. Nauchn. Obsch. II, 24.

Perennial. Plants 15–50 cm high. Stems few, usually erect, angular in lower half, cylindrical above, branched, with branches straight, upward spreading in lower half or one-third, ribbed-barbate, grayish arachnoid-hairy, less often almost green (f. *glabrescens* Iljin) and covered with fine, scattered, sessile glandular hairs, with many leaves, except below capitulum; basal and lowermost cauline leaves narrowed gradually in a short petiole; cauline leaves sessile, very short-decurrent, with entire wings, usually narrow-oblong, often appressed, almost undivided and entire, or usually sparsely sinuate-toothed or broadly sinuate-toothed, with obtuse apex, sometimes pinnatilobate or pinnatipartite, with short cuspidate upcurved lobes, narrowly involute, usually green, weakly rugose above, with fine sessile glandular hairs and depressed midrib, whitish-grayish beneath due to more or less dense arachnoid-hairy tomentum, occasionally concolorous, canescent (f. *canescens* Iljin); uppermost leaves 689 filiform. Capitula with many florets. Involucre cupuliform, 12–15 mm long, imbricate, five-rowed, arachnoid-hairy in lower half; outer involucre bracts somewhat pale, with prominent midrib and dark green weakly fleshy, subobtuse or short-cuspidate, uncately bent apex, sometimes with purple tinge; all other bracts entirely appressed; middle bracts lanceolate, acuminate, dark purple, with three to five prominent veins, scarcely visible ciliolate along margin, like innermost bracts, densely covered on outer surface with large sessile glandular hairs; innermost bracts acuminate with brownish cusp. Receptacle squamose; scales acuminate, one-fifth to one-fourth as long as involucre. Corolla raspberry-red, 13–17 mm long, narrowed over 4.5–6 mm, with 3–4 mm

long lobes of limb, covered with fine sessile glandular hairs; apical appendages of anthers abruptly narrowed into thin, 2.5–3 mm long, cusp, basal appendages setaceous, divided, 2.5 mm long; filaments almost smooth; style glabrous, usually purple; stigma about 1.5 mm long, divided, almost up to base into divergent papillate branches, with tuft of short erect bristles at base. Pappus always smoky, slightly longer than achene, excluding two or three prominent bristles, arranged in few rows, shorter toward outside and connate into ring, easily shedding on maturation of achenes, bristles short-barbate, with barbules equal to or two times as long as thickness of bristles, oblique and dense. Achenes 3–4(5) mm long, obpyramidal, four-angled, with toothed corona at tip, and longitudinal discontinuous parallel rows of tubercles along edges below corona modified into one or two, or three toothed tip, densely covered, especially above, with lustrous sessile glandular hairs, light brownish, with flask-shaped pappophorus at apex terminating in stalked nectary exerted from pappus ring. Flowering VII–VIII; fruiting VIII–IX.

Stony slopes.—*Soviet Central Asia*: Tien Shan (center), Pamiro-Alai. Endemic(?). Described from the vicinity of Lake Issyk-Kul. Type in Leningrad.

133. **J. foliosa** (Iljin) Iljin comb. nov.—*J. lanipes* subsp. *foliosa* Iljin in *Izv. Glavn. Bot. Sada*, XXVII, 1 (1928) 83.

Perennial. Plants 30–60 cm high. Stems usually few, erect, simple, weakly floccose-arachnoid-hairy, especially above, leafy up to middle or slightly below. Leaves lanceolate, petiolate, petiole longer in basal and lower cauline leaves, acuminate, undivided and entire, less often weakly lyrate, with narrow, acuminate terminal lobe and few, small, distant lateral lobes, green and subglabrous above, grayish-green beneath due to very fine arachnoid-tomentum. Capitula solitary. Involucre 15–25 mm wide, glabrous or subglabrous; involucre bracts almost equal, linearly lanceolate, acuminate; middle and outer bracts weakly recurved-sinuate, herbaceous-green. Corolla 15–20 mm long, pink-purple, narrowed over 5–7 mm, with 4–5 mm long lobes of limb. Pappus entirely persistent or less often deciduous, snow-white, barbate, with barbules almost as long as or slightly shorter than thickness of bristles; bristles weakly connate in a ring, partly persistent on achene. Achenes 6–7 mm long, toothed-fimbriate, tuberculate-spiny in upper half, with tubercles in longitudinal rows and connate at base, with broadly cupuliform, sinuate, whitish, pappophorus at apex inside corona, somewhat dome-shaped in center and terminating with small nectary that sometimes penetrates through pappus ring and then fused with ringlet by membranous base. Flowering VI–VII; fruiting VI–VIII.

Steppe, meadow-steppe and stony mountain slopes.—*Soviet Central Asia*: Tien Shan (eastern). Endemic. Described from Alma-Ata Region, from the Aleksandrovskii Range, from Shekul Mountain. Type in Leningrad.

134. *J. almaatensis* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VI, 3 (1937) 58.

Perennial. Plants 25–40 cm high, many-stemmed. Stems arising from caudices covered with remains of petioles of basal leaves, branched only in lower half, leafless in upper half. Leaves somewhat hard, bright green and glabrous above, greenish beneath due to somewhat arachnoid-hairy pubescence, more dense in lower leaves; basal and lower cauline leaves narrowed into more or less long petiole, lyrate or almost pinnatisect, with oblong or lanceolate terminal lobe and one to three pairs of oblong, remote lateral lobes, others entire or with one or two teeth in lower part, oblong; all leaves narrowed toward base, uppermost linear. Capitula solitary. Involucre cupuliform, about 15 mm long and 15–18 mm wide, almost glabrous; outer and middle bracts recurved. Receptacle squamose; scales almost half as long as involucre. Corolla about 18–20 mm long, narrowed over 6–7 mm, with 4–5 mm long limb. Pappus deciduous, barbate, with barbules almost one and one-half times as long as thickness of bristles; bristles connate into ring at base, surrounding nectary at base. Achenes 5–6 mm long, covered with sharp scales (tubercles), especially along ribs, in longitudinal rows, connate at base; pappophorus narrowly conical, modified at apex into stalk terminating with nectary.

Rocks.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the Trans-Ili Alatau, from the Malaya Almaatinka River. Type in Leningrad.

135. *J. lanipes* Rupr. ex Osten-Sacken and Rupr. in Mém. Acad. Pétersb. sér. VII, XIV, 4 (1869) 58; Korsh. in Bull. Acad. Sc. Pétersb. V, 1, 126; O. and B. Fedtsch. Perech. Rast. Turk. IV, 301; Trautv. in Tr. Peterb. Bot. Sada, VIII, 1, 310; Iljin in Tr. Turk. Nauchn. Obshch. II, 28.

Perennial. Plants 15–60 cm high, with solitary or few erect and simple branches (exception, single branch at extreme base), floccose-arachnoid-hairy, almost leafless stems. Leaves usually green above, also weakly arachnoid-hairy, with depressed veins, sparsely tomentose beneath, sometimes almost entirely tomentose when young, weakly sinuate and very narrowly involute, pinnatisect into oblong or oblongly linear obtuse lobes (f. *pinnatipartite* Korsh.) or lyrate (sometimes mixed with undivided leaves) below, short-petiolate; uppermost leaf usually

filiform; basal leaves usually numerous. Capitula solitary, relatively large. Involucre cupuliform, with depressed base, 15–20 mm long and wide, green or floccose-arachnoid-hairy with long and finely acuminate, lanceolately linear, appressed bracts; innermost bracts often with purple tinge and revolute in upper part. Receptacle densely covered with bristles about one-third as long as involucre. Corolla purple, covered with sessile glandular hairs, 15–24 mm long, narrowed over 4–9 mm, with 3–6 mm long lobes of limb, less often shedding entirely, usually with partly persistent bristles below pappophorus. Pappus white, 8–10 mm long, densely barbate, with barbules approximately as long as thickness of bristles. Achenes 5–6 mm long, oblong-obpyramidal, with parallel discontinuous ridges modified into acute tubercles above, with toothed corona above, enclosing flask-shaped pappophorus with neck, exerted from opening of ring and fused with it, encircling tip, and terminating with five-lobed nectary. Flowering VI–VIII; fruiting IV–IX.

Alpine and subalpine forest meadows, loessy mounds, stony and rocky habitats.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai Region. *General distribution*: Dzhungaria-Kashgaria (Sinkiang). Described from central Tien Shan. Type in Leningrad.

Note. Korshinsky distinguished the following varieties with corresponding synonyms: var. *typica* Korsh. l.c. (*J. arachnoidea* × var. *lyrata* Winkl. in herb. and Korsh. l.c.).—Leaves lyrate, divided, sometimes mixed with undivided leaves; var. *pinnatipartita* Korsh. l.c. (*J. chaetocarpa* var. *macrantha* Herder in Rgl. and Herd. Bull. Soc. Nat. Mosc. XL (1867) 167).—Leaves pinnatisect.

136. **J. *algida*** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 11–12 (1924) 170; Iljin in Tr. Turk. Nauchn. Obshch. II, 26.—*J. depressa* O. and B. Fedtsch. Perech. Rast. Turk. IV, 304, non al.

Perennial. Plants 2–10 cm high, mostly stemless or with very short stems. Leaves oblong or lanceolate, obtuse or subacute, undivided (f. *integrifolia* Iljin), lyrate (f. *lyrata* Iljin) or pinnatipartite (f. *pinnatifolia* Iljin), less often lobed, entire, finely arachnoid-hairy above, gray or grayish-whitish beneath due to tomentum, gradually narrowed into petiole. Capitula usually sessile. Involucre 15–20 mm long and 12–20 mm wide, green, often with purple tinge above; outer and middle involucre bracts not strongly arachnoid-hairy, distinctly recurved in upper 692 herbaceous, half or two-thirds, part; innermost bracts almost glabrous, appressed, acuminate, narrowly membranous-fimbriate along margin. Receptacle squamose; scales short, connate at base, smooth, acuminate, one-sixth to one-fifth as long as involucre. Corolla pink or pale pink-purple, 15–20 mm long, narrowed over 6–8.5 mm, with 3.5–5 mm long lobes of limb, covered with sessile glandular hairs. Pappus entirely

deciduous on maturation, snow-white, 13–16 mm long; pappus bristles short-barbate, barbules distant, all bristles connate into dense ringlet, surrounding nectary at base, fused with membranous roundish base, dropping off on maturation. Achenes 6–7 mm long and 2 mm wide, glabrous, smooth, lustrous, brownish, longitudinally striate, striations tuberculate, with toothed corona above along edges enclosing conical pappophorus modified above columnar structure, terminating with somewhat five-lobed nectary with recurved lobes. Flowering VII–IX; fruiting VIII–IX.

Stony, rubbly, gravelly slopes, as well as in juniper zone, in subalpine and alpine zone.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai Region. Endemic. Described from Karabulak, on the basis of collections of O. Fedtschenko (subsp. *fetissowii* (Winkl.) Iljin) from the Pamiro-Alai Region, in the Karakol Region (subsp. *kuschakewiczii* (Winkl.) Iljin).

Note. Two races can be noted: the one, indigenous to the Tien Shan Mountain system, *J. algida* subsp. *fetissowii* (Winkl.) Iljin (in *Tr. Turk. Nauchn. Obshch.* II (1925) 26).—Pappus bristles scabrous or scabrous-barbate; and the other, growing in the Pamiro-Alai Mountain system, *J. algida* subsp. *kuschakewiczii* (Winkl.) Iljin l.c.—Pappus barbules one and one-half to three times as long as thickness of bristles.

137. *J. darvasica* Iljin in *Izv. Tadzh. Bazy Akad. Nauk SSSR*, 1, 1 (1933) 66.

Perennial. Plants caespitose, 10–20 cm high, having caudices covered with remains of old leaves. Stems usually numerous, arachnoid hairy-tomentose, simple or weakly branched, erect or often ascending, slightly exceeding leaves. Leaves lyrate divided, with large oblong-oval or oblongly obtuse terminal lobe and one to three pairs of lateral, small, distant lobes, matte-green and glabrous above, sparsely grayish-tomentose beneath; basal leaves numerous, like lower cauline leaves, petiolate, other leaves less numerous, reduced, almost undivided, sessile. Capitula with hemispherical involucre, 15–17 mm long and wide; outer and middle bracts lanceolate, acuminate, appressed, purple, almost glabrous. Corolla pink, 20–22 mm long, narrowed over 8–10 mm, with about 4 mm long lobes of limb; basal appendages of anthers setaceous, 2.5–3 mm long. Pappus deciduous, snow-white, barbate, with barbules two to three times as long as thickness of bristles; bristles, connate into ring. Achenes 693 spinulose, toothed above, almost with bottle-shaped pappophorus in center of corona, with five-toothed nectary at tip of column piercing through ring opening.

Stony mountain slopes.—*Soviet Central Asia*: Pamiro-Alai Region.

Endemic. Described from Darvaz, from a place between Dashtak and Kergovat. Type in Leningrad.

138. **J. densisquamea** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 11–12 (1924) 169; Iljin in Tr. Turk. Nauchn. Obshch. 2, 20.

Perennial. Plants short, 10–15 cm high, caespitose with many-headed caudex, many-stemmed. Previous year's stems reduced, woolly-tomentose, densely covered with scales at base, narrowed toward apex, woody; stems of current year simple or with few branches, slender, with erasing arachnoid-hairy pubescence, arachnoid hairy-tomentose at base and below capitulum. Leaves oblongly lanceolate or lanceolate, pinnatifid, less often pinnatisect or sometimes mixed with undivided leaves (usually lower leaves), acute or subobtusely, gradually narrowed toward base into petiole, broadened at base; uppermost leaves small, linear, sessile; all leaves greenish, somewhat arachnoid-hairy and rugulose above, gray or whitish, arachnoid hairy-tomentose beneath. Capitula solitary, poculiform, about 20 mm long (including florets). Involucre weakly floccose-arachnoid-hairy, mainly glabrous or subglabrous below, usually green, up to 15 mm wide above; involucre bracts five- or six-rowed, reduced toward outside, acuminate, obliquely membranous-fimbriate along margin; inner bracts usually with pink-purple tinge; all bracts with almost indistinct veins, appressed. Receptacle densely covered with more or less short, smooth, bristles. Corolla pale-pink, covered with scattered glandular hairs, especially in lower part, 17–18 mm long, narrowed over 5–6 mm, with about 4 mm long limb; anther appendages setaceous, 2–2.5 mm long; filaments smooth. Pappus snow-white, deciduous, less often few outermost bristles persistent, barbate, about 15 mm long, with barbules two to three times as long as thickness of bristles, dense; bristles connate into compact ring or, more precisely, short tube enclosing urceolate nectary. Achenes 5.5–6 mm long (not fully mature), obpyramidal, toothed above, along edges, with longitudinally arranged tubercles above on outer side, terminating with very short spinules at apex, decurrent at base and in lower part of achene modified into discontinuous, longitudinal, fused folds, absent in lower side, with whitish conical pappophorus at apex, nectary piercing through pappus ring. Flowering V(?)–VI; fruiting VI–VII.

Stony places.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from the Isfairam River Valley between the mouth of the Surma-Tash River and Lyanger area. Type in Leningrad.

694 139 **J. nivea** Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 321; O. and B. Fedtsch. Perech. Rast. Turk. IV, 300; Iljin in Tr. Turk. Nauchn. Obshch. II, 21.

Perennial. Plants 8–20 cm high; tap root bearing many-headed caudex, continued into short vertical rhizomes covered with membranous, yellow, scaly, remains of old leaves in axils and woolly globules. Stems few, erect, simple or with isolated branched at base, cylindrical, floccose, and whitish arachnoid-hairy, finely-sulcate. Basal and lower cauline leaves and leaves on vegetative shoots oblong-oval, obspatulate or less often oblong, undivided and entire, occasionally lowermost leaves with distant, obtuse, short lobes, cuspidate, gradually narrowed into petiole, broadened at base, rugulose, with somewhat depressed midrib, grayish-green above due to fine tomentum, whitish beneath due to more dense arachnoid-hairy tomentum, with prominent yellowish midrib; upper leaves narrower, sessile, narrowed toward lower side, smaller. Capitula solitary terminal on branches, many-flowered. Involucre cupuliform, 18–22 mm long, floccose-arachnoid-hairy; outer bracts green, oblong, short-cuspidate; middle bracts lanceolate, acuminate, with less prominent veins, somewhat ciliate, with sessile glandular hairs, purple, like innermost bracts, gradually narrowed, acuminate, broadly membranous; middle and usually outer bracts arcuately recurved. Receptacle squamose; scales long, very broad, acuminate. Corolla pink-purple, covered with sessile glandular hairs, 14–16 mm long, narrowed over 6 mm, with 3–4 mm long lobes of limb; apical appendages of anthers 2–2.25 mm long, short-acuminate, basal appendages 2–2.5 mm long, setaceous; filaments almost smooth; style covered with sessile glandular hairs from middle; stigma 1.5–2 mm long, bifid, with small papillae, with short erect basal bristles. Pappus very immature, persistent, snow-white, 6–7 mm long (excluding long bristles); bristles short-barbate, many-rowed, two or three inner bristles almost two times as long as others. Immature achenes brownish, obpyramidal, four-angled, tuberculate-rugose(?), glabrous or with sessile glandular hairs, with toothed corona above along edges and flattened pappophorus at tip. Flowering VII.

Ravines and gravelly river beds.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from the Kyzylsu River Valley in Kavuk area. Type in Leningrad.

140. **J. grumosa** Iljin in Sched. ad Herb. Fl. As. Med. XIV–XX (1928) 107.—Exs.: H.F.A.M. No. 491.

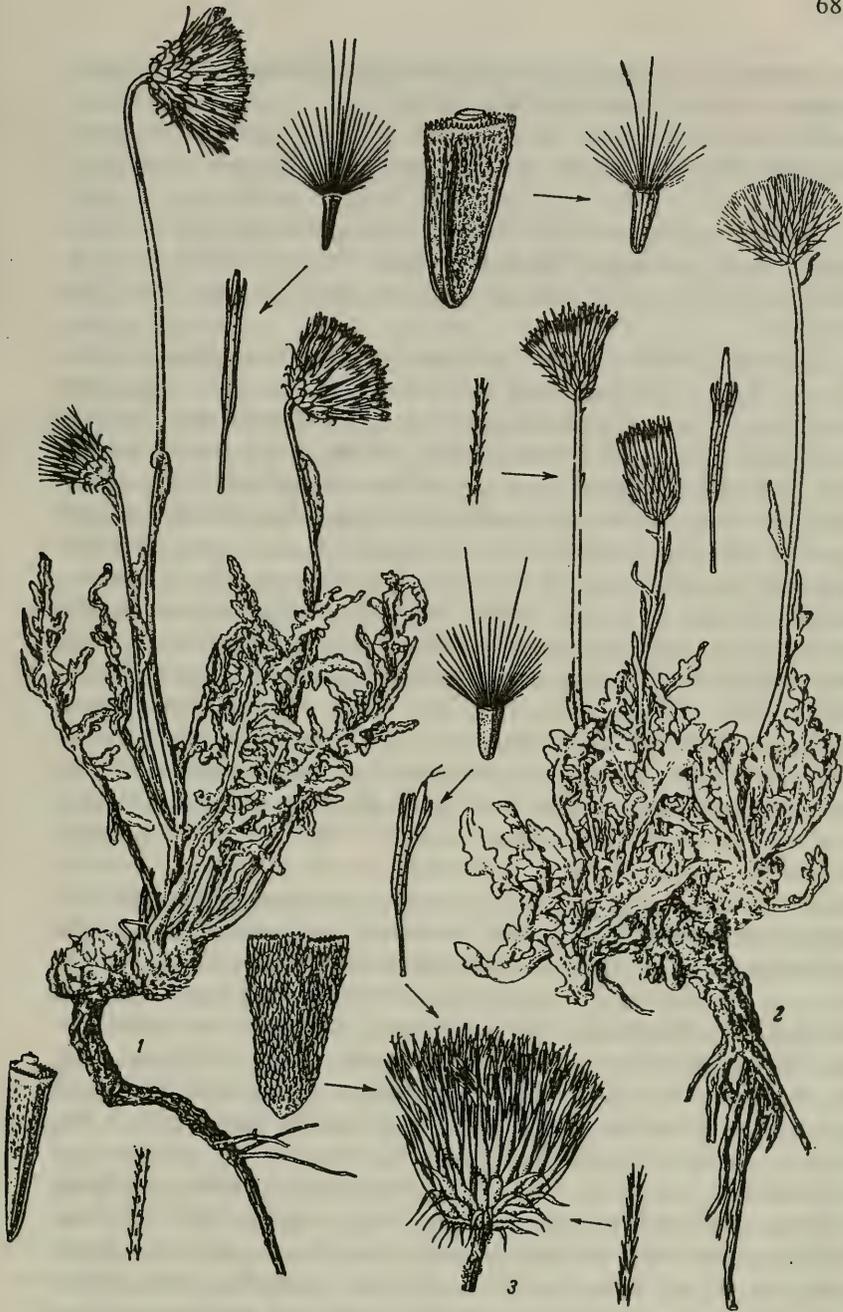
695 Perennial. Plants short, densely caespitose, stemless, tap root long, stems underground, arising from root in tuft and densely covered with long scaly remains of leaves. Leaves numerous, linear, acute or subacute, gradually narrowed toward base, only slightly broadened at attachment, usually remotely pinnatipartite, pinnatilobate or only toothed, less often almost entire in upper part, narrowly involute, grayish-green above due to sparse arachnoid-hairy pubescence, whitish-tomentose beneath.

Capitula sessile or less often on short arachnoid-hairy, up to 0.5 cm long, peduncle, solitary terminal on stem, forming dense mass on surface of pad. Involucre cupuliform, about 10–15 mm long, glabrous, arachnoid-hairy at base, only at isolated places, with green appressed bracts, narrow pale-membranous-fimbriate along margin, narrowly lanceolate, acuminate. Receptacle densely covered with short, up to 3 mm long, yellowish bristles. Corolla pale-purple, 12–13 mm long, narrowed over 5–6 mm, with 2.5–3 mm long limb; basal appendages of anthers setaceous, 2–3 mm long, undivided or almost undivided; filaments smooth. Pappus deciduous, up to 10 mm long, snow-white, short-barbate, barbules densely arranged, approximately as long as thickness of bristles; all bristles connate at base into ring, through which nectary passes. Achenes four-angled, narrow, 4–6 mm long, with small teeth above along edges, especially at corners, with scarcely visible scattered spinules and sessile glandular hairs in upper half, modified in lower half into distinct, nonuniform folds; pappophorus conical, with short nectary at tip. Flowering VII(?)–VIII; fruiting VIII–IX(?).

Pebbles, gravelly places.—*Soviet Central Asia*: Tien Shan. Endemic. Described from a place at the confluence of the Kyzylsu and the Ak-Sai rivers. Type in Leningrad.

141. **J. poacea** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 344, Fig. 1.

Perennial. Plants 30–50 cm high, many-stemmed, glabrous, green. Stems bearing fibrous roots, finely sulcate, simple or with few upward spreading branches in lower part. Leaves linear, usually 6–8 cm long and 3–5 mm wide, or still narrower, narrowed at base and usually very short and narrowly decurrent, short acuminate, undivided and entire, green and glabrous on both sides, with one whitish vein and scattered sessile glandular hairs above in deep alveolae; leaves obliquely directed upward, numerous, solitary in uppermost part of stem, small, petiolate. Corolla solitary terminal on stem. Involucre cupuliform, with weak arachnoid-hairy pubescence, 10–15 mm long, with many oblong, ovate, inner broadly lanceolate, short-acuminate bracts, usually three-veined, with narrowly membranous margin, often with uneven small teeth, appressed. Corolla pink (?), 10–12 mm long, narrowed over 4–5 mm, with 2.5–3 mm long lobes of limb; basal appendages of anthers setaceous, divided up to 2 mm. Pappus deciduous, 10–12 mm long, whitish, 696 somewhat yellowish at base, comprising many unequal, somewhat flat bristles, especially longest, with dense barbules, equal or shorter than flattened side, connate in a ring. Achenes 2.5–3 mm long, with distinct markings of discontinuous striations, almost continuous on edges, corona with unequal teeth, almost membranous, with gentle conical pappophorus



and nectary above passing through the ring. Flowering VII–VIII(?); fruiting VIII–IX. (Plate XL, Figs. 6, 7.)

Rocks, stony slopes.—*Soviet Central Asia*: Tien Shan. Endemic. Described from the vicinity of Lake Sary-Chilek. Type in Tashkent.

142. ***J. baldshuanica*** Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 283; O. and B. Fedtsch. Perech. Rast. Turk. IV, 302; Iljin in Tr. Turk. Nauchn. Obshch. 2, 25.—*J. hissarica* Iljin Ibid. 35.—**lc.**: Iljin, Ibid. Plate VIII.

Perennial. Plants extremely polymorphic, 25–100 cm high or taller; rhizome short, producing strong funiform adventitious roots. Stems few or solitary, simple or with isolated long branches originating in lower half, erect, cylindrical, distinctly ribbed-sulcate, finely arachnoid-hairy, with scabrous moniliform hairs below, floccose-arachnoid-hairy above, especially below capitulum, covered with scattered, fine, sessile, glandular hairs, leafless from middle. Basal and lower cauline leaves gradually narrowed into long, more or less winged petiole, undivided and entire, lyrate divided or lyrate toothed, with very large, terminal, usually acute lobe and small lateral teeth; middle cauline leaves sessile, narrowed toward base, long-decurrent with undivided or somewhat toothed wing, with distinct network of veins on both sides, scabrous above due to short, somewhat stiff, moniliform hairs, grayish beneath due to arachnoid-hairy pubescence, veins and petioles with large, many-celled, moniliform hairs. Capitula large, solitary, with many florets. Involucre cupuliform, four- or five-rowed; outer bracts somewhat thick, green, herbaceous, acuminate, lax (similar to *J. cyanoides*), usually somewhat floccose-arachnoid-hairy and, besides, covered with fine appressed bristles, recurved in immature fruits, other bracts appressed, gradually acuminate, with prominent veins, membranous-fimbriate, somewhat ciliate, covered on outer side with short appressed bristles and scattered sessile glandular hairs, purple. Receptacle densely squamose, scales smooth, acuminate. Corolla purple, covered with sessile glandular hairs, 17–20 mm long, narrowed over 6–8 mm, with 3–5 mm long lobes of limb; apical
698 appendages of anthers about 3 mm long, abruptly narrowed into fine cusp, uncately incurved; basal appendages caudate or membranous, divided, 2–2.5 mm long, filaments somewhat thick, glabrous or slightly scabrous; style glabrous; stigma about 3 mm long, divided up to base, finely papillate, with short erect bristles at base. Pappus deciduous, snow-white or slightly yellowish, 7–10 mm long (excluding three or four longer bristles), not strongly connate into ring, but shedding easily on maturity; bristles unequal, short-barbate, with barbules as long as or one and one-half times (less often two times) as long as thickness of bristles; bristles connate into ringlet, through which pierces nectary with

small membranous lobe and surrounded by broadly funnel-shaped structure. Achenes 6–7 mm long, oblong-obpyramidal, whitish, glabrous, toothed above along edges, with parallel approximate bands along longitudinal ridges below upper edge to one-third or half of achene length; pappophorus conical, inside corona, with nectary on tip of narrowed part. Flowering V–VII; fruiting VI–IX.

Alpine and subalpine zone, in belts of juniper, rose communities, tallgrass meadow and alpine steppes, less often reaching into the belt of woody vegetation, found at 1,800–3,500 m.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from the vicinity of the village of Kangurt. Type in Leningrad.

Note. An extremely polymorphic species, highly variable in growth and morphological characters, varying from the type described by Winkler as *J. baldshuanica* Winkl., to the type described by Iljin as *J. hissarica* Iljin. Based on the herbarium material, which is still inadequate, it is difficult to determine whether these are unique races (for example, *J. baldshuanica* subsp. *hissarica* Iljin) or forms associated with alpine tallgrass and subalpine steppes. In extreme cases, they sharply differ in their growth habit, although the individual morphological characters are found in very different combinations, which requires detailed study under natural conditions.

This description of the species is proposed taking into account all the forms studied that are available in the Herbarium of the Botanical Institute, Academy of Sciences of the USSR, and in the herbarium in Tashkent.

143. ***J. kirghisorum*** Janisch in Tr. Obshch. Estestv. Kaz. Univ. XLI (1905) 5, Plate 2, 2; Tr. Peterb. Bot. Sada, XXVIII, 4; O. and B. Fedtsch. Perech. Rast. Turk. IV, 298; Iljin in Tr. Turk. Nauchn. Obshch. 2, 17; Fl. Yugo-Vost. VI, 390.

Perennial. Semishrub, 10–25 cm high, densely covered with leaf scars, in basal woody part of branches, with numerous strongly branched reduced nonfloriferous branches; floriferous branches of current year, as also leaves, grayish due to fine arachnoid-hairy pubescence, simple, with one to three branches above, leafy up to half or two-thirds. Leaves spatulate, gradually narrowed toward base, entire or with sparse, often attenuate teeth, usually subacute; uppermost leaves almost linear, sessile. Capitula solitary. Involucre 11–13 mm long and 10–12 mm wide (at 699 fruiting up to 14 mm), ovoidly cupuliform, grayish due to arachnoid-hairy, roundish at base, comprising appressed weakly obtuse, imbricate bracts; outer bracts oval, middle oblong, and innermost lanceolately linear, acute, membranous-fimbriate. Receptacle covered with long bristles up to half or two-thirds as long as involucre. Corolla pink, about

15–16 mm long and narrowed over 6–7 mm, with 3.5–4 mm long lobes of limb. Pappus persistent, snow-white, 5–7 mm long, barbate, with barbules dense, almost as long as or slightly longer than thickness of bristles. Achenes 4–5 mm long, pale-yellowish, sharp tuberculate along edges and ribs; tubercles in longitudinal rows, terminating with incurved cusps; pappophorus flask-shaped, with small, cylindrical, five-toothed nectary at tip. Flowering V–VI; fruiting VII–VIII.

Chalk beds.—*European Part*: Lower Volga (eastern part); *Soviet Central Asia*: Aralo-Caspian Region. Endemic. Described from the chalky Akchattau Mountains north of Uilsk. Type in Leningrad.

144. **J. spissa** Iljin in *Izv. Glavn. Bot. Sada*, XXVII, 1 (1928) 80; *Fl. Turkm.* VII, 220.

Perennial. Semishrub, 5–25 cm high, with long woody root, caespitose, with numerous caudices bearing rosettes of leaves. Stems 1–16 cm long, arising singly from apex of each stolon, erect or often spreading, simple, longitudinally striate-sulcate, sparsely and weakly arachnoid hairy-pubescent, greenish-yellow or with purple tinge. Basal leaves very numerous, linear, 2.5–7.5 cm long, involute up to midrib, grayish due to arachnoid-hairy pubescence, gradually narrowed at base into flattened petiole and here woolly-tomentose; cauline leaves few, sessile. Capitula solitary terminal on stem, almost always declinate. Involucre poculiform, 15–25 mm long and 7.5–12 mm wide; involucre bracts relatively lax, almost appressed up to anthesis, usually with divergent apices at full bloom and fruiting, weakly arachnoid-hairy, entire upper part pink-purple, along border, also in inner bracts, lanceolate, long-toothed, especially innermost bracts (latter never divergent). Receptacle densely covered with yellowish, smooth, very short bristles, often connate at base forming corona around achene. Corolla pink-purple, 20–23 mm long, gradually narrowed over 7–10 mm, with 4–6 mm long limb, with scattered glandular hairs; anther appendages 3–4 mm long, thin, setaceous; filaments smooth. Pappus deciduous, snow-white, plumose-barbate, with barbules three to four times as long as thickness of bristles, not very dense; pappus bristles connate at base into short tube. Achenes up to 6 mm long and about 2 mm thick; oblong, four-
700 angled, with well developed, almost membranous, corona at apex; somewhat toothed along edges, separated from achene itself; edges of achene finely tuberculate-scabrous, with scattered glandular hairs, ribs with toothed, whitish scaly thickenings, with small conical pappophorus above, in center, enclosing nectary on long stalk. Flowering VI; fruiting VI–VII(?). (Plate L, Fig. 1.)

Gravelly, stony mountain slopes, rocks.—*Soviet Central Asia*: mountainous Turkmenia (Bolshie Balkans). Endemic. Described from the Bolshie Balkans from the Muger Spring. Type in Leningrad.

145. **J. czilikinoana** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 10 (1937) 246.

Perennial. Semishrub, 20–40 cm high, with relatively dense grayish compact remains of old leaves and woody lower branches, forming loose turf; vegetative shoots numerous, erect or ascending in lower part, simple, finely floccose-arachnoid-hairy, striately striped, densely leafy in lower part, leafless above. Leaves 2–5 cm long and about 1 mm wide, almost cylindrical, undivided, strongly involute, finely arachnoid-hairy, obliquely directed upward. Capitula solitary. Involucre cupuliform, about 15 mm long, roundish at base, floccose-arachnoid-hairy; involucre bracts appressed, linearly lanceolate or lanceolate (outer bracts) one-veined, gradually narrowed into fine cusp, herbaceous-green, later turning gray; inner bracts linear, narrowed into still thinner and longer, aristate, membranous, usually purple and somewhat divergent cusp (like other involucre bracts). Receptacle densely covered with short bristles about one-third as long as involucre. Pappus persistent, snow-white, 8–10 mm long, short-barbate, with dense barbules as long as thickness of bristles. Achenes 5.5–6 mm long, four-angled, obpyramidal, with thickened ribs, fimbriate above with toothed corona; coronal teeth continued in upper part of edges and located as parallel discontinuous ridges at extreme tip, connate at base and, later smooth; pappophorus somewhat large cupuliform at achene apex, with five-toothed nectary inside. Flowering V–VI(?); fruiting VI–VII(?).

Gravelly desert slopes of mountains.—*Soviet Central Asia*: Tien Shan (Karatau). Endemic. Described from the mountains of Greater Aktau. Type in Leningrad.

146. **J. fedtschenkoana** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 4–5 (1924) 7; Iljin in Tr. Turk. Nauchn. Obsch. 2, 17.

701 Perennial. Semishrub, up to 25 cm high, with short, woody stems, arising from turf, covered with scales of dead leaves, one-year-old branches usually simple, floccose-arachnoid-hairy. Leaves linearly-filiform, strongly involute, sessile; lower leaves somewhat broader at base, with remote, solitary, linear or toothed lobes along margin. Capitula solitary. Involucre 1–1.5 cm wide, weakly arachnoid-hairy; involucre bracts short-acuminate with scarcely visible very short and appressed bristles, ovate (outer) to oblong-lanceolate. Corolla 13–14 mm long, narrowed over 5 mm, with 4 mm long lobes of limb. Pappus deciduous, barbate or barbate-serrate, with dense barbules, almost as long as or slightly shorter than thickness of bristles. Achenes about 6 mm long, compressed-four-angled, longitudinally tuberculate, with appressed spinules above and along edges, connate below into longitudinal ridges, thickened along main ribs, with thick patellate pappophorus above,

enclosing cylindrical, milky-white, sinuate, nectary. Flowering V–VI; fruiting VI–VII. (Plate XLVI, Fig. 2.)

Chalk beds.—*Soviet Central Asia*: Aralo-Caspian Region. Described from chalky Akbut mountains south of Temir. Type in Leningrad.

SPECIES OF UNCLEAR POSITION

Section 10. *Derderia* (Jaub. and Spach) Boiss.

1. *J. pteroclada* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VIII, 10 (1940) 195.

Perennial. Plants 20–25 mm high, more or less many-stemmed, grayish-green, almost glabrous, or somewhat floccose. Stem virgate, simple or branched in lower part; branches long, like stem, winged, one-headed. Leaves oblong, undivided and entire, subobtuse and short-cuspidate, often scarcely sinuate above, one-veined, long and broadly decurrent, and almost appressed, borne right up to top. Capitula sessile. Involucre turbinate, 25–30 mm long, slightly narrowed at base, somewhat arachnoid; involucre bracts imbricate, linear, appressed, narrowed into straight awn, 3.5–7 mm long. Receptacle densely setose, with up to 2 mm long bristles. Corolla pink, densely glandular, 28–30 mm long, with 10–17 mm long tube and 4–5 mm long lobes of limb; basal appendages of anthers filiform. Pappus snow-white, up to 20 mm long, with almost plumose unequal bristles. Achenes immature, glabrous and smooth. Flowering VIII; fruiting IX(?).

Deserts in the region of varicolored adyrs.—*Soviet Central Asia*: Pamiro-Alai Region. Described and known only from the vicinity of the Kim Springs. Type in Dushanbe.

Section 11. *Stechmannia* Boiss.

2. *J. bracteata* Rgl. and Schm. in Tr. Peterb. Bot. Sada, VI, 1 (1880) 323; Trautv. *ibid.* VIII, 1, 510; O. and B. Fedtsch. *Perech. Rast. Turk.* IV, 299; Iljin in Tr. Turk. Nauchn. Obshch. II, 15.

702 Perennial. Semishrub, 7–12 cm high; caudices covered with remains of old leaves, some bearing rosettes of leaves, others modified into floriferous shoot. Stems erect or usually weakly ascending, covered up to tip with small, bracteal leaves, simple or often branched above, bearing one to three capitula. Leaves on vegetative shoots and basal leaves oblong-lanceolate, sinuate-toothed or sinuate-pinnatifid, gradually narrowed below, pointed like teeth, involute, scabrous and glutinous above. Involucre turbinate, about 15 mm long, many-rowed, glabrous;

involucral bracts appressed, outer significantly shorter, ovate, subobtuse, gradually elongated inward; inner bracts linear, acuminate; all bracts with distinct midrib. Receptacle densely covered with hairs, up to three-fourths as long as involucre. Pappus barbate; immature achenes smooth. Fruiting V.

Soviet Central Asia: Balkhash Region. Endemic. Described from the Ili River Valley near Karachoku. Type in Leningrad.

Note. Until now known only from the original specimen of A. Regel, which was quite fragmentary. Owing to the lack of achenes and pappus, it is difficult to assign it to a particular section.

3. *J. spiridonovii* Iljin, in Addenda XXVI, 724.

Perennial. Semishrub, 8–15 cm high, with many-headed caudex and short rhizomes covered with reddish brown scales and producing rosettes of leaves at soil surface. Stems simple. Basal leaves oblong-linear, gradually narrowed into petiole, somewhat broadened at base, undivided and entire, hard, with depressed midrib, rugose, and weakly arachnoid-hairy above, also with scattered sessile glandular hairs, whitish-tomentose beneath with prominent midrib, glandular under tomentum; cauline leaves absent. Capitula small. Involucre about 10 mm long, poculiform; involucral bracts appressed, almost glabrous; outer bracts ovate, middle oblong-oval, inner exceeding all others, membranous in upper part. Receptacle covered with long, thin, smooth scales almost as long as involucre. Corolla, pappus and achenes absent.

Soviet Central Asia: Aralo-Caspian Region. Endemic. Described from the Selektá River Valley, 1.5 km west of the Tas-Mola Tomb, on the basis of the collection of M.D. Spiridonov.

Section 15. *Chaetocarpa* (Korsh.) Iljin.

4. *J. mariae* Pavl. in Vestn. Akad. Nauk KazSSR, 3(60) (1950) 34.—*lc.*: Pavl. *Ibid*, Fig. 11.

Perennial. Plants 35–45 cm high, loosely turfey, producing numerous, long, woody caudices. Stems few, more or less ascending, cylindrical, finely sulcate-ribbed, sparsely floccose-arachnoid-hairy, with scabrous, short, acute spinules along ribs, weakly branched up to two-thirds height with long, more or less arcuate branches, almost leafless in upper one-third part. Leaves obovate-oblong, or uppermost and basal leaves oblanceolate, entire, short-cuspidate, frequently with unequal large teeth in lower part, with triangular acute teeth; basal and lowermost cauline leaves narrowed into short narrow-winged petiole; other cauline leaves sessile, decurrent; all leaves weakly scabrous up to tip due to stiff, somewhat acute, tubercles, green, without arachnoid-hairy pubescence,

weakly rugose and with sessile glandular hairs, somewhat grayish beneath due to sparse-arachnoid-hairy pubescence, with numerous sessile glandular hairs; uppermost leaves small, somewhat decurrent. Capitula solitary, with many florets, on long peduncle. Involucre cupuliform, 15–16 mm long and 8–10 mm wide, roundish at base or slightly depressed, slightly floccose-arachnoid-hairy in lower part or glabrous; bracts appressed with prominent veins; outer bracts herbaceous green; middle and inner bracts purple, membranous and ciliolate along margin, with scarcely visible, short, appressed bristles on outer surface; all bracts gradually acuminate. Receptacle densely squamose; scales smooth, acute, up to half as long as involucre. Corolla pink-purple, glabrous, 15–17 mm long, narrowed over 4–5 mm, with 4–5 mm long lobes of limb; apical appendages of anthers about 3 mm long, abruptly narrowed into thin cusp, basal appendages caudate, about 2–2.5 mm long; filaments slightly tuberculate; style glabrous; stigma about 3 mm long, divided almost up to base, very small papillate, with longer erect, short bristles at base, somewhat continued on style. Pappus snow-white, 12–13 mm long; bristles equal, short-barbate; barbules dense, as long as or shorter than thickness of bristles. Achenes immature, 4–5 mm long, obpyramidal, four-angled, smooth, with plicate, discontinuous, parallel longitudinal ridges, terminating in very short teeth, with toothed corona above along edges. Flowering VII–VIII.

Stony screes in subalpine region.—*Soviet Central Asia*: Tien Shan. Endemic. Described from southern Kazakhstan from Bostandyk in the upper part of Aksarsai.

Note. According to N.V. Pavlov, it is close to *J. capusii* Franch., but differs in having entire leaves, a glabrous involucre, and a shorter corolla (7–9 mm long).

5. ***J. monticola*** Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 11–12, (1924) 69; Tr. Turk. Nauchn. Obshch. II, 26.—*J. abramovii* O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 303 p. p.

Perennial. Plants 5–15 cm high, usually with ascending stems, one-year-old stems usually simple, arachnoid-hairy; leaves 1–2.5 cm long, spatulate or almost oblong, gradually narrowed toward base, narrowly involute, pinnatifid or less often pinnatilobate, with very few, 704 triangular-oblong, weakly obliquely directed upward lobes, grayish-green above, grayish-tomentose beneath; basal leaves numerous; uppermost leaves linear or filiform. Capitula solitary. Involucre about 15 mm wide; involucre bracts linear, acuminate, with scarcely visible teeth, purple, almost glabrous, appressed. Receptacle squamose; scales one-third as long as involucre, or longer, but reaching up to half its height. Corolla pinkish, 13–14 mm long, narrowed over 5–6 mm, with 3.5–4 mm long

lobes of limb. Pappus persistent, with barbules almost as long as or slightly shorter than thickness of bristles. Achenes with patellate, reddish-brown, toothed, pappogenus at apex, enclosing nectary.

Gravelly slopes.—*Soviet Central Asia*: Tien Shan (Karatau). Described from Mindzhelke in the northern part of Karatau Range. Type in Leningrad.

GENUS 1585. *Jurinelia* Jaub. and Spach.^{1, 2}

Jaub. and Spach, Ill. pl. or. II (1844–1845), tab. 183–185.

Capitula with many florets; receptacle alveolate; all florets bisexual; corolla actinomorphic, long-pedunculate; anthers glabrous with apical appendages gradually acuminate, basal appendages membranous, caudate-flexuous; filaments more or less densely covered with fine hairs at transition of tubular stipule into constriction; style glabrous; stigma bifid up to base, with tuft of bristles at base, remaining part densely covered with very short papillae. Pappus fragile, few-rowed, scabrous-barbate or scabrous, with all outer shorter hairs connate into ring and easily separated from achene, with tuberculate thickening inside (pappogenus) and nectary in center, latter roundish, five-toothed along the margin. Achenes oblong or oblong-oval, slightly obpyramidal, four-angled, without corona, with smooth margins, modified into a beak in middle, basal hilum, with longitudinal striations and usually with transverse depressions. Plants mostly stemless, perennial. Only four species have been reported so far.

Type species: *J. subacaulis* (Fisch. and Mey.) Iljin.

1. Plants stemless or with poorly developed stem 2.
 + Plants with 10–30 cm high stems
 3. **J. squarrosa** (Fisch. and Mey.) Iljin
 2. Leaves lyrate divided, with large ovate or roundish, usually entire lobes 1. **J. moschus** (Habl.) Bobr.
 705 + Leaves uni- or bipinnatisect, with terminal lobe equaling lateral lobes 2. **J. subacaulis** (Fisch. and Mey.) Iljin

1. **J. moschus** (Habl.) Bobr. in Bot. Zhurn. XLVII, 4 (1962) 580.—*Jurinella aucheri* Jaub. and Spach, Ill. pl. or. II (1844–1846) 183.—*Centaurea moschus* Habl. in Neue nord. Beiter. IV (1783) 54 and in S.G. Gmel. It. IV (1784) 61.—*Serratula depressa* Stev. in Mém. Soc.

¹Treatment by M.M. Iljin.

²Diminutive of generic name *Jurinea*.

Nat. Mosc. IV (1813) 101; MB. Fl. taur.-cauc. III, 548.—*Onopordon lyratum* Schulz Bip. in *Linnaea*, XIX (1847) 329.—*Jurinea depressa* C.A.M. Enum. cauc. (1831) 67; Boiss. Fl. or. III, 583; DC. Prodr. VI, 677; Ldb. Fl. Ross. II, 767; Grossh. Fl. Kavk. IV, 170; Sosn. in Zhurn. Russk. Bot. Obshch. 11, Nos. 1–2, 200.—*Jurinea depressa* var. *biebersteiniana* Trautv. in Tr. Peterb. Bot. Sada, VII, 2 (1880) 474.—*Jurinea moschus* (Habl.) Bobr. in Bot. Zhurn. XLIII, 11 (1958) 1545.—Ic.: Trans. Linn. Soc. XI, tab. 38; Tchichatcheff, As. Min. atl. bot. (1860) tab. 33.

Perennial. Plants stemless or with very short stem, less often up to 15 cm high (f. *caulescens* Sosn.). Stem simple, or sometimes branched; roots with musky smell. Leaves usually in basal rosette, lyrate, with large terminal lobe, broadly oval or oblong-ovate, usually cordate at base or less often roundish, entire, sometimes irregularly small toothed or boldly sinuate, and one to five (six) pairs of distinctly separate, much smaller, roundish or ovate, less often oblong, lateral lobes, usually narrowed at base, entire or more or less lobate, gradually narrowed into long, flat petiole amplexicaul on lower side; cauline leaves significantly reduced, and simple, pale greenish or yellowish-green, rugose above, weakly arachnoid-hairy, somewhat scabrous due to sparse and fine papillae, gray or whitish beneath due to arachnoid-hairy tomentum, with network of veins on both sides, depressed on upper surface and raised beneath. Capitula large, with many florets, usually in groups of few due to approximate branches bearing solitary heads. Involucre broadly cupuliform, 15–30 mm long, many-rowed, arachnoid-hairy, with herbaceous bracts; outer and middle bracts recurved, innermost row with herbaceous, membranous, soft, long-acuminate, straight bracts with scarcely visible appressed bristles and sessile glandular hairs. Receptacle alveolate, alveolae surrounded by acuminate smooth scales, several times shorter than involucre. Florets usually fragrant. Corolla pale, white, or pinkish, less often even yellowish, 22–30 mm long, narrowed at 10–18 mm, with 6–8 mm long lobes of limb, scatteredly covered by sessile glandular hairs; anthers usually violet; appendages 3–3.5 mm long, gradually acuminate upward, basal appendages 2.5–3 mm long, membranous-caudate and sinuate; filaments covered with very short hairs. Pappus less often white, slightly yellowish or dirty yellow, smoky, in few rows, easily separated from achene, usually 15–20 mm long; pappus bristles unequal, but barbate, with very sparse barbules, fragile, connate into ring. Achenes 5–6 mm long, light or dark gray, oblong or somewhat obpyramidal, more or less four angled, finely longitudinally and usually also transversely strongly and scabrously rugose, roundish at tip, modified into short, whitish, pappophorus. Flowering VI–VIII; fruiting VI–VIII.

Screes, rocks in ravines, clayey slopes in alpine and subalpine zones.—*Caucasus*: Ciscaucasia, Dagestan, western, eastern, and southern Transcaucasia. *General distribution*: Northwestern Iran, northwestern Turkey. Described from eastern Caucasus between the mountain streams Khodial and Kussarchai.

Type in London?

Note. An extremely variable species. Plants with fruits of three different kinds are found: 1) light gray, with fine, close, longitudinal, threadlike ridges and transverse, deep, oblong-oval depressions; usually these achenes do not exceed 5 mm in length; 2) longer, to 6 mm, darker and more narrowly oblong, with only fine longitudinal markings; and 3) intermediate forms. But are these different developmental stages? The question remains unanswered for want of enough material and the absence of studies in nature.

2. *J. subacaulis* (Fisch. and Mey.) Iljin comb. n.—*Jurinea subacaulis* Fisch. and Mey. in Ind. sem. H. Petropol. IV (1837) 39; Ldb. Fl. Ross. II, 767; Sosn. in Zhurn. Russk. Bot. Obshch. XI, 1–2, 200; Grossh. Fl. Kavk. IV, 170.—*J. rhizantha* DC. Prodr. VI (1837) 677.—*J. depressa* α. *pinnatisecta* Boiss. Fl. or. III (1875) 583.—*Jurinella chamaecynara* Jaub. and Spach, Ill. pl. or. II (1844–1846) 184.—*Ice.*: Jaub. and Spach Ibid tab. 184.

Perennial. Plants stemless or less often with 15 cm high stems (f. *caulescens* Boiss.), with single large capitulum up to 6–8 cm wide or with two to four aggregated capitula; rhizome virgate or less often few, merging into very short underground stem, covered with fibrous remains of old leaves. Leaves basal, numerous, petiolate, with somewhat flat, usually dirty purple petioles, broadened at base, lamina usually pinnatisect or bipinnatisect, with terminal lobe equal or almost equal to lateral lobes, or distinctly larger, but not roundish as in previous species (f. *lyrata* (Trautv.) Iljin = *J. lyrata* Trautv.); lateral lobes oblong or oval, usually subobtuse, sometimes acute, somewhat narrowed toward base, often more or less approximate, on narrow-winged rachis, with entire margin, toothed, lobate or divided, less often entire (f. *subintegra* Sosn.), glabrous, green, or weakly arachnoid hairy-pubescent, smooth, often slightly rugose, occasionally somewhat scabrous, and involute above, whitish beneath due to more dense tomentum; rosette flat or arcuately raised, and surrounding capitulum. Capitula with many florets. Involucre broadly cupuliform; outer bracts recurved, cuspidate and floccose-arachnoid-hairy and erect; inner bracts thin-membranous, gradually acuminate, more or less dirty-purple, with small teeth, often with scattered sessile glandular hairs. Receptacle alveolate, covered with short (about 5–7 mm long), smooth, acuminate scales, connate at base around alveoles. Corolla 20–

25 mm long, narrowed at 10–15 mm, with 5–8 mm long lobes of limb bearing scattered sessile glandular hairs; anthers usually violet; apical appendages attenuate, about 3 mm long, basal appendages 2–2.5 mm long, caudate, divided below; stigma divided up to base, acute, 2–2.25 mm long, with papillae; style glabrous. Pappus 12–20(25) mm long, fragile, snow-white, later turning yellow, somewhat serrate, with serrations shorter than thickness of bristles, less often almost as long; pappus bristles in few rows, somewhat unequal, all connate into ring, shedding easily. Achenes 4–6 mm long, almost obpyramidal, four-angled, blackish-brown or dark gray, strongly transversely rugose, glabrous, more or less truncate at apex, with roundish edges, terminating with dome-shaped, whitish pappophorus in center covered with scales. Flowering V(end)–VIII; fruiting VII–VIII.

Alpine and subalpine belts, on moraines, along screes, slopes of ravines, in alpine tapetum and subalpine meadows on clayey-gravelly and sandy-gravelly soils; on limestone debris reaches permanent snow line and to edges of glaciers, 2,000 to 3,500 m.—*Caucasus*: Ciscaucasia, western, eastern, and southern Transcaucasia. *General distribution*: Asia Minor, northwestern Iran. Described from Azerbaidzhan, from the peaks of Arekligeduk Mountain, as *Jurinea subacaulis*, in the same year, from the same place, and on the basis of the same specimen as *Jurinea rhizantha*. Type in Leningrad.

Note. An extremely polymorphic species, close to *Jurinella depressa* (Stev.) Iljin. It is possible that after detailed study in nature and under cultivation a series of separate races can be recognized. The Karabakh-Nakhichevan race, subsp. *rhizantha* (DC.) Iljin, with fine, usually bipinnatisect, arcuately bent leaves with acute lobes, is quite distinct, as well as race segregated by Trautvetter as a separate species: *Jurinea lyrata* Trautv., which in typical form, is widespread in Balkaria (for example, on the Shtulu Pass) and is described by him on the basis of Radde's collection from Neshkadag (*Ind. sem. H. Petropol.* (1865) 37).

3. ***J. squarrosa*** (Fisch. and Mey.) Iljin comb. n.—*Jurinea squarrosa* (Fisch. and Mey.). *Ind. sem. horti. Petropol.* XI (1845) 75; Grossh. Fl. Kavk. IV, 170; Sosn. in Zhurn. Russk. Bot. Obsch. 11, 22, 200.—*J. coelestis* Sosn. in Vestn. Tifl. Bot. Sada, 49 (1920) 34.

Perennial. Plants mostly (8)10–30 cm high; roots vertical, merging with a short rhizome densely covered with remains of old leaves. Stems solitary or few, simple, relatively thick, distinctly sulcate-striate, strongly arachnoid-hairy due to thin long hairs. Leaves in basal rosette many, petiolate, broader toward base, narrow-winged; lower cauline and middle leaves on shorter petioles, imparipinnatisect and pinnatisect into narrowly lanceolate segments with longer terminal and oblique lateral lobes, often

geminate at base and sometimes short, entire, green above, usually scabrous due to more or less short papillae, lustrous, densely white-tomentose beneath, involute almost up to midrib; uppermost leaves entire, linear, usually arachnoid-hairy. Capitula 2–5 cm wide, solitary terminal on stems, with many florets. Involucre broadly cupuliform, 20–25(30) mm long, with depressed base; outer bracts arachnoid-hairy, squarrose, hard, prickly, with prominent midrib, bracts green, purple at ends; innermost bracts erect, membranous, ciliate, mostly purple, with whitish or yellowish cusp, at fruiting all bracts recurved. Receptacle alveolate-pitted, strongly squamose; scales equal, smooth, acuminate, surrounding alveoles and usually connate at base, slightly shorter than half of involucre length. Corolla 17–23 mm long, narrowed over 8–12 mm, with 5–7 mm long lobes of limb; apical appendages of anthers more or less gradually acuminate, 3–3.5 mm long, basal appendages 2–3 mm long, divided below, often caudate; filaments finely tuberculate; stigmas 2–2.5 mm long, divided up to base, surrounded by tuft of short bristles, often gradually modified into small papillae on outer side; style glabrous. Pappus fragile, snow-white, serrate-barbate or somewhat serrate, with serrations shorter than thickness of bristles, comprising unequal bristles arranged in irregular rows, innermost bristles longest, all connate into ring, easily detached; ring inside pappus modified into broad area terminating with pentagonal base of corolla. Achenes glabrous, oblong-obpyramidal, four-angled, 4.5–5.5 mm long, dark gray, with dark transverse spots, finely striate; mature achenes strongly rugose transversely, without corona, terminating into whitish tuberculate pappophorus covered with scales. Flowering VI–VII; fruiting VII–VIII.

Subalpine zone, mostly on rocks and sandy slopes.—*Caucasus*: Southern Transcaucasia (Trialeti Range, Nor-Bayazet, Sevan, Alagoz). Endemic. Described from Alagoz. Type in Leningrad.

GENUS 1586. *Perplexia* Iljin^{1, 2}

Iljin in *Addenda XXVI*, 727.

Plants stemless; capitula sessile, more or less with few florets; receptacle comprising few, polygonal, small, glabrous areas, slightly convex, surrounded by very short, smooth, acuminate scales; all florets bisexual, corolla gradually narrowed toward base; apical appendages of anthers attenuate above, basal appendages setaceous-caudate, flexuous; pappus bristles connate at base into ring; pappus entirely shedding easily,

¹Treatment by M.M. Iljin.

²From the Latin word *perplexus*—unclear, confused, with double meaning.

some lower bristles above base abruptly deflexed and slightly entangled, half of inner bristles erect; achenes oblong, turbinate, glabrous and smooth, without corona, only with sparse, fine tubercles, surrounding pappophorus, even when mature.

Two species of this genus are known, the one in the USSR, and the other, *P. frigida* (Boiss.) Iljin, in Iran.

1. ***P. microcephala*** (Boiss.) Iljin in Addenda XXVI, 727.—*Jurinea microcephala* Boiss. Fl. or. III (1825) 584; Iljin in Tr. Turk. Nauchn. Obshch. III, 27.—**lc.**: Iljin *ibid.* X, Fig. 1; Fl. Turkm. VII, Plate XXXIV.

Perennial. Plants 2–8 cm high, stemless, forming relatively loose pads, with woody, short, numerous, caudices covered with remains of old leaves, terminating with rosette of short leaves, 5–10(15) mm long, linear, somewhat narrowed at base, entire, involute up to midrib, grayish due to arachnoid-hairy pubescence. Capitula sessile, solitary. Involucre cylindrical, 10–12(15) mm long; outer bracts sparsely arachnoid-hairy, tapering from oblong-ovate base toward apex and with curved tip, broadly membranous along margin; inner bracts lanceolate, glabrous, membranous, acuminate and usually weakly recurved at tip or even erect; all bracts without distinct veins. Receptacle squamose; scales few, smooth, several times shorter than involucre. Corolla pink, with sessile glandular hairs, 12–17 mm long, narrowed over 5–8 mm and with 4.5–5 mm long limb; anther appendages setose, longitudinally parted. Pappus snow-white, 10–12 mm long, comprising thin, lax, very finely serrate bristles. Achenes 4.5–6 mm long and 1.5–2 mm wide, oblong-turbinate, with scarcely visible ribs, glabrous and smooth, matte, gray. Flowering VII; fruiting VII–VIII(?).

Stony habitats in subalpine mountain zone.—*Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran. Described from Khorasan, between Nishapur and Mashhad. Type in Geneva.

GENUS 1587. **Pilostemon** Iljin^{1, 2}

Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 391.

Capitula cyathiform. Receptacle punctate-alveolate, with alveoli surrounded by short, smooth, acuminate scales, connate at base. All 710 florets tubular, bisexual; corolla glandular; anthers covered with long, thin, crisped, fragile, easily shedding hairs; filaments glabrous; style glabrous; stigma divided up to base into arcuate branches, scarcely

¹Treatment by M.M. Iljin.

²From Greek words *pilos*—hair; and *stemon*—stamen.

enlarged at tip, grooved above, with tuft of short bristles at base. Pappus snow-white, of numerous, many-rowed, almost equal plumose bristles; outer bristles shorter, adherent to achene, others weakly connate into ring, always without two to four prominent long bristles (as in *Jurinea*). Achenes weakly obpyramidal, oblong, three- or four-angled, densely covered with sessile and short-stalked glandular hairs; hilum basal. Plants herbaceous, perennial. A West Asian and Soviet Central Asian species.

Type species: *Pilostemon karategini* (Lipsky) Iljin.

1. Leaves oblong; corolla 10–13 mm long, narrowed over 3–5 mm, lobes of limb 1.25–2 mm long; achenes smooth 1. **P. karategini** (Lipsky) Iljin
 + Leaves filiform; corolla 16–20 mm long, narrowed over 7–8 mm, lobes of limb 3–4 mm long; achene longitudinally sulcate 2. **P. filifolia** (Winkl.) Iljin

1. **P. karategini** (Lipsky) Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 391.—*Jurinea karategini* O. Fedtsch. in O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 297; Iljin in Tr. Turk. Nauchn. Obshch. 2, 15.—*Saussurea karategini* Lipsky in Tr. Peterb. Bot. Sada, XXVI (1909) 323.—**lc.**: Iljin, op. cit. (1961) 392.

Perennial. Plants 25–80 cm high, more or less divaricately branched from base almost up to top, canescent due to flocculose arachnoid-hairy pubescence, less often almost green (f. *glabrescens* Iljin). Tap root long and fibrous. Stems several, finely sulcate-ribbed, cylindrical, with scattered sessile glandular hairs. Basal leaves, sometimes also lowermost cauline leaves oblong, up to 6–10 cm long and 10–15 mm wide, undivided and entire, usually with short cusp, grayish above, and with depressed veins, whitish beneath due to dense velutinous pubescence, withering before anthesis; cauline leaves linear, with prominent midrib beneath, grayish, narrowly revolute, cuspidate, reduced upward. Capitula numerous, solitary terminal on stem and branches. Involucre poculiform, 12–15 mm long, almost entirely covered with fine white tomentum; involucre bracts mostly five-rowed; outer bracts small, middle oblong, with prominent midrib and pair of less distinct veins on each side, yellowish-golden, often with violet-purple tinge, with short, brownish cusp; innermost bracts often only slightly arachnoid-hairy or almost glabrous, broadly membranous, lanceolate, tapering into longer spine, long ciliate. Receptacle alveolate, margins of alveoli covered with yellowish basally connate scales, several times shorter than involucre. Corolla pinkish-purple, 10–13 mm long, narrowed over 3–5 mm, with 1.25–2 mm long lobes of limb, usually with scattered glandular hairs, apical appendages of anthers 2.25–2.5 mm long, abruptly

narrowed above; basal appendages about 2 mm long, caudate, flexuous; anthers sparsely arachnoid hairy-pubescent; filaments glabrous; style glabrous; stigma 2.5–2.75 mm long, divided, with very short hairs at base, divided up to base in arcuately divergent branches with scarcely visible papilliform hairs. Pappus snow-white, 10–15 mm long, of almost equal bristles connate into ring, at base, less often reduced toward outside; outer pappus shorter row of bristles with sparse and shorter barbules, often adherent to achene; inner pappus of long, many-rowed, plumose bristles connate with not dense ring. Achenes four-angled, obpyramidal, 4–5 mm long, yellowish, pale, smooth, covered with scattered glandular hairs, with toothed corona above. Flowering V–VIII; fruiting VII–X.

Sandy-pebbled deposits in river valleys, stony river beds in mountain regions, wormwood—saltwort deserts, on stony soils.—*Soviet Central Asia*: Tien Shan, Syr-Darya, Pamiro-Alai Region. *General distribution*: Iran (Afghanistan), Dzhungaria-Kashgaria (Sinkiang). Described from Karategin, from the Surkhob River Valley. Type in Leningrad.

2. *P. filifolia* (Winkl.) Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 393.—*Jurinea filifolia* Winkl. in Tr. Peterb. Bot. Sada, XI, 1 (1890) 170; O. and B. Fedtsch. Perech. Rast. Turk. IV, 296; Iljin in Tr. Turk. Nauch. Obshch. 2, 15.—*Saussurea filifolia* Rgl. and Schm. in Tr. Peterb. Bot. Sada, VI, 1 (1890) 170.—*lc.*: Iljin op. cit. (1961).

Perennial. Plants 25–50 cm high, canescent due to dense arachnoid-hairy tomentum, less often grayish green. Stems numerous, divaricately branched from base, simple at tip, finely sulcate, with dense globules in axils of scaly leaves at base. Leaves sessile, linear, involute up to middle, entire, subobtusely, gradually reduced upward to distinct, bract-like, very small leaflets; lowermost leaves up to 10 cm long, somewhat flat, often with isolated and distant teeth, usually withering at anthesis. Capitula numerous, solitary terminal on branches, with few florets. Involucre poculiform, more or less densely covered with crisped arachnoid-hairy pubescence, five- or six-rowed; outermost bracts short, others lanceolate, with violet-purple tinge, with prominent midrib and one or two pairs of lateral veins, with scarcely visible appressed bristles under flocculose pubescence along margin, with small teeth, terminating into short, yellowish spine; innermost bracts cuspidate, with serrations along margin modified into hairs. Corolla 16–20 mm long, pink-purple, covered with sessile and short-stalked glandular hairs, gradually narrowed over 7–8 mm, with 3–4 mm long lobes of limb; apical appendages of anthers whitish-pinkish, about 2 mm long, abruptly attenuate above, basal appendages caudate, flexuous, 2–3 mm long; filaments glabrous, initially whitish, on maturation brownish-yellowish; style glabrous, with visibly

projecting bristles only below bifurcation; stigma 1.5–2 mm long, divided and divergent, somewhat enlarged at apex, with scarcely visible hairs outside, inner side ciliolate. Receptacle densely squamose; scales small, smooth, acuminate, several times shorter than involucre. Pappus snow-white, about 12–15 mm long, pappus bristles deciduous, plumose, central bristles almost equal, four prominent bristles absent as in *Jurinea*, outermost bristles short. Achenes oblong, about 5 mm long, four- or usually three-angled, whitish or olive green, longitudinally sulcate, covered with sessile or very short-stalked, glandular, hairs, especially above, toothed above, teeth translucent, more or less divided, with short pappophorus in center bearing nectary. Flowering VII–VIII; fruiting VIII–X.

Pebbles of rivers, dry gullies, gorges.—*Soviet Central Asia*: Tien Shan (central), Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria. Described from the Khorgos River Valley from the Dzharkent Mountains. Type in Leningrad.

GENUS 1588. *Nikitinia* Iljin^{1, 2}

Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 356.

All florets bisexual; corolla tube long, with five-partite limb; anthers dark brown, with membranous-setose basal appendages; filaments distinct, densely barbate; style and stigma prominent, stigma with short tuft of bristles at base, divided at apex, with erect or weakly divergent branches, enlarged at tip, obtuse, covered with scarcely visible papillae; receptacle almost cylindrical, convex, with pit, covered with long, smooth, glabrous scales; pappus of equal bristles; achenes with basal hilum; involucre poculiform with five- or six-rowed involucre bracts.

A monotypic genus from Soviet Central Asia.

1. *N. leptoclada* (Bornm. and Sint.) Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 356; Iljin in Fl. Turkm. VII, 235.—*Jurinea leptoclada* Bornm. and Sint. in Journ. Russ. Bot. (1911) 5; O. and B. Fedtsch. Perech. Rast. Turk. IV, 296; Iljin in Tr. Turk. Nauchn. Obshch. 2, 14.—*Exs.*: H.F.A.M. No. 493.—*lc.*: Iljin op. cit. pp. 357, 358.

713 Perennial. Plants 50–100 cm high, almost semishrubs, glabrous in all parts, somewhat woody, many-stemmed, strongly virgate, branched

¹Treatment by M.M. Iljin.

²Named after V.V. Nikitin, student of the Turkmenian flora.

from base. Stems numerous, smooth, not always sharply sulcate, densely branched in lower half, with few long branches above. Leaves numerous in lower and middle part, very dense, narrowly linear, sessile, short-cuspidate to whitish cartilaginous at apex, 20–40 mm long and 1.0–2.0 mm wide, entire, gradually reduced upward, so that capitula appear long-pedunculate; basal leaves withering before anthesis. Capitula solitary terminal on main stem and branches, numerous, narrow-poculiform. Involucre 18–25 mm long and about 5–6 mm wide in middle, glabrous; involucre bracts almost coriaceous, imbricate, glabrous; outermost bracts finely scaly, others oblong-ovate, yellowish-brown, gently convex, with three dark brown striations above, compactly appressed, subobtuse, very short cartilaginous-cuspidate; innermost bracts prominent, linearly-oblong, membranous, acuminate. Receptacle convex, covered with long, smooth, whitish, membranous scales with fine scattered barbules visible under high magnification, almost equalling involucre. Florets bisexual, corolla pink, 17–19(20) mm long, narrowed over 6–8 mm, with acuminate lobes of limb, 4–5 mm long, eglandular, connate along margin, and further along narrower part, borders continued into darker, thin, lines; staminal tube slightly longer than corolla with apical appendages of anthers white-pinkish, 2.5–3 mm long; anthers brownish, about 5 mm long, with basal appendages, colorless, membranous-caudate, discontinuous in lower half, 0.5–1.2 mm long; filaments distinctly papillate. Pappus 8–12 mm long, ferruginous; pappus bristles many, equal, serrate, connate into ring at base. Achenes at maturity 6–7 mm long, narrowly oblong, glabrous, smooth, with basal hilum and slightly narrowed here, with small apical corona. Flowering V–IX; fruiting VII–IX.

Stony, gravelly mountain slopes, rocks in the steppes and juniper zone.—*Soviet Central Asia*: Mountainous Turkmenia. *General distribution*: Iran. Described from the Iran border, from the vicinity of the village of Sulyuklyu (Saratovka). Type in Leningrad.

DIAGNOSES PLANTARUM NOVARUM IN TOMO XXVII
 FLORAE URSS COMMEMORATARUM
 (Identification of New Species Included in Vol. XXVII)

August, 1962

ECHINOPS L.

1. *E. kafirniganus* Bobr. n. sp. (sect. *Ritrodes* Bge.).

Radix palaris 3–5-cephala; caules in numero duae-tres, 60–80 cm alt. superne ramosi, non manifeste sulcati albo-arachnoidei, sub tomento glabri eglandulosi; folia inferiora 15–20 cm long., 6–8 cm lat. superne pinnatisecta lobis 3–4-paris suboppositis uno terminali, lobi superi 3–4 cm long., 2–3 cm lat. margine fissi spinoso-dentati remoti breviter descendentes; lobi inferi—1–2 cm long. late remoti; folia basi semi-amplexicaulia spinosa; folia superiora lanceolata profunde pinnatifida lobis spinosodentatis; folia supra albo cinereo-viridia eglandulosa arachnoidea, subtus propter tomento denso arachnoideo feré alba, eglandulosa. Calathidia duo-tria 3.5–4 cv diam., periclinium universale e setis membranaceis 6–8 mm long. reflexum, cauli adpressum; receptaculum pyriforme vel obovatum 4–6 mm long.; capitula sive calathidia partialia 14–15 mm long., penicilli setae plures planiusculae 8–9 mm long.; involucelli squamae 16–20 tenuissime scabridae pallidae, extimae—9–10 mm long. membranaceae subfiliformes apice cochleariformes dilatatae, fuscae, dentatae, utrinque 2–3 ciliis gerentes; squamae duarum serierum sequentium 12–14 mm long. carinatae, superne acuminatae margine ciliis adpressis, interne fuscae; squamae intimae inferne triente coalitae, interne atrofuscae vel nigricantes apice liberae acuminatae fimbriatae; tubus corollae superne minus glandulosus; achenium fusiforme dense pilosum, pilis flavidis appressis pappum superantibus.

Affinis est *E. albicauli* Kar. et Kir. sed notae singulares habet: folia inferiora pinnatisecta lobis 3–4-paris suboppositis; calathidia partialia 14–15 mm long., penicillus 8–9 mm long; tubus corollae superne minus glandulosus.

*Reproduced from the Russian Original—General Editor.

Habitat in pistaceis semidesertis.

Area geographica: Asia media, Tadzhikistania australis.

Typus: Kafirnigan, in decliviis inter fontes Ajchatyn et Czilczik 5 × 1931 leg. A. Butriakov, conservatur in Leningrad.

2. *E. tjanschanicus* Bobr. n. sp. (sect. *Ritrodes* Bge.).

Radix 2–3-cephala; caules in numero 1–3 basi petiolis vetustis vestiti usque ad apicem dense arachnoidei vel laxe albotomentosi, superne
715 ramulo uno vel duobus; folia coriacea superne incana vel incano-viridia laxe arachnoidea glandulis sessilibus minutis praedita, petiolis stipitati-glandulosis, subtus propter pubescentiam densam arachnoideam fere albotomentosa foliola inferiora petiolata lanceolata usque ad 20 cm long., 3–4 cm lat. in parte superiore profunda pinnatipartita lobis lanceolatis spinoso-dentatis rachide angusti sinuati, lobi foliorum in parte inferiore laminae deminuti fere aculeiformes; folia caulina sessilia amplexicaulia, basi spinosa, superiora lanceolata acute spinoso-dentata. Calathidia 3–4 cm diam. caesia; capitula seu calathidia partialia 14–15 mm long.; penicilli setae inaequales, 3–4 mm long.; involucri phylla (involucelli squamae) in numero 20–24 libera caesia scabra superne paulo reslinata; phylla extima setas duplo longiora lanceolata acuminata carinata ciliata ad intimas sensim elongata plus attenuata; phylla intima longior ciliata, medio cohaerentia atrofusca; corolla coerulescens profunde partita tubo glanduloso pilis brevibus non numerosis tecto; achenium pilis appressis dense tectum; pappi setae scabrae inaequales superne liberae. VII–VIII.

Affinitas. Ab *E. dasyantho* Rgl. et Schm. differt foliis superne laxe arachnoideis insuper glandulis minutis sessilibus tectis, petiolis glandulis stipitatis praeditis, tubo corollae pilis brevibus non numerosis tecto.

Habitat in steppis montanis et in Juniperetis.

Area geographica: Asia media, in jugis australibus Tjanschanicis.

Typus: in decliviis australibus jugi Kuramensis, in fissura Babijjab superior, junipereta, 2200 m s. m. 27 VII 1935 n^o 573, leg. Emme-Markovskaja, conservatur in Leningrad.

JURINEA CASS.

Sectio *Cyanoides* (Korsh.) Iljin.

3. Sec. *Cyanoides* (Korsh.) Iljin sect. nov.—*Jurinea* §2. *Longifoliae* DC. Prodr. VI (1837) 674 p. p., §3. *Decurrentes* DC. Ibid. 675 p. p. and §4. *Pinnatilobatae* DC. Ibid. 675 p. p.—Sect. *Platycephalae* Benth. and Hook. f. Gen. Pl. II, 1 (1873) 473 p. p.—*Jurinea* §3. *Pinnatae* Boiss.

Fl. or. III (1875) 572 p. p.; Hoffm. in Pflanzenfam. IV, 5 (1894) 321 p. p.—*Stirps J. cyanoides* Korsh. in Izv. Akad. Nauk, 1, 2 (1894) 8; Iljin in Izv. Bot. Sada Akad. Nauk SSSR, 30, 3–4 (1932) 348.—Group *Cyanoides* Klok. (non Iljin) in Bot. Zhurn. URSS, 8, 1 (1951) 47.—Sect. *Platycephalae* Benth. and Hook. subser. *Cyanoides* Sosn. in Zhurn. Russk. Bot. Obshch. 11 (1926) 196.

Pappus nunquam deciduus, setis serrulatis vel serrulato-barbellatis, basi in anulum non connatis. Achenium obpyramidatum, quadrangulum, ad basin attenuatum, glabrum, sublaeve vel paralleliter striatum, coronulam veram non formans, attamen supra margine denticulatum, pappogeno composito, setis pappi incumbentis, nectario quinquentato coronato instructum. Plantae semper herbaceae, perennes, caulibus foliatis, saepe alatis foliis diversiformiter pinnatipartitis, interdum integris, supra plus minusve viridibus, subtus canescenti-albotomentosis.

716 Sectio nova ad sectionem *Bellae* Iljin approximata est, attamen species omnes sectionis omnes sectionis *Bellae* statura humiliore, caulibus semper scapiosis, eramosis sat distant.

Typus sectionis: *Carduus cyanoides* α. *monoclonos* L.

Area geographica: Europa, Asia occid.

4. **J. schischkiniana** Iljin sp. nov.—*J. cyanoides* Schischk. (non DC.) in Krylov, Fl. Zap. Sib. XI (1949) 293 p. p.—*J. pollichii* Ldb. (non DC.) Fl. Ross. II (1844–1846) 764.—*Serratula cyanoides* Bge. (non DC.) in Ldb. Fl. alt. IV (1833) 42 p. p.—*J. albicaulis* × *J. cyanoides* Schischk. op. cit. 2933.

Perennis, 30–75 cm, caulibus erectis, pauciramosis vel simplicibus, foliis radicalibus et caulinis inferioribus petiolatis, reliquis caulinis sessilibus, supremis diminutis integris, omnibus non decurrentibus, pinnatisectis, segmentis oblongo-lanceolatis vel linearibus per rachidem decurrentibus et basi confluentibus. Capitula grandiuscula, 20–35 mm in diam. involucri 15–20 mm alt., manifeste arachnoideo, squamis omnibus depressis. Corolla roseo-purpurea, 14–21 mm lg. limbi laciniis 5–7 mm lg. Pappus e setis serrulato-barbellatis constans. Achenia 5–6 mm lg.

Area geographica: Sibiria altaica et Kazachstaniana altaica.

Typus: Dit. Barnaul. Inter pagum Solonovka ad ripam fl. Kamsala et Malyshevsky Log. in pinetis, 23 VI 1913, leg. V. Reverdatto. In Herb. Inst. Bot. Ac. Sc. URSS (Leningrad) conservatur.

5. **J. xerophytica** Iljin sp. nov.

Perennis, 20–60 cm alt., rhizomate verticali longo (in arenis) vel valde abbreviato, saepe ramoso, squamis brunneis obtecto, in axillis glomerulis gossypinis instructo; caules basi atque petioli foliorum

inferiorum dense albo-tomentosi, solitarii vel numerosi, reliquorum floccoso-arachnoidei vel fere glabri (f. *glabrescens* Iljin), tenuiter striato-sulcati, striis flavidis et purpureis, rarius fere ex toto purpurascens, sulcis viridulis, caules plus minusve flexuosi vel erecti, a basi vel supra basin, interdum in parte superiore ramosi; folia rigida, radicalia et caulina inferiora petiolata pinnatipartita vel pinnatisecta, media et superiora sessilia, segmentis oblongis vel linearibus acuminatis seu acutis, integerrimis, interdum lyratopartita vel raro segmentis basi lobatis vel dentatis, omnia vel inferiora tantum integra et integerrima, superiora diminuta, supra omnia virescentia, tenuiter arachnoidea vel glabra, rugulosa, asperiuscula, glandulis sessilibus instructa, margine anguste, interdum ad nervos primarios revoluta, subtus albo-tomentosa, sub tomento glandulosa; capitula mediocria vel parva, multiflora 15–25 mm diam., involucre 10–15 mm alt. plus minusve arachnoideo, phyllis ut in *J. cyanoide* dispositis, corolla roseo-purpurascens, pauciglandulosa (11–12) 16–20 mm alt., laciniis limbi (4) 5–6 mm lg.; pappus niveus (10) 12–15 mm alt. setis longioribus breviter barbellatis, barbellis plus-minus dense dispositis; achenia (4–5) 6 mm lg., ferruginea, opaca longitudinaliter striata, superne margine denticulata, apice pappophoro instructa.

717 *Area geographica*: Partes meridionales et orientales Kazachstaniae centralis.

Typus: In dit. Turgai, in valle sicca (log) Aksaj in systemate fl. Sarysu, 9 VI 1941, leg. M. Spiridonov. In Herb. Bot. Inst. Ac. Sc. URSS (Leningrad) conservatur.

6. *J. gorodkovii* Iljin sp. nov.

Perennis, 20–50 cm alt., caulibus solitariis vel paucis, tenuiter arachnoideis, simplicibus vel paulo ramosis, foliis oblongo-linearibus, acuminatis, integris, integerrimis, raro segmentis solitariis instructis, supra viridibus, subtus albo-tomentosis, radicalibus usque ad basin gradatim attenuatis, caulinis sessilibus, semiamplexicaulibus, anguste decurrentibus; capitula parva vel media raro 20 mm in diam., involucre 10–15 mm lg., tenuiter arachnoideo, phyllis omnibus vel solum exterioribus apice herbaceis, tenuiter linearibus, laxis vel solum basi appressis, internis erectis, acuminatis; corolla rosea vel roseo-purpurea, 13–15 mm lg., laciniis limbi 4–4.5 mm lg. Pappus niveus, setis serrulato-barbellatis; achenia 4.5–5 mm lg., oblonga, obpyramidata, margine denticulata.

Area geographica: Sibiria occid. (in ditione Tobol).

Typus: Sibiria occidentalis in ditione Jalutorovsk, pineta cladiosa in Padunskaja 18 VIII 1912, n^o 1850 leg. Sviticz. In Herb. Inst. Bot. Ac. Sc. URSS (Leningrad) conservatur.

7. **J. cretica** Iljin sp. nov.

Perennis, 15–30 cm alt.; caules erecti, rarissime decumbentes, floccoso arachnoidei, striati, ramosi, raro fere simplices; folia radicalia atque caulina inferiora petiolata petiolis albo-tomentosis, laminis simpliciter pinnatisectis, rarissime fere bipinnatisectis, segmentis anguste linearibus acuminatis vel acutis, remotis, margine manifeste, saepe ad nervos medianos impressos revolutis paucis, caulina media et superiora sessilia, alatum vel angustissime alatum decurrentia, supra rugulosa glandulis sessilibus inter rugas dispersis, vix exasperata subtus albotomentosa, sub tomentulo glandulosa, superiora et suprema integra et integerrima linearia et filiformia; capitula apice caulis et ramorum solitaria, mediocria, 20–30 mm in diam., multiflora, involucri ca. 12–15 mm alt., phyllis exterioribus et mediis arachnoideis, acuminatis, laxe et perplexae dispositis ut in *Jurinea* cyanoide intimis rectis in parte superiore purpurascensibus, paleaceis, acuminatis, margine ciliatulis, a tergo vix conspicue hirsutiusculis; corolla roseo-purpurea 16–18 mm alt., laciniis limbi 5–6 mm lg.; pappus niveus, setis breviter barbellatis, barbellis densissime dispositis; achenia immatura striata.

Typus: In vicinitate Chvalynsk (distr. Saratov), arenae cretarum "Pesczanaja Gora", prope "Sosnovaja Myza" 25 VI 1926 n° 1044 leg. K. Grosset. In Herb. Bot. Inst. Ac. Sc. URSS (Leningrad.) conservatur.

8. **J. altaica** Iljin sp. nov.

718 Planta 25–40 cm alt., caulibus fere a basi ramosis, floccoso-arachnoideis; folia radicalia et caulina inferiora in petiolum attenuata, pinnatisecta, segmentis oblongo-linearibus, acuminatis vel mucronatis, cauline reliqua sessilia, sat late et longe decurrentia, superiora integra et integerrima diminuta, supra canescenti-virescentia, tenuiter arachnoidea subtus albo-tomentosa; capitula mediocria inflorescentiam corymbosam racemosam formantia involucri arachnoideo, phyllis exterioribus reflexis canescentibus; corolla purpurascens 14–15 mm lg., laciniis limbi circiter 4 mm lg.; achenia supra marginem vix denticulata.

Area geographica: Sibiria altaica.

Typus: Sanatorium Aul (Krasnyi Aul), arenae ad marginem pineti. prope stationem viae ferreae Aul. 19 VIII 1932, leg. V. J. Veretschagin. In Herb. Inst. Bot. Ac. Sc. (Leningrad) conservatur.

9. **J. transuralensis** Iljin sp. nov.

Perennis, 15–70 cm alt., caulibus erectis, floccoso-arachnoideis vel albo tomentosis, interrupte alatis, ramosis, rarius simplicibus; folia radicalia numerosa, petiolata, pinnatisecta, segmentis linearibus acuminatis vel acutis, integerrimus margine anguste revolutis, rarissime integra (f. *integrifolia*), caulina sessilia basi dilatata, auriculata et

manifeste decurrentia atque pinnatisecta, apicem versus diminuentia integra, omnia supra viridia vel vix canescentia, glabra vel tenuiter arachnoidea, subtus albo-tomentosa; capitula parva vel mediocria, involucrio 10–15 mm alt., glabro vel arachnoideo, phyllis externis gradatim in aristas elongatas, glabras, coloratas saepissime virides abeuntibus horizontaliter arcuato-inclinatis, internis erectis, apice palaeaceo-acuminatis; corolla roseo-purpurascens, 12–15 mm alt., laciniis limbi 4–5 mm lg.; pappus niveus (10) 12–15 mm lg., setis serrulato-barbellatis; achenia vix striata, costulata, margine superiore denticulata, apice pappophoro composito instructa.

Area geographica: Kazachstania tursoralensis.

Typus: Dit. Aktjubinsk. In systemate fl. Uil, prope stationem Aschkinau (via ferrea Gurjev-Kandagacz), prope urbem Temir, steppa arenosa, stipeta agropyreta, 24 VI 1955, n^o 61, leg. V Grubov et N. Lubarsky. In Herb. Bot. Inst. Ac. Sc. URSS (Leningrad) conservatur.

10. *J. kazachstanica* Iljin sp. nov.

Perennis, 20–60 cm alt., rhizomate longo, squamis brunneis obtecto. caulibus erectis, raro simplicibus, plerumque supra medium ramosis, floccoso-arachnoideis, interrupte alatis; folia radicalia numerosa, atque caulina inferiora petiolata, pinnatisecta, segmentis linearibus, elongatis, acuminatis, integerrimis, remotis, laminis rarius integris (f. integrifolia), reliqua caulina sessilia, late vel anguste decurrentia, suprema diminuta integra, omnia supra viridia vel canescenti-virescentia, tenuiter arachnoidea, subtus albo tomentosa; capitula numerosa parvula, 10–12 mm in diam., multiflora, involucrio 10–15 mm alt., arachnoideo, floccoso, phyllis externis et mediis apice vix bamatis, internis erectis, apice paleaceis, corolla rosea vel roseo-purpurea (10) 12–16 mm alt., laciniis limbi 3–6 mm lg.; pappus niveus 10–12 mm alt., setis serrulato-barbellatis, dense dispositis; achenia 5–6 mm lg.

719 *Area geographica:* Kazachstania occid., arenae mobiles (Tajsugan, Kok-dzida, Barsuki et al.).

Typus: Dit. Uralsk, in reg. Gurjev. Arenae grumosae Tajsugan, n^o 297, 15 VI 1927, leg. M.M. Iljin et J.S. Grigorjev.

11. *J. pineticola* Iljin sp. nov.

J. pollichii Ldb. (non DC) Fl. Ross. II, 2 (1845–1846) 764 p. p.—*Serratula cyanoides* Bge. (non DC.) in Ldb. Fl. alt. IV (1833) 4 p. p.—*Jurinea polyclonos* Korsh. (non DC.) in Izv. Akad. Nauk 1, 2 (1894) 119; *J. cyanoides* × *polyclonos* Korsh. Ibid. 121 (specim. e Loktjensk, Irtysch and Semipalatinsk).—*J. albicaulis* Iljin (non Bge.) Obz. Turk. Vidov Roda *Jurinea* Cass. (1925) 20 p. p.—*J. albicaulis* × *cyanoides* Schischk, in Krylov, Fl. Zap. Sib. XI (1949) 2933.

Perennis, 15–35 cm alt., radice dura in rhizomata horizontalia vel verticalia squamis brunneis et reliquis foliorum vetustorum oblecta transeunte; caules albo-tomentosi, rarius floccoso-arachnoidei, erecti vel decumbentes, plerumque ramosi; folia radicalia numerosa, integra et integerrima, acuminata, usque ad basin sensim in petiolum brevem attenuata vel epetiolata, interdum nonnulla-pinnatipartita, vel pinnatisecta, lobis bijugis vel trijugis, caulina integra, sessilia non decurrentia vel vix decurrentia vel solum semiamplexicaula et auriculata, raro manifeste decurrentia, suprema diminuta, omnia supra viridia et virescentia, tenuiter arachnoidea, subtus albo-tomentosa; capitula parva, 10–12 mm in diam., solitaria vel apice caulis et ramorum bina-terna, involucri 10–12 mm alt. arachnoideo phyllis exterioribus appressis vel apice praecipue fructificatione horizontaliter retrofractis, internis erectis. acuminatis, in parte superiore paleaceis; corolla rosea vel roseo-purpurascens, interdum ochroleuca (10) 13–15 mm alt., laciniis limbi 3–5 mm lg.; pappus 10–12 mm lg., niveus barbellatus; achenia (4.5) 5–6 mm lg.

Area geographica: Kazachstania, pineta distr. Semipalatinsk.

Typus: Prope pagum Schulbinskaja, arenae mobiles, 7 VII 1930, n° 23; leg. U. Winter. In Herb. Bot. Inst. Ac. Sc. URSS (Leningrad) conservatur.

12. *J. tanaitica* Klok. sp. n.

Planta perennis rhizomate brevi et surculis sterilibus evolutis. Caules saepissime solitarii ca. 35–55 cm alti, inferne ob pubescentiam albidii, superne flocculoso-arachnoidei, apice ramosi. Folia radicalia petiolata ca. 10–25 cm longa, petiola lamina breviora, pinnatisecta, segmentis lateralibus utroque 3–5, subtus albitomentosa, supra laete viridia, glabriuscula et laevia; foliorum segmenta linearia oblongaque acutata, margine revoluta et manifeste crispula; segmentum terminale usque ad 10 cm longum et 7 mm latum, lateralibus ca. 2–6 cm longa et 2–5 mm lata; folia caulina inferiora radicalibus minora, usque ad 10 cm longa; media trifida segmentis angustis, superiora anguste linearia, diminuta; caulina exceptis inferis decurrentia, in caule alas usque ad 5–6 cm longas et 5–7 mm latam formantia. Calathidia numerosa (15–26) in pedunculis usque ad 6–7 cm longis, inflorescentiam paniculato-corymbosam formantia; calathidium floribuscum ca. 17 mm longum; involucri crateriforme ca. 10–11 mm longum, inferne ob pubescentiam tenuiter tomentoso-arachnoideam in phyllis externis cinereum, superne sordido-purpureum ob phylla interna colorata; involucri phylla oblongo-vel lineari-lanceolata, ca. 2–11 mm longa et 0.7–1.4 mm lata, acuminata, omnia adpressa; corollae flosculorum ca. 13–15 mm longae, roseo-purpureae. Achenia cuneata, 4–5 mm longa, ca. 2.5 mm lata, laete brunnea; pappus ca. 10 mm longus, setis longissimis 5, albidus.

Habitat in sabulosis tanaiticis.

Affinitas. Ab *J. amplexicauli* (S. G. Gmel.) Bobr. phyllis involucri adpressis, a *J. thyrsoflora* Klok. caulibus late alatis primo aspectu abhorret.

Typus: Ditio Kamenskiensis, prope pag. Oblivskaja, in sabulosis ad fl. Czir, 25 VIII 1928 fl., A. Gael. In Herbaria Instituti botanici Ac. Sci. RSS Ucr. Kiiviae conservatur.

13. Sectio **Bellae** Iljin sect. nov.—§5. *Subacaules* Boiss. (non Benth.) Fl. or. III (1875) 582 p. p.; praeter *J. frigidam* Boiss. and *J. microcephalam* Boiss.

Perennis, scaposa, non raro capitulis sessilibus, foliis rosulatis; setis pappi denticulatis vel barbellato-denticulatis in anulum non concretis; achenia parvula 2.5–3 (4–5) mm lg., glabra, ± laevia, plerumque longitudinaliter striata, supra margine denticulata, apice pappophoro composito instructa.

Plantae alpinae in Caucaso et Asia occidentali distributae.

Typus sectionis: *J. cadmea* Boiss.

14. **J. venusta** Iljin sp. nova.

Planta 25–30 cm alt., caulis scapiformis, solitarius, tenuiter striatus, vix laxe arachnoideus. Folia rosulata in petiolum sensim attenuata, pinnatisecta, segmentis oblongo-linearibus, obtusatis, interdum vix mucronatis, integerrimis 2–3 mm lat., basi dentibus vel lobis brevibus et obtusatis instructis, margine anguste revolutis, rachide aequilatis, oblique sursum vel rarius fere horizontaliter vergentibus, sinulis segmentis triplo-quadruplo latioribus, omnia utrinque pallide viridia, glabra, supra scabrida, nervis impressis, parce glandulosa, subtus dense glandulosa, nervo medio pallido, prominente. Capitula p. m. magna, circiter 30–35 mm diam., multiflora; involucri cupuliforme, 18–22 mm alt., basi vix arachnoideum vel glabrum, phyllis subaequilongis, laxe dispositis, flexuosis intenis ± erectis. Corolla rosea purpurascens, 12–13 mm lg. 5–6 mm lat., laciniis limbi 4–5 mm lg. Pappus circiter 10–12 mm alt., fumosus, setis scabrido-barbellatis. Achaenia circiter 5 mm lg., oblonga compresso obpyramidata, pallida, glabra, paralleliter striata, in parte superiore denticulato-marginata dentibus inaequalibus, apice pappophoro.

Area geographica: Caucasus septentrionali-occidentalis (in regione Krasnaja Poljana).

Haec species ad *Jurineam Iljinii* Grossh. valde accedit, attamen *J. Iljinii* Grossh. rosula foliorum medium vel supra medium scapi attingente, 721 foliis angustioribus, 5–15 mm lat., segmentis 3–10 mm lg., omnibus integerrimis ± acuminatis vel acutis, manifeste sursum vergentibus, phyllis involucri adpressis sat distat.

Typus: in parte superiore fluminis Malaja Laba. In pratis lapidosis, 18 VIII 1936, leg. L. Vassiljeva. In Herb. Inst. bot. Acad. Sc. URSS (Leningrad) conservatur.

15. Sectio **Integrae** Iljin sect. n.

Caules plus minus alati, folia integra integerrima nonnulla segregata rarissime teriata, decurrentia; achenia glabra laevia, saepe striata vel jugata laeviterque striata, sub coronula denticulata; pappus cum pappogeno caducus (*J. kokanica*, *J. rhizomatoidea* et *J. trifurcata* exclusae).

Plantae praecipue tjanschanicae; in flora nostra species 12 adsunt.

Typus sectionis: *J. Abolinii* Iljin.

16. Sectio **Suffrutices** Iljin sect. n.

Suffrutices foliis integris integerrimisque linearibus vel filiformibus; involucri phylla appressa, apice tantum interdumque reclinata; pappus crenatus vel crenato-barbullatus non caducus (*J. Sintenisii* exclusa); achenia glabra laevia saepe longitudinaliter striata vel plicata; pappogenum semper adest; pappophorum tantum *J. Sintenisii* habet.

Typus sectionis: *J. mugodsharica* Iljin.

Sectio **Penduliflorae** Iljin

17. Sectio **Penduliflorae** Iljin sect. n.

Flores marginales nutantes; corolla basin sensim angustata, rosea vel purpurea glandulis sparsis sessilibus praedita. Pappus non caducus (*J. Komarovii*, *J. elegantissima*, *J. Kamelinii* exclusae). Achenium magnum glabrum costis teretibus parallelis parum conspicuis praeditum. Pappophorum vulgo non evolutum, pappogenum calycinum, nectarium satis magnum, manubrio sat breve.

Sectio habet quindecim species in flora URSS.

Typus sectionis: *J. robusta* Schrenk.

18. **J. kamelinii** Iljin sp. n.

Planta 25–40 cm. alta; caules solitarii vel pauci canaliculati costis albescentibus glandulis sessilibus dense et pilis longiusculis flexuosis tectis, apice arachnoidei; folia in dimidio inferiore aggregata, radicalia ad basin angustata anguste-lanceolata, superiora linearia deminuta sessilia omnia integerrima acuminata utrinque viridia dense pilosa glandulis sessilibus plurimis tecta supra venula impressa, folia suprema auriculata. Calathidia solitaria multiflora 25–35 mm in diam.; involucrium 15–20 mm alt., involucri phylla appressa oblonga vel anguste lanceolata

722 acuminata dorso glandulis dispersis munita albo-marginata, phylla interna longe acuminata purpurascens dense glandulosa margine ciliata; corolla 24–27 mm long., rosea lobis 5–6 mm long.; pappus albus nectario quinquelobato; achenium maturum 7 mm long. glabrum longitudinaliter lineatum apice spinulosum, coronula inaequidentata pappophoro praedita.

Habitat in montibus Pamiroalaicis.

Affinitas. Haec species *J. Komarovii* valde affinis differt tamen pappo partim caduco, pubescentia pilosa nec papillosa.

Typus: Jugum Seravschanicum, in decursu medio fluminis Seravschan 18 VI 1960 n° 568 leg. R. Kamelin; typus in herbario Leninopolitano conservatur.

19. *J. elegantissima* Iljin sp. n.

Planta 50–60 cm alta usque a basi ramosa viridis parum arachnoidea glandulis numerosis sessilibus ramis tenuibus; folia linearia integerrima sessilia non decurrentia utroque latere unicolora reclinata. Calathida solitaria, involucrium 20–25 mm long., phyllariis appressis acuminatis glabris viridibus externis valde deminutis internis longe attenuatis; corolla roseola 25–27 mm long., lobis 6–7 mm long.; pappus caducus; achenium oblongum 9–10 mm long. costis elongatis apice denticulatum.

Habitat in gypsaceis pamiroalaicis.

Affinitas. Ab *J. robusta* Schrenk foliis linearibus integerrimis non decurrentibus differt.

Typus: Pamir-Alaj, fontes fluminis Jakkabag, in vicinitate pagi Taschkurgan, in gypsaceis 4 VII 1936 n° 624, leg. V. Botschantzev et A. Butkov; typus in herbario Leninopolitano conservatur.

20. *J. botschantzevii* Iljin sp. n.

Planta vulgo 25–40 cm alt., caulibus furcatis arachnoideo-tomentosis ad dimidium longitudinis ramosis foliosisque, ramis basi foliatis; folia pinnatipartita lobis elongatis obtusis caulinis decrescentibus utrinque arachnoideis glandulosisque, folia inferiora petiolata, superiora sessilia. Calathidia solitaria multiflora involucrium acetabuliforme 20–25 mm alt. pubescens glandulis dispersis praeditum, phylla interna elongata acuminata, media—lanceolata, interna—longe acuminata glandulosa et paulo setosa; flosculis roseis disperse glandulosis 22–30 mm long. lobis 5–7 mm long.; pappus non caducus, pappo setis barbellatis tenuissimis; achenium vix lutolum tetragonum obpyramidatum longitudinaliter striatum 6 mm long. apice dense dentatum; pappogenum quinquelobatum, nectarium magnum minute quinquedentatum.

Habitat in montibus Pamiroalaicis in declivibus cretaceis.

Affinitas. Ab *J. bucharica* Winkl. differt caulibus magis robustioribus foliis caulinis sessilibus.

Typus: Tadshikistania australis, montes Kojkitau in vicinitate pagi Ajvadzh, in decliviis schistosis 17 V 1960 n^o 46, leg. V. Botschantzev et T. Egorova; typus in herbario Leninopolitano conservatur.

21. **J. winkleri** Iljin sp. n.

Haec species e serie *Pinnatae* Iljin in primis ab *J. Botschantzevii* Iljin differt foliis non undulatis integris vel lyratis, ab *J. tadshikistanica* 723 Iljin differt pubescentia evanescente, laminis foliorum minus rugosis densius glandulosis, glandulis non impressis, venula minus impressa.

Habitat in promontoriis regionis Ferganensi.

Typus: Prov. Fergana distr. Margelan, prope pagum Assake, 4 V 1913, n^o 426, leg. N. Dessjatova; typus in herbario Leninopolitano conservatur.

22. **J. tadshikistanica** Iljin sp. n.

— A praecedente *J. Winkleri* Iljin differt pubescentia crispula regulari laminis foliorum alde et minute rugosis, glandulis dispersis profunde dispositis, venula distincte impressa, pappi setis raro breviterque barbellatis setulis semiappressis.

Habitat in promontoriis vallis Vachsch.

Typus: Tadshikistania, in valle fluminis Vachsch, in decliviis schistosis montis Buritau, 3 V 1937, n^o 519, leg. V. Nikitin; typus in herbario Leninopolitano conservatur.

23. Sectio **Insculptae**

Folia varie incisa decurrentia, pappus ex toto cum pappogeno et nectario deciduus (*J. asperifolia*, *J. serratuloides*, *J. hamulosa* et *J. litophila* exclusae); achenia glabra vel sub coronula denticulata apice nectario mitriformi.

Typus sectionis: *J. maxima* Winkl.

24. **J. zakirovii** Iljin sp. n.

Planta ad 50 cm alt., rhizomata squamis dense obtecta, in axillis superioribus globulis gossypino-villosis instructa. Caules pauci, erecti, ramis paucis elongatis, pro more solitariis, cylindrici, manifeste sulcato-costati, glandulis sessilibus parvulis et pilis crispatis brevioribus albidis obtekti, sub capitulo solum vix arachnoidei in dimidio et triente superiore aphylli. Folia radicalia 10–15 cm longa in petiolum basi dilatatum sensim transeuntia, oblonga, pinnatilobata vel pinnatidentata, lobis et dentibus oblique oppositis et sursum vergentibus, terminalibus manifeste elongatis, gradatim acuminatis, apice cartilagineo-mucronatis, margine anguste revolutis; caulina sessilia, decurrentia, integerrima vel rarius dentibus triangularibus solitariis et binis instructa, omnia utrinque concolora,

opaco-viridio, supra nervo medio impresso instructa, breviter crispule hirta, rugulosa et glandulis sessilibus minimis obsita, subtus nervo medio prominenti et nervis lateralibus conspicuis craspedodromis donata, pilis crispatis longioribus et glandulis sessilibus oblecta. Capitula apice caulis et ramorum singularia, multiflora; involucrium 15–20 mm alt., basi ad caulem impressum, flavido-viride, phyllis quadriseriatis externis et mediis oblongo-lanceolatis, in parte superiore acuminatis et vix arcuatis, nervis manifestis percursis, intimis in arista longa abeuntibus; omnibus margine ciliatis, extus glandulis sessilibus numerosis parvulis cum papillis minimis intermixtis obsitis; receptaculum paleis involucri triplo brevioribus. Corolla rosea, 16–18 mm alt. laciniis limbi 4–5 mm lg., dense glandulosa; filamenta antherarum vix tuberculata. Pappus deciduus, setis in anulum connatis, barbellatis. Achaenia obpyramidata, quadrangula, ca. 5 mm lg., glabra et laevia, longitudinaliter striata, coronula aequaliter dentata, cuius in parte interiore pappogenum conoideum apice nectario coronatum, in anulum pappi penetrans observatur.

Affinitas: Specis haec nova ad *J. helichrysofolia* M. Pop. appropinquat sed foliis decurrentibus, concoloribus differt.

Typus: Asia Media, Usbekistania, jugum Nuratau, in circumjectus Jangokly, prope Langar, 19–21 V 1941, leg. K. Zakirov. In Herb. Univers. Asiae Mediae (Taschkent) conservatur.

25. *J. helichrysofolia* M. Pop. in Tr. Uzbeksk. Univers., Nov. Ser. 27 (1941) 105 (nomen nudum).

Planta 20–40 cm alt., radice valde fibrosa in rhizomate verticali transeunte, apice polycephala; tenuiter tomentosa. Caules pauci, erecti simplices, flavescendo-virescentes, cylindrici, striati, pilis brevibus crispatis et glandulis sessilibus oblecti, non arachnoidei, sub capitulo solum vix arachnoidei. Folia radicalia in petiolum longum, basi dilatatum sensim transeuntia, oblongo-linearum, ad 10–20 cm lg., ca. 5 mm lt., margine vix revoluta, caulina sessilia, anguste decurrentia, usque ad medium caulis vel vix supra vel infra disposita, omnia linearum, integra et integerrima, cauli semiappressa, mucronata, mucrone cartilagineo, supra nervo medio impresso percursa, manifeste rugulosa, punctato-foveolata, propier papillas brevissimas asperula, vix floccose-arachnoidea, margine valde revoluta plerumque ad nervum medium, glandulis in foveolis assidentibus instructa, subtus magis arachnoidea, suprema diminuta, filiformia. Capitula apice caulis solitaria, multiflora; involucrium cupuliforme, ca. 20 mm alt., phyllis imbricatis appressis, externis oblongis, flavescens, apice obscure viridibus, breviter mucronatis, nervis vix conspicuis mediis lanceolatis longe acuminatis, in parte superiore sordide purpurascens, nervis prominentibus, intimis in arista gradatim elongatis, omnibus extus glandulis sessilibus instructis et vix araneosis, margine minime

ciliolatis. Corolla roseo-purpurea, glandulosa, plerumque 17–18 mm alt., laciniis limbi 4–5 mm lg. Pappus niveus, barbellatus. Achaenia immatura glabra longitudinaliter vix plicatula, coronula denticulata.

Affinitas: Haec species ad *J. Zakirovii* Iljin accedit, attamen foliis discoloribus, necnon phyllis externis involucri sat recedit.

Typus: Asia Media. Ad radices montium jugi Hissar in ditione Kschtut, in ripa fl. Negnot, leg. M.G. Popov. In Herb. Univers. Asiae Mediae (Taschkent) conservatur.

Sectio *Stechmannia* Boiss.

26. *J. spiridonovii* Iljin sp. n.

Species ut videtur e sectione *Stechmannia*; suffrutex 8–15 cm alt. caudice polycephalo rhizomate brevi; caules simplices; folia in fasciculos congesta, inferiora elongato-lineariter in petiolo angustata ima basi vix dilatata, integerrima rigida rugosa supra venula impressa, infra albotomentosa sub tomento glandulosa, folia caulina adsunt. Calathidia parva, involucrium ca 10 mm alt. acetabuliforme, phyllaria appressa subglabra, externa—ovata, media—elongato-ovata, interna—longiora apice membranacea; receptaculum paleis tenuibus longis laevibusque tectum; corolla pappi et achenia desunt.

Typus: Kasachastania in valle fluminis Selecta non procul a sepulcro Tasmola 7 VIII 1929, n^o 2280 leg. M. Spiridonov; planta in herbario Leninopolitano conservatur.

Sectio *Nanae* Iljin

27. Sectio *Nanae* Iljin sect. n.

Suffrutices montani humiles acaules vel caulibus nanis, foliis integris vel tenuiter fissis, praesertim rosulatis, pappus barbatus crenatusque, semper caducus, pappogenum pappophorumque semper evoluta; achenium glabrum saepe costis laevibus.

Typus sectionis: *J. Abramovii* Rgl. et Herd.

28. *J. bobrovii* Iljin sp. n.

Suffrutex ramulis prostratis apice dense foliatis; folia in fasciculos congesta; caules 15–25 cm alt. striati flocculoso-arachnoidei stricti inferne foliati, folia inferiora fasciculataque lanceolata vel elongata emarginata vel dentibus raris praedita, basi angustata apice acuminata; folia caulina angustata sessilia; omnia supra cinereo-viridia rugosa glandulis profunde sessilibus venula prominula. Calathidia solitaria, involucrium patelliforme

inferne arachnoideum, phyllaria externa acuminata apice arcuatim reflexa, media—minus reflexa, interna—erecta membranacea longe acuminata, omnia venula prominula, margine serrulata; corolla 14–15 mm long. lobis 4–5 mm long. glandulis dispersis; pappus caducus setis coalitis crenulatis pappogenum patelliforme lobulatum inferne subalbidum interne rubrum in centro pappophorum gerens, achenia 2–2.25 mm long. longitudinaliter lineata apice coronata e dentibus membranaceis aequalibusque.

Habitat in decliviis montosis Turcomaniae occidentalis.

Affinitas: Ab *J. Abramovii* Rgl. et Herd. foliis integris subintegerrimisque, ab *J. Knorringiana* Iljin foliis lanceolatis inferne albotomentosis, pappo setis crenulatis, achenio minore differt.

Typus: Montes Kopetdagh in declivi occidentali montis Chossardagh VII 1928 leg. E.G. Bobrov; planta in herbario Leninopolitano asservatur.

Sectio *Molles* Korsh.

29. *J. kasakorum* Iljin sp.nov.

726 Planta ad 50 cm alt. Caules pauci et verosimiliter singulares, erecti, simplices, vel breviter et paulo ramosi, longitudinaliter striati, virescentes vel sordide purpurascens, floccoso-arachnoidei, glandulis sessilibus parvulis instructi. Folia fere omnia in parte inferiore caulis contracta, radicalia numerosa brevipetiolata, caulina sessilia, loco insertionis dilatata, semiamplexicaulia et denticulato-decurrentia, omnia pinnatisecta, lobis linearibus, rarius oblongis, remotis, emarginato-dentatis, acuminatis, margine valde revolutis et semper crispatis, cum rachide folii anguste alato, partim denticulato confluentibus, superiora simpliciuscula et diminuta, omnia supra canescenti-arachnoidea, vix rugulosa, non asperula, glandulosa, subtus laxe albo-tomentosa, sub tomento glandulosa. Capitula apice caulis solitaria multiflora; involucrium late cupuliforme, basi impressum, ca. 20 mm alt., phyllis extimis et mediis appressis, triangulato-lanceolatis valde arachnoideis, glandulosis, apice breviter calloso-acuminatis e tomento vix emergentibus, intimis aristato-elongatis, non arachnoideis, extus glandulis sessilibus densis et setulis minimis appressis obtectis, margine breviter ciliatis; receptaculum paleis acuminatis laevibus involucrio duplo triplo brevioribus obtectum. Corolla rosea ca. 12–13 mm alt., laciniis limbi 4–5 mm lg. Pappus caducus niveus, 6–8 mm alt., setis breviter barbellatis, basi in anulum concretis, barbellis dense dispositis, anulo fundiculo paleaceo margine breviter inflexo aperto est, apice cum nectario centrale cum pappo adjecto. Achaenia ca. 3–3.5 mm lg. pallide flava, mox brunnescentia, per costam crassiusculo cartilagineam, transverse dense plicatam interdum interrupto

tuberculato foveola ornata, in lateribus 3–4 paralleliter et dense costulata, costulis interrupto-foveolatis et glandulis sessilibus minimis disperse obsita, apice margine dentato coronato, intra coronulam pappophoro calyptriformi instructa.

Affinitas: *J. cretaceae* Bge. proxima est, sed phyllis involucri externis et mediis appressis, corolla minore, achaeniis densius costatis et validioribus ex toto ornatis, dentibus coronulae erectis, paleaceis, mox cartilagineis sat bene distat.

Typus: Dit. Volgograd, pagus Klekaja. In creta 16 VII 1887, leg. D. Litvinov. *Typus* in Herb. Int. Bot. Ac. Sc. URSS (Leningrad) conservatur.

30. *J. michelsonii* Iljin sp. n.

Caulibus ca. 50–60 cm alt., erectis, striatis, molliter arachnoideis, glandulosis, striatis, a basi usque ad tertiam partem caulis longe ramosis; foliis radicalibus et infimis longe petiolatis, petiolis planis, alatis, usque ad basin gradatim dilatatis et semiamplexicaulibus, caulina media breviter petiolata vel sessilia, basi auriculata et decurrentia, omnia pinnatisecta, sectionibus linearibus, acuminatis, margine anguste recurvatis, remotis opposite vel vix oblique opposite dispositis, cum rachide alata confluentibus, supra rugulosa, viridia, glandulosa, subtus canescentia, laxe arachnoideo-tomentosa; folia suprema angustissima linearia, simplicia. Capitula majora ca. 3.5–4 cm in diam., involucre late cupulato 20–25 mm alt., phyllis extremis et mediis longe arcuatis, sensim acuminatis, arachnoideis, partibus arcuatis atrato-violaceo-purpureis, internis erectis acuminatis, apice longe aristatis, margine longe ciliatis et valde involutis, extus hirsutiusculis et glandulosis. Corollae purpurascens, glandulosae, 15–16 mm lg., laciniis 5–6 mm lg. Pappus breviter barbellatus. Achenia immatura.

Area geographica. Ucraina occidentalis.

Affinitas: species nova ad *J. mollissimam* Klok. et *J. calcaream* Klok. appropinquat, sed phyllis externis et mediis valde arcuatis recedit.

Typus: statio Maximovka—Bogdanovka, prope pag. Romanovka, 9 VI 1916, leg. A. Michelson. In Herb. Inst. Bot. Ac. Sc. (Leningrad) conservatur.

31. *J. demetrii* Iljin sp. n.

Perennis, 15–60 cm alt., flavescens-virescens, caulibus comparate tenuibus, striatis, a basi usque ad partem mediam longe ramosis, abunde glandulosis et laxe et tenuiter arachnoideis, folia radicalia et caulina infima breviter petiolata, petiolis alatis, semiamplexicaulibus, caulina media sessilia, basi auriculata et vix anguste et breviter decurrentia, pinnatisecta, segmentis linearibus, integerrimis acutis, margine revolutis supra viridia scabrella, rugulosa, subtus albotomentosa. Capitula mediocria, involucre

cupuliformi, 12–18(20) mm alt., basi leviter arachnoideo, phyllis externis apice breviter deorsum recurvatis, apicibus atro-viridibus vel atropurpurascensibus et mucronatis; internis erectis, sensim acuminatis, dense glandulosis. Corollae 13–18 mm alt., purpurascens, laciniis 5–6 mm lg.; pappus facile ex toto deciduus, albotomentosus, serrulato-barbellatus; achenia 2.5–3 mm lg., vix scrobiculata, tota et glandulis sessilibus, breviter pedicellatis structuram achenii occultantibus densissime oblecta.

Area geographica: Turcia ad finem USSR.

Affinitas: Haec species *J. anatolicae* Boiss. et speciebus affinis proxima est.

Typus: Distr. Kars, Olty, inter Bardu et Promezshutoczny, 26 VI 1911, leg. Demetrius Sosnovsky. In Herb. Inst. Bot. Ac. Sc. (Leningrad) conservatur.

32. *Pereplexia* Iljin gen. n.

Planta scaposa; capitula sessilia ± pauciflora; receptaculum polygonale, polygonis leviter convexis, nudis, inter ea paleis acuminatis laevibus brevissimis donatum; flosculi omnes hermaphroditi, corolla usque ad basin plus minusve gradatim attenuata, appendices superiores antherarum sursum attenuatae, inferiores setaceo-caudatae, flexiles, setae pappi basi in anulum concretae, omnes facile deciduae externae supra basin reflexae et perplexae, internae erectae; achenia oblonga, obconica, glabra, laevia, non coronulifera vel perfecte matura tuberculis minimis disjunctis pappophorum cingentibus instructa.

A genere *Jurinea* Cass. genus nostrum structura achenii et pappi distinctissimum est.

E genere hoc duae tantum species adhuc cognitae sunt.

33. *P. fragida* (Boiss.) Iljin comb. n.—*Jurinea frigida* Boiss. Diagn. I, 6 (1845) 112; Boiss. Fl. or. III (1875) 582.—*Jurinella absinthifolia* Jaub. and Spach. Ill. pl. or. II (1844–1846) 185.—*lc.*: Jaub. and Spach. tab. 185.—Iran septr.-occid, in alpinis (mons Demavend, mons Totschal).

34. *P. microcephala* (Boiss) Iljin comb. n.—*Jurinea microcephala* Boiss. Fl. or. III (1875) 584; Iljin in Tr. Turk. Nauchn. Obsch. 2 (1925) 27.

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